



Original Article

Sex Differences in Relationship between Stress Responses and Lifestyle in Japanese Workers



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ABSTRACT

Background: This study examined the relationships between stress responses and lifestyle, including sleeping and eating behaviors, in Japanese workers according to sex.

Methods: Questionnaires about stress responses and lifestyle were completed by 3,017 workers in a financial enterprise (41.5% men, 58.5% women). Data were collected in Japan in August 2011. Participants were classified into stress and nonstress groups. Relationships between stress responses and lifestyle were investigated using logistic regression analysis with stress response as a dependent variable.

Results: There were 254 (8.4%) participants in the stress group and 2,763 (91.6%) in the nonstress group. The results showed that sleeping for shorter periods [odds ratio (OR) = 2.97, 95% confidence interval (CI): 1.58–5.60] was associated with stress responses in women, whereas we found no relationship between stress responses and lifestyle among men. However, working overtime was associated with stress responses in men (OR = 2.71, 95% CI: 1.43–5.15). Eating at night was associated with stress responses in the univariate analysis (men: OR = 2.10, 95% CI: 1.16–3.80; women: OR = 1.61, 95% CI: 1.09–2.39).

Conclusion: This study showed that stress responses were related to lifestyle among women but not among men. Among women, stress responses were related to sleeping for shorter periods, whereas they were related to working long hours among men. In addition, stress responses were related to eating at night in the univariate analysis, although this relationship was not seen in the multivariate analysis, in either sex.

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1. Introduction

Stress leads to serious conditions such as cardiovascular disease, gastrointestinal disease, and depression, as well as to poor quality of life and increased mortality in many countries [1–4]. Japan is no exception, and stress is a critical problem for Japanese workers. According to a report released by the Ministry of Health, Labor, and Welfare (MHLW), ~60% of workers feel intense stress [5], work-related claims for mental disorders have increased sharply, and the annual number of work-related suicides has also increased in recent years [6]. The MHLW mandated a specific health checkup to identify people with stress in recognition of the importance of stress management to efforts to prevent the harmful effects of stress.

The process of stress involves a perception that an external stimulus, a stressor, is a threat; this leads to a stress response. In

other words, responses differ depending on whether a potential stressor is perceived as a threat, and each perception is affected by situational, psychological, and genetic factors. In addition, whether a stress response is produced depends on how one copes with the stimulus. Stress responses that occur frequently or continue for prolonged periods can lead to serious conditions [7].

It has been suggested that stress responses are associated with unhealthy lifestyles, and several studies have examined the relationship between stress responses and lifestyle. For example, smokers have higher stress levels than nonsmokers [8,9], and those who drink to excess report more stress compared with those who do not drink [9]. Moreover, those who report less physical activity are at a significantly greater risk for depression than are those who report more activity [10]. Studies have found a relationship between depression and sleeping disorders [11], in that those who

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reported insufficient sleep were more likely to develop depression than were those who reported sufficient sleep, regardless of time worked [12].

Sleeping is related to eating behaviors, as well as the stress responses. Specifically, eating breakfast and eating at night are related to sleeping. Some studies have shown that not eating breakfast and eating at night were associated with sleeping for short periods and sleep quality [13–16]. Relationships between higher stress levels and skipping breakfast and eating at night have also been observed [8,17–20]. However, these studies did not include sleeping habits. It is likely that skipping breakfast and eating at night have a negative effect on physical and psychological health, in addition to being related to obesity [15,18,21]. It is important to examine the relationship between stress and lifestyle, including sleeping habits and eating behavior.

In addition, working overtime is an important contributor to the stress and lifestyle of workers. Many studies have shown that working overtime is associated with mental health [22], including depression, and with physical health, including blood pressure [22], weight gain [22,23], and heart disease [24]. In addition, several previous studies have shown that working overtime is related to unhealthy lifestyles, such as short sleeping times, and unhealthy eating behaviors, such as finishing dinner shortly prior to bedtime, eating dinner late, and skipping meals. Therefore, it is important for research on the lifestyles of workers to consider the impact of working overtime. Thus, this study included this factor in its analyses.

This study examined the relationship between stress responses and lifestyles of Japanese workers, considering overtime work. Behaviors do not operate independently [25,26]; therefore, this study examined a comprehensive set of lifestyle-related behaviors (e.g., eating breakfast, eating at night, and sleeping habits). This study differentiated between men and women because stress responses have been reported to occur more frequently in women than in men [27], and because the relationships between stressors and lifestyle [28,29] and between stress responses and lifestyle [9] differ in men and women.

2. Materials and Methods

2.1. Study participants

A self-administered questionnaire was mailed to the homes of 4,462 workers at a financial enterprise in August 2011. The questionnaires included forms to apply for standard medicine-chest items, as well as self-addressed envelopes. Participants were asked to return the questionnaires and application forms to the health insurance union within 1 month. The applicant identification on the questionnaire was used by the health insurance society to identify the health insurance member, and the authors received only the questionnaires and identification. We explained the academic value of the results and the purpose of this study to the health insurance union, which then agreed to participate. This study was approved by the Ethics Review Committee of Ochanomizu University, Tokyo, Japan.

2.2. Content of the questionnaire

2.2.1. Demographic characteristics

The questionnaire asked about age, sex, living situation (“with family” or “alone”), marital status (“married” or “not married”), employment status (“management or higher”, “regular employee”, or “nonregular employee”), visiting a doctor regularly (“yes” or “no”), and taking medication (“yes” or “no”). Body mass index (BMI) was calculated from height and weight (kg/m^2).

Table 1

Demographic characteristics, job characteristics, and health status of participants*

Characteristic	Overall (<i>n</i> = 3,017)		Men (<i>n</i> = 1,251)		Women (<i>n</i> = 1,766)	
	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)
Demographic characteristics						
Age (y) (<i>n</i> = 2,899)						
20–29	634	(21.9)	191	(16.5)	443	(25.4)
30–39	864	(29.8)	317	(27.4)	547	(31.4)
40–49	920	(31.7)	354	(30.6)	566	(32.5)
≥50	481	(16.6)	296	(25.6)	185	(10.6)
Living situation (<i>n</i> = 2,997)						
With family	2,368	(79.0)	960	(77.2)	1,408	(80.3)
Alone	629	(21.0)	283	(22.8)	346	(19.7)
Marital status (<i>n</i> = 2,980)						
Married	1,587	(53.3)	949	(76.0)	638	(36.8)
Not married	1,393	(46.7)	299	(24.0)	1,094	(63.2)
Employment status (<i>n</i> = 2,983)						
Management and higher	551	(18.5)	537	(43.8)	0	(0.0)
Regular employee	1,791	(60.0)	580	(47.3)	1,211	(69.4)
Nonregular employee	641	(21.5)	108	(8.8)	533	(30.6)
Health status						
BMI (<i>n</i> = 2,596)						
<25	2,226	(85.7)	925	(77.7)	1,301	(92.5)
≥25	370	(14.3)	265	(22.3)	105	(7.5)
Visit a doctor regularly (<i>n</i> = 2,723)						
No	1,760	(64.6)	716	(64.5)	1,044	(64.7)
Yes	963	(35.4)	394	(35.5)	569	(35.3)
Take medication (<i>n</i> = 2,735)						
No	2,114	(77.3)	818	(73.4)	1,296	(80.0)
Yes	621	(22.7)	297	(26.6)	324	(20.0)

* Missing values were excluded for each item.

2.2.2. Lifestyle

The lifestyle questionnaire, which was based on the 2007 National Health and Nutrition Survey in Japan [30] and discussions with several professionals, asked about breakfast, eating 2 hours prior to bedtime, smoking, frequency of alcohol consumption, amount of alcohol consumed, sleeping habits, and physical activity. According to a report released by the Japan Labor, Health, and Welfare Organization, the average worker's bedtime is after 11:30 PM. [31]. This study defined eating at night as eating 2 hours prior to bedtime. The question about eating 2 hours prior to bedtime could be answered using “very rarely”, “2–3 times/week”, and “over 4 times/week”. Regarding eating breakfast, “skip” indicated missing this meal at least once per week, and “eat every day” referred to eating breakfast every day. Responses to the question about smoking were selected from “never smoked”, “ex-smoker”, or “smoker”. Frequency of alcohol consumption was scored as “very rarely”, “1–3 times/month”, “1–2 times/week”, “3–4 times/week”, or “almost every day”. Responses to the question about alcohol consumption were selected from “under 20 g/day”, “20–40 g/day”, “40–60 g/day”, or “over 60 g/day”. This division was based on the recommendation of MHLW, which

Table 2

Numbers in stress and nonstress groups

Group	Overall		Men		Women	
	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)
Stress group	254	(8.4)	85	(6.8)	169	(9.6)
Fatigue only	47	(18.5)	13	(15.3)	34	(20.1)
Anxiety only	12	(4.7)	3	(3.5)	9	(5.3)
Depression only	102	(40.2)	30	(35.3)	72	(42.6)
Fatigue and anxiety	0	(0)	0	(0)	0	(0)
Fatigue and depression	29	(11.4)	11	(12.9)	18	(10.7)
Anxiety and depression	30	(11.8)	13	(15.3)	17	(10.1)
Fatigue and anxiety and depression	34	(13.4)	15	(17.6)	19	(11.2)
Nonstress group	2,763	(91.6)	1,166	(93.2)	1,597	(90.4)
Total	3,017	(100.0)	1,251	(100.0)	1,766	(100.0)

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