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Employment Type, Workplace Interpersonal Conflict, and Insomnia: A Cross-sectional Study of 37,646 Employees in Japan

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Abstract

This study explored whether workplace interpersonal conflict (WIC) is associated with insomnia, and whether the relationship between WIC and insomnia differs across different employment groups. A total of 37,646 Japanese full-time employees participated in a cross-sectional survey. Employment types included permanent employment and 2 forms of temporary employment: direct-hire and temporary work agent (TWA). Insomnia symptoms, including difficulty initiating sleep, difficulty maintaining sleep, and early morning awakening were measured. Insomnia was defined as having experienced 1 or more of these symptoms on 3 nights per week over the past 12 months. Results showed that WIC was significantly associated with an increased risk of insomnia (odds ratio OR = 1.63; 95% confidence interval CI = 1.55–1.71), controlling for confounders. However, the relationship between WIC and the risk of insomnia was significantly stronger for TWAs than for permanent employees (OR = 1.97; 95% CI = 1.13–3.45). A frequent exposure to WIC may increase the risk of insomnia, particularly for TWAs.

Keywords

employment status; epidemiology; insomnia; Japan; sleep; workplace interpersonal conflict

Insomnia refers to a condition in which a person experiences difficulties initiating sleep (DIS), difficulties maintaining sleep (DMS), early morning awakening (EMA), and/or nonrestorative sleep (NRS) despite having ample opportunities to rest.¹ In sleep literature, a common quantitative criterion for assessing insomnia is the presence of 1 or more of these symptoms, occurring a minimum of 3 nights per week for over a month.¹⁻³ Based on this criterion, 16% to 21% of adults are estimated to suffer from insomnia.⁴ Past epidemiological studies have shown that insomnia takes a substantial toll on a person's quality of life. For example, insomnia impairs a person's physical activities, social functioning, and daily energy, and may also increase bodily pain.^{5,6} Several studies have also addressed economic costs of insomnia. Walsh and Engelhardt⁷ estimated the direct cost of insomnia, such as medical fees incurred by patients and insurance companies, to be \$13.93 billion in the United States. Another study estimated that insomnia costs firms as much as \$91.7 billion dollars annually due to increased absenteeism and turnover, and decreased productivity.⁸ Thus, insomnia is not just a personal health concern but also an issue that affects society.

Over the past decades, much effort has been directed toward identifying risk factors of insomnia. That is, who is at a greater risk of developing insomnia? In terms of demographics, studies typically find that insomnia symptoms are more frequently reported by women than by men, and by older adults (ie, 45 years of age) than by their younger counterparts.^{6,9} Stressful life events, such as the death of one's spouse, have also been shown to increase the risk of insomnia.⁶ Insomnia is also prevalent among individuals with health problems, including heart disease, ulcer, diabetes, and depression.¹⁰⁻¹² In terms of physical problems, chronic pain such as arthritis and back pain has been identified as a major risk factor.⁵

In recent years, there has been growing interest in psychosocial job stressors as potential risk factors of insomnia. For example, a 1-year prospective study found that high levels of job demands increased the risk of insomnia among individuals who did not report any symptoms of insomnia at the onset of the study.¹³ Several cross-sectional studies have also found that high levels of job demands and low levels of job control were associated with poorer quality of sleep.^{14,15} Further, in a longitudinal quasi-experimental study, the average frequency of insomnia symptoms was shown to be significantly higher among nurses whose pay was cut by 10% compared with nurses whose pay remained unchanged.¹⁶

Another psychosocial job stressor that has been studied intensively by occupational health researchers is workplace interpersonal conflict. Workplace interpersonal conflict refers to negatively charged interactions with others at the workplace, such as engaging in arguments with a colleague or being treated in a nasty manner by one's superior.¹⁷ Workplace interpersonal conflict is often reported as one of the most stressful aspects of the job by employees, and it has been linked to a number of undesirable health outcomes, including burnout, depression, and somatic symptoms.¹⁸⁻²⁰ A longitudinal study also showed that workplace interpersonal conflict is a risk factor of prolonged fatigue and poor general health at the 1-year follow-up period.²¹ Moreover, workplace interpersonal conflict has been shown to be related to an increased use of tranquilizers among Finnish male workers: tranquilizers are a type of sedative drug that are commonly prescribed to patients suffering from insomnia.²² More specific to workplace interpersonal conflict in Japan, approximately

10% of 13,609 organizations surveyed admitted that at least one of their employees had requested a long-term sick leave and/or voluntarily left the organizations within the past 5 years due to severe psychological distress.²³ The same study also surveyed over 17,000 employees from these organization and found that interpersonal conflict was the predominant reason (38%) for their psychological distress.

Whereas workplace interpersonal conflict has been shown to be a psychosocial job stressor that relates to a variety of health outcomes, the topic remains relatively neglected in sleep literature. One of the few exceptions is a study by Nakata et al.,²⁴ which found that among 17 job stressors considered, interpersonal conflict was the strongest stressor related to insomnia. Nonetheless, this study was limited in that the participants consisted only of male white-collar workers. As such, the first objective of the current study was to partially replicate the earlier study by investigating the relationship between workplace interpersonal conflict and insomnia while including both male and female participants, and employees representing both white-collar and blue-collar workers.

Another work-related topic that has generated a great deal of attention among occupational researchers is growth in temporary employment. Specifically, the number of temporary employees has increased in many industrialized countries as a result of growing domestic and global competition among firms. For example, temporary employees in Japan constituted 10% of the total workforce in 1990, but the number had increased to 14% by 2010.²⁵ A somewhat similar trend has been observed in the Netherlands, the United Kingdom, and the United States.²⁴ Past studies indicate that occupational risk factors and their negative impacts on health are not equally distributed across types of employment. For example, a meta-analysis found higher psychological morbidities, including depression, exhaustion, and poor overall health, among temporary employees than among permanent employees.²⁶ In addition, temporary employees may have a higher risk of occupational injury than permanent employees when they are exposed to high levels of job demands and low levels of job control.²⁷

In regard to experiences of insomnia, the question of whether temporary employees are more adversely affected by workplace interpersonal conflict than permanent employees has not been addressed in the past. Nonetheless, job security is a common concern among temporary employees.²⁸ Thus, these employees are often motivated to perform well and to demonstrate their ability to work with others, as this may increase their chances of attaining a new contract or even promotion to a permanent status in the organization.²⁹ However, when temporary employees frequently experience interpersonal conflict, they may perceive that they are not performing up to the acceptable standard or that they are seen as unfit for the job by the supervisor, the colleagues, or both. More importantly, such incidents may negatively impact a person's sense of job security (eg, worries about losing the job or nonrenewal of the contract), which has been known to increase the risk of insomnia.³⁰ In contrast, the job of a permanent employee is fairly secure and low-intensity interpersonal disruptions such as arguments and yelling do not necessarily result in firing of these employees.³¹ Thus, given that job-related consequences of interpersonal conflicts are likely to be greater for temporary employees, it is possible that such conflicts are perceived as more threatening by temporary employees than by permanent employees. Consequently,

workplace interpersonal conflict might be more strongly related to sleep difficulties for temporary employees compared with permanent employees.

To summarize, the first objective of the current study is to investigate the relationship between workplace interpersonal conflict and insomnia. The second objective is to investigate whether the relationship between workplace interpersonal conflict and insomnia differ across different employment types, which has not been systematically investigated to date.

METHODS

Participants

Data for the current study were drawn from the Mental Health and Life Style Inventory conducted in Tokyo, Japan (April 2008 to December 2010). The survey sampled from 62 organizations representing a variety of job sectors (see Table 1). Based on the organizations' records, all of the 62,408 employees were identified. These employees were given a survey packet composed of questions concerning demographics, life style, job, and health. A total of 53,767 employees agreed to participate and returned the survey, yielding a response rate of 86.2%. For the current study, we discarded data from 7,100 individuals who were not full-time employees or who skipped the employment type question. Although part-time employment is considered a type of temporary employment, these employees were excluded in order to promote the comparability between permanent and temporary employees (eg, work hours), as well as to avoid the problematic overlapping of part-time and permanent employment (ie, the multiple-job problem).^{26,32} In addition, because a disproportionately large number of managerial and executive employees were permanent employees (94.8%), and there is evidence to suggest that one's organizational status influences the degree of psychological distress in response to interpersonal stressors, we decided to excluded data from managers and executives ($n = 9,021$).^{33,34} On average, the executives and managerial employee were 10.1 years older, and reported lower degrees workplace interpersonal conflict ($M = 2.07$) than the nonmanagerial employees ($M = 2.12$). The executives and managerial employees also had a lower prevalence of insomnia (13.2%) than the nonmanagerial employees (16.1%). Altogether, we retained 37,646 cases of data from full-time nonmanagerial employees for the current analyses. Missing cases (see Table 1) were listwise-deleted in all of the analyses. The study was approved by the Ethical Committee of the Ibaraki Prefectural University of Health Sciences. Participants were informed of the anonymous and voluntary nature of the study, and a written consent was obtained from each participant.

Measures

Employment Category—Employment categories included permanent employment and 2 forms of temporary employment: direct-hire and temporary work agent. The definitions of and differences between these 2 types of employment have been discussed extensively elsewhere.^{32,35} Briefly, direct-hire employment is a temporary job wherein a person directly negotiates the pay and some benefits with the employer. Direct-hires may renew their contract with the employer provided that their job performance is adequate and that the

organization has need of their services. In contrast, temporary work agents (TWAs) are individuals involved in a tripartite employment relationship between the employee, the employer, and a temporary staffing agency. Similar to direct-hires, TWAs may renew their contract, but the staffing agency typically negotiates the terms of the employment with the employer on behalf of its workers. In the context of Japan, TWAs and direct-hires are also different in that the former typically receive a lower salary and shorter contract term.³⁶

We distinguished between direct-hires and TWAs because the aforementioned meta-analytical study found that the magnitude of the relationship between the employment type and psychological morbidities differs substantially across studies.²⁶ Such heterogeneity across studies, according to these authors, may be attributed to different forms of temporary employment. That is, even though temporary employment is used as a general term for all jobs that are nonpermanent, factors that affect employees' well-being, such as work arrangements, job stability, and health benefits, may differ across forms of temporary employment. As such, these authors suggested that future studies should clearly define the types of temporary employment and systematically stratify the sample according to these definitions.

Workplace Interpersonal Conflict—A 3-item workplace interpersonal conflict scale from the Brief Job Stress Questionnaire (BJSQ) was used.³⁷ The respondents were asked to indicate the extent to which they (1) experienced differences in opinion with members of their workgroup, (2) experienced personality clashes with members of other workgroups, and (3) perceived their workgroup members as friendly (reversed item). The items were rated on a 4-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree). The scale has shown an adequate internal consistency and criterion-related validity.³⁸ In the current sample, the internal consistency of the scale as measured by Cronbach's alpha was .65.

Insomnia—Insomnia was measured by asking the frequency with which the respondent had experienced difficulties initiating sleep, difficulty maintaining sleep, and early morning awakening over the past 12 months (see Appendix A). The response options included (1) never or almost never, (2) a few times a year, (3) more than once a month, (4) more than once a week, (5) more than 3 times a week, and (6) almost every day. According to Lichstein et al, the research-grade criteria of insomnia should require a minimum of 3 nights per week of the insomnia symptom(s) lasting 6 months or longer.³ In the current study, individuals reporting at least one of the symptoms 3 nights per week over the past 12 months were classified as experiencing insomnia.

Confounders

Confounders included the data collection period (ie, 4 seasons), sex, age, industry sectors, alcohol consumption, cigarettes smoked per day, body mass index, work schedule, overtime work hours, job demands, job control, and the number of chronic health problems. Alcohol consumption was estimated based on the respondent's self-reported daily consumption of beer, sake, wine, and whiskey. Job demand and job control scales were taken from the BJSQ. The job demand scale consisted of 7 items, whereas the job control scale consisted of

3 items; the items were rated on a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree). Example items include “I have an extremely large amount of work to do (job demand)” and “I can work at my own pace (job control).” Internal consistency of these scales as measured by Cronbach’s alpha was .75 for job demand and .84 for job control. Chronic health problems included back pain, cancer, heart disease, liver disease, shoulder pain, and ulcer. Participants were asked if they are currently being treated for any of these diseases.

Statistical analyses

Two hierarchical logistic regression analyses were conducted in order to investigate whether employment status and workplace interpersonal conflict relate to insomnia. In the first hierarchical logistic regression analysis (Model 1), we first entered the employment type and workplace interpersonal conflict into the equation, followed by the interaction between these 2 predictors. In the second analysis (Model 2), we first entered all of the confounders into the equation, followed by the employment type and workplace interpersonal conflict, and finally the interaction between the 2 predictors. Prior to the analyses, the continuous variables were centered around their grand mean in order to improve the interpretability of the outcomes.³⁹ We analyzed the data using the Statistical Package for the Social Sciences version 15.0 (SPSS, Chicago, IL, USA).

RESULTS

Table 1 provides a summary of descriptive statistics of the participants, stratified by their employment type. The participants consisted of 35,914 permanent employees, 1,351 direct-hires, and 381 TWAs. On average, the permanent employees reported the highest degree of workplace interpersonal conflict ($M = 2.13$), followed by the direct-hires ($M = 1.95$), and then the TWAs ($M = 1.87$). Of the 3 insomnia symptoms, DIS was the sleep disturbance most frequently reported by all 3 employment groups. The prevalence of insomnia was the highest among the permanent employees (16.26%), followed by the direct-hires (13.77%) and the TWAs (10.76%).

Table 2 provides a summary of hierarchical logistic analyses predicting insomnia. In the first analysis, workplace interpersonal conflict was significantly associated with an increased risk of insomnia (odds ratio [OR] = 1.98, 95% confidence interval [CI] = 1.89–2.07, $p < .001$). In contrast, the odds of experiencing insomnia were not significantly different among the 3 employment groups. The interaction between workplace interpersonal conflict and a dummy code for the permanent employees and the TWAs was statistically significant (OR = 1.88, 95% CI = 1.10–3.22, $p < .05$), whereas the interaction between workplace interpersonal conflict and a dummy code for the permanent employees and the direct-hires was not (OR = 1.14, 95% CI = 0.79–1.08, $p > .05$).

In the second regression analysis (ie, Model 2), the main effect of workplace interpersonal conflict on insomnia remained statistically significantly (OR = 1.63, 95% CI = 1.55–1.71, $p < .001$) after the inclusion of the confounders. The interaction between workplace interpersonal conflict and a dummy code for permanent and TWAs remained statistically significant as well (OR = 1.97, 95% CI = 1.13–3.45, $p < .05$). The interaction between

workplace interpersonal conflict and a dummy code for the permanent employees and the direct-hires was not statistically significant (OR = 1.11, 95% CI = 0.86–1.43, $p > .05$). Follow-up simple slope tests indicated that interpersonal conflict was statistically significant predictor of insomnia for the permanent employees ($b = .48$, $p < .001$), the direct-hires ($b = .58$, $p < .001$), and the TWAs ($b = 1.16$, $p < .001$). The predicted probability of insomnia as a function of workplace interpersonal conflict and employment type is depicted in Figure 1. As the figure indicates, the probability of experiencing insomnia increased as the level of workplace interpersonal conflict increased for all 3 employment groups, but this trend was particularly strong for the TWAs.

COMMENT

Previous studies have shown that frequent exposures to psychosocial work stressors, such as high levels of job demands and perceived organizational injustice, increase the risk of insomnia.^{13–16} Workplace interpersonal conflict is a psychosocial stressor often reported as one of the most stressful aspects of their work by employees, and it has been shown to relate to a number of undesirable health outcomes, including poor general health and depression.^{18–20} However, relatively little research has specifically examined whether workplace interpersonal conflict relates to insomnia.²⁴ In addition, past research on insomnia has either did not distinguish between different employment categories or treated employment types as a background, statistical control variable.²⁴ This might be an oversight because, as stated earlier, the negative impacts of work stressors on health outcomes may not be equivalent across types of employment.³⁵ Thus, the current study investigated the relationships between workplace interpersonal conflict, employment type, and insomnia.

Results indicate that high levels of workplace interpersonal conflict are associated with an increased risk of insomnia. One possible explanation of this result is that a frequent exposure to interpersonal conflict resulted in cognitive disturbances, which in turn increased the likelihood of insomnia. Specifically, interpersonal conflicts are stressful not just because they evoke threat perceptions, but because individuals have negative ruminations about conflict situations, as well as anxiety over repeated incidents in the future.^{40,41} Past research has shown that the frequency of presleep cognitive disturbances (eg, rushing thoughts) distinguishes between good sleepers and insomniacs.⁴² Additionally, individuals suffering from insomnia report intrusive thoughts as the main reason for their sleep difficulties.⁴³ As such, if exposure to workplace interpersonal conflict caused employees to have negative ruminations and/or excessive worries, then their sleep might also have been disrupted.

In contrast to workplace interpersonal conflict, the relative risk of experiencing insomnia was not significantly different between the employment types. Perhaps more important, the current study found an interaction between employment type and workplace interpersonal conflict in terms of insomnia risk. Specifically, workplace interpersonal conflict was significantly associated with an increased risk of insomnia for the 3 employment groups, but this trend was particularly strong for the TWAs. As mentioned earlier, one potential explanation is that TWAs perceived interpersonal conflicts as a greater threat to their job security than was the case for permanent employees. For instance, they may have perceived their chances of receiving a new contract or permanent status to be small because of not

getting along with other employees and/or a supervisor. If employees became excessively worried about their future job stability, then their sleep could have been disrupted. Alternatively, because of their short-term contract, TWAs often lack personal connections or informal power from being well acquainted with others at work. Not surprisingly, these employees tend not to receive as much social support as permanent employees do.⁴⁴ Conceivably, TWAs might have been more adversely affected than permanent employees by workplace interpersonal conflict because they received lower levels of social support.

Contrary to our expectation, the relationship between workplace interpersonal conflict and the likelihood of insomnia was not significantly different between the permanent employees and the direct-hires. This finding led us to question why the direct-hires were not more adversely affected by workplace interpersonal conflict than the permanent employees, but the TWAs were. One potential explanation is that direct-hires did not perceive workplace interpersonal conflicts as a threat to their job stability to the same extent as was true for TWAs. According to a study by the Japan Institute for Labour Policy and Training, direct-hires tend to have more specialized job skills and are more optimistic about obtaining a better, permanent job than is the case for TWAs.³⁶ If workplace interpersonal conflict is a contributing factor of an increased likelihood of insomnia because of cognitive disturbances, such as worries about one's job future, then direct-hires might not have been as adversely affected due to their greater employability. For example, direct-hires might perceive that they can look for employment opportunities elsewhere if they do not get along with others at their current workplace.

Limitations

The current study has several limitations that may have affected the results. First, self-report measures raise concerns about bias due to retrospective memory and social desirability. For example, employees might have underreported workplace interpersonal conflict because they were embarrassed about having poor interpersonal relationships. The accuracy of the measurements might have been improved if we had obtained data from additional sources, such as the employee's immediate supervisor. Related to this point, several studies in the past have used objective measures to assess sleep behaviors (eg, polisomnography). Use of such a device would have enabled a more accurate assessment of insomnia. Secondly, the current study is based on cross-sectional data. As such, we cannot draw causal conclusions about the variables studied in this study. Third, the current study is based on data obtained from Japanese employees, which potentially raises concerns about the generalizability of the findings. For example, the employment law in Japan prohibits temporary employees from being hired in the construction, port operation, and security industries. Accordingly, we did not have data from temporary employees in these industries. We acknowledge this unique aspect of temporary employment in Japan as a potential issue in terms of the study's generalizability. Fourth, the differences in the distribution of industries among the employment types (eg, 72% of permanent employees in the IT sector) may have also affected the results. For example, 72.32% of permanent employees were in the information technology (IT) industry, whereas only small proportions of temporary employees were in the IT industry. Although our analyses included industry sectors as a statistical control variable, doing so does not completely remove the effects of industry types.

Conclusion

As domestic and global competition among firms has increased, so has the pressure for employers to make adjustments in their employment practices. One such practice is an increased utilization of temporary employees, who provide relatively cheap and flexible labor. Despite such economic advantages, studies indicate that these workers might be at a greater risk of developing health-related problems. The current study found that workplace interpersonal conflict was related to experiences of insomnia, but this relationship was generally stronger for temporary employees than for permanent employees. Organizational leaders are encouraged to consider the possibility that temporary workers are more vulnerable to experiencing sleep disturbances as a result of interpersonal stressors. Past research has demonstrated that sleep disturbances can have costly consequences, such as occupational injury and reduced productivity.

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APPENDIX A

Items for measuring difficulty initiating sleep, difficulty maintaining sleep, and early morning awakening.

1. How often do you have difficulty initiating sleep after getting into the bed?
2. How often do you wake up at night and have difficulty going back to sleep?
3. How often do you wake up in the early morning, earlier than you wish to, and have difficulty going back to sleep?

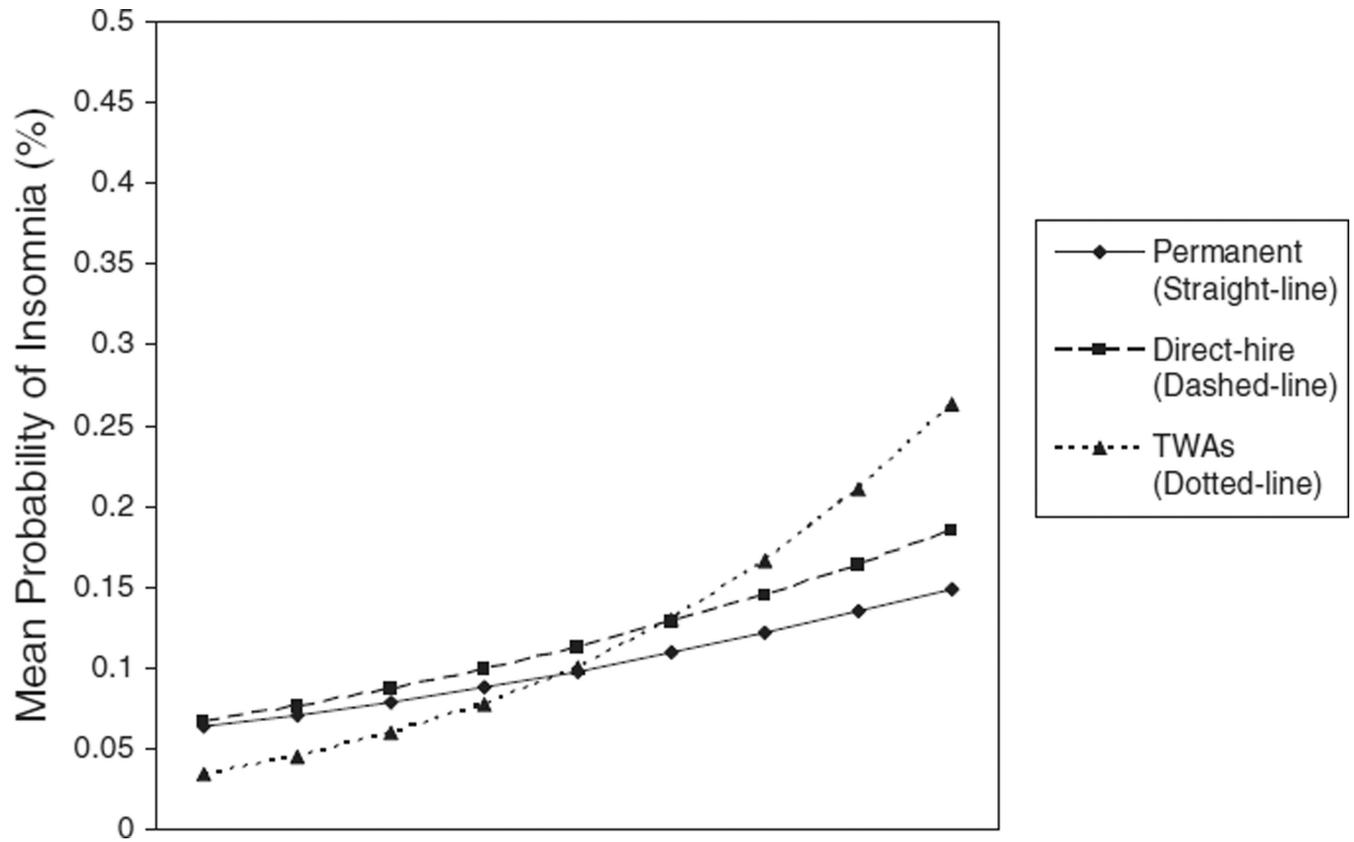


Fig. 1. A line chart depicting the estimated mean probability of insomnia as a function of the employment types and workplace interpersonal conflict. WIC = workplace interpersonal conflict; TWAs = temporary work agents.

Table 1

Characteristics of Participants By Employment Categories (N = 37,646)

Characteristic	Employment type						χ^2 test
	Permanent		Direct-hire		TWAs		
	n	%	n	%	n	%	
Difficulty initiating sleep (DIS)							$p < .01$
At least 3 times a week	4,884	13.60	139	10.33	34	8.95	
Missing	224	0.62	5	0.37	1	0.26	
Difficulty maintaining sleep (DMS)							$p = .45$
At least 3 times a week	1,674	4.66	67	4.96	13	3.41	
Early morning awakening (EMA)							$p = .53$
At least three 3 a week	1,410	3.93	56	4.15	11	2.89	
Insomnia							$p = .24$
Yes	5,840	16.26	186	13.77	41	10.76	
Data collection period by season							$p < .01$
Spring (March–May)	1,036	2.88	212	15.69	242	63.52	
Summer (June–August)	25,969	72.31	63	4.66	28	7.35	
Autumn (September–November)	4,115	11.46	906	67.06	84	22.05	
Winter (December–February)	4,794	13.35	170	12.58	27	7.09	
<i>Demographic factors</i>							
Age							$p < .01$
29 or younger	11,110	30.94	324	23.98	164	43.04	
30 to 39	14,820	41.27	266	16.69	83	21.78	
40 to 49	6,895	19.20	169	12.51	68	17.85	
50 to 59	2,786	7.76	244	18.06	40	10.50	
60 or older	303	0.84	348	25.76	26	6.82	
Sex							$p < .01$
Men	28,576	79.57	831	61.51	171	44.88	
Women	7,338	20.43	520	38.49	210	55.12	
<i>Lifestyle</i>							

Characteristic	Employment type						χ^2 test
	Permanent		Direct-hire		TWAs		
	n	%	n	%	n	%	
Alcohol consumption (grams per day)							$p < .01$
0	7,082	19.72	288	21.32	108	28.35	
1 to 9	13,885	38.66	498	36.86	195	51.18	
10 to 19	5,338	14.86	193	14.29	32	8.40	
20 to 29	1,878	5.23	67	4.96	10	2.62	
30 to 39	2,934	8.17	120	8.88	15	3.94	
40 to 49	1,790	4.98	66	4.89	6	1.57	
50 or more	2,857	7.96	106	7.85	12	3.15	
Missing	150	0.42	13	0.96	3	0.79	
Cigarette smoke (per day)							$p < .01$
0	22,725	63.28	908	67.21	302	79.27	
1 to 4	360	1.00	19	1.41	3	0.79	
5 to 9	818	2.28	35	2.59	12	3.15	
10 to 14	2,494	6.94	104	7.70	28	7.35	
15 to 19	2,387	6.65	60	4.44	13	3.41	
20 or more	7,130	19.85	225	16.65	23	6.04	
Body mass index							$p < .01$
15 to 19	8,005	22.29	337	24.94	108	28.35	
20 to 24	20,330	56.61	764	56.55	224	58.79	
25 to 29	6,142	17.10	222	16.43	33	8.66	
30 to 34	1,093	3.04	19	1.41	11	2.89	
35 or higher	221	0.62	4	0.30	0	0	
Missing	123	0.34	5	0.37	5	1.31	
Heart disease							$p < .01$
Yes	53	0.15	7	0.52	0	0	
Cancer							$p < .01$
Yes	129	0.36	11	0.81	3	0.79	
Panic disorder							$p = .28$

Characteristic	Employment type												χ^2 test			
	Permanent			Direct-hire			TWAs									
	n	%	n	%	n	%	n	%	n	%	n	%				
Yes	193	0.54	5	0.37	4	1.05										
Autonomic disorder																$p = .81$
Yes	339	0.94	15	1.11	4	1.05										
Ulcer																$p = .28$
Yes	610	1.70	19	1.41	3	0.79										
Back pain																$p = .15$
Yes	5,186	14.44	216	15.99	63	16.54										
Shoulder pain or stiffness																$p = .01$
Yes	129	0.36	11	0.81	3	0.79										
Liver disease																$p = .19$
Yes	311	0.87	12	0.89	0	0										
<i>Work-related factors</i>																
Industry sectors																$p < .01$
Manufacturing	1,259	3.51	117	8.66	20	5.25										
Real estate	1,321	3.68	620	45.89	16	4.20										
Retail and wholesales	1,300	3.62	47	3.48	8	2.10										
Agriculture	679	1.89	35	2.59	65	17.06										
Health care	66	0.14	18	1.33	7	1.84										
Public administration	2,401	6.69	180	13.32	227	59.58										
Finance	2,896	8.06	137	10.14	14	3.67										
Information technology	25,972	72.32	197	14.58	24	6.30										
Arts and entertainment	20	0.06	0	0	0	0										
Work schedule (Shift work)																$p = .42$
Yes	7,159	19.93	253	18.73	70	18.37										
Overtime																
Less than 15 hours	9,699	27.00	811	60.03	267	70.08										
15 to 29 hours	8,752	24.37	239	17.69	46	12.07										
30 to 44 hours	9,857	27.45	129	9.55	27	7.09										

Characteristic	Employment type												χ^2 test
	Permanent			Direct-hire			TWAs			M or n	SD or %	F test	
	n	%	n	%	n	%	n	%					
45 to 59 hours	4,073	11.34	82	6.07	18	4.72							
60 to 80 hours	2,298	6.40	38	2.81	6	1.57							
80 hours or more	868	2.42	35	2.59	12	3.15							
Missing	367	1.02	17	1.26	5	1.31							
	M or n	SD or %	M or n	SD or %	M or n	SD or %	M or n	SD or %	M or n	SD or %	F test		
Workplace interpersonal conflict [†]	2.13 ^a	0.61	1.95 ^b	0.63	1.87 ^{ba}	0.60						<i>p</i> < .01	
Missing [‡]	19	0.001	0	0	0	0							
Job demands [†]	2.76 ^a	0.54	2.56 ^b	0.63	2.65 ^{ba}	0.81						<i>p</i> < .01	
Missing [‡]	7	0.0002	0	0	0	0							
Job control [†]	2.49 ^a	0.64	2.55 ^b	0.68	2.54 ^{ba}	0.67						<i>p</i> < .01	
Missing [‡]	11	0.0003	0	0	0	0							

Note. TWAs = temporary work agents.

[†]Data are *M* and *SD*.

Means with different subscripts differ at the .05 level of significance according to a Tukey HSD test.

[‡]Data are *n* and%.

Table 2
Odds Ratios of Insomnia Among Permanent Employees, Direct-Hire Employees, and Temporary Work Agents (TWAs)

	Model 1			Model 2			χ^2
	OR	95% CI	χ^2	Adjusted OR	95% CI		
Block 1							1636.23 ***
Data collection period by season							
Spring (Reference category)				1.00			
Summer				1.28*	1.05–1.55		
Autumn				1.26*	1.02–1.56		
Winter				1.00	0.82–1.23		
Demographic and lifestyle factors							
Age				0.99***	0.98–0.99		
Sex (Reference group = male)				1.19	1.09–1.29		
Alcohol consumption				1.19***	1.09–1.29		
Cigarette smoke				1.02***	1.01–1.02		
Body mass index				1.03	1.02–1.03		
Number of diseases				1.55***	1.49–1.61		
Work-related factors							
Job sectors							
Manufacturing (Reference group)				1.00			
Real estate				1.01	0.82–1.26		
Retail and wholesales				0.86	0.68–1.09		
Agriculture				0.64**	0.48–0.87		
Health care				0.50	0.24–1.04		
Public administration				0.78*	0.63–0.96		
Finance				0.90	0.71–1.13		
Information technology				1.15	0.95–1.38		
Arts and entertainment				1.35	0.42–4.30		
Shift work (Reference = nonshift group)				1.25***	1.16–1.35		

	Model 1			Model 2		
	OR	95% CI	χ^2	Adjusted OR	95% CI	χ^2
Overtime work hours						
Less than 15 hours (Reference group)				1.00		
15 to 29 hours				0.89**	0.82–0.97	
30 to 44 hours				0.84***	0.77–0.91	
45 to 59 hours				0.86**	0.78–0.96	
60 to 79 hours				0.75***	0.66–0.86	
80 hours or more				0.81*	0.66–0.98	
Block 2			924.75***			382.63***
Interpersonal conflict (IC)	1.98***	1.89–2.07		1.63***	1.53–1.71	
Employment type (ET)						
Permanent (Reference group)	1.00			1.00		
Direct-hire	0.92	0.79–1.08		1.17	0.97–1.41	
TWA	0.74	0.53–1.02		1.04	0.72–1.50	
Block 3			6.51*			6.56*
Workplace interpersonal conflict (WIC)	1.96***	1.87–2.05		1.61***	1.53–1.69	
Employment type (ET)						
Permanent (Reference group)	1.00			1.00		
Direct-hire	0.92	0.78–1.08		1.16	0.97–1.40	
TWA	0.73	0.52–1.02		1.03	0.70–1.50	
IC × ET interaction						
C × Direct-hire	1.14	0.89–1.46		1.11	0.86–1.43	
IC × TWA	1.88*	1.10–3.22		1.97*	1.13–3.45	

Note. OR = odds ratio; CI = confidence interval.

* $p < .05$;

** $p < .01$;

*** $p < .001$.