HHS Public Access

Author manuscript

Int J Behav Med. Author manuscript; available in PMC 2015 October 29.

Published in final edited form as:

Int J Behav Med. 2014 February ; 21(1): 42–52. doi:10.1007/s12529-013-9325-y.

Workplace Psychosocial Factors Associated with Work-Related Injury Absence: A Study from a Nationally Representative Sample of Korean Workers

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Abstract

Background—Little is known about the association between psychosocial factors and injury absence in the workplace.

Purpose—This study aims to assess the association of comprehensive workplace psychosocial factors with work-related injury absence among Korean workers.

Methods—The data (*n*=7,856) were derived from the First Korean Working Conditions Survey conducted in 2006 with a representative sample (*n*=10,043) of the Korean working population. The survey instrument contained questions about hours of work, physical risk factors, work organization, and the effect of work on health/injury. Work-related injury absence was indicated by a dichotomous variable with at least 1 day absence during the preceding 12 months. Logistic regression models were used to calculate odds ratio and confidence interval (CI). Incremental adjustments for sociodemographic, health behavior, and occupational confounding variables were employed in the models.

Results—The overall 1-year prevalence of work-related injury absence in this study was 1.37 % (95 % CI, 1.11–1.63 %). Those who experienced violence at work (adjusted odds ratio (aOR), 7.05 (95 % CI, 2.69–18.5)), threat of violence at work (aOR, 4.25 (95 % CI, 1.32–13.64)), low job autonomy (aOR, 1.79 (95 % CI, 1.17–2.74)), and high job strain (aOR, 2.38 (95 % CI, 1.29–4.42)

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The authors also declare that they have no conflict of interest.

had an increased risk of injury absence, compared with their respective counterparts ($p<0.05$). Among all job types, skilled workers in Korea were at a near fourfold risk of work absence due to occupational injuries, compared with managers in low-risk jobs.

Conclusion—Workplace violence and increased job strain were two key workplace psychosocial factors associated with work-related injury absence.

Keywords

Work-related injury absence; Psychosocial factors; Korean Working Conditions Survey; Workplace violence; Job strain

Introduction

Factors affecting absence resulting from work-related injuries are not given that much attention [1, 2] because the focus may be on severity or rate of injury in preventing work-related injuries [3]. As the working population is aging and the economic burden for workplace injuries is increasing in developed countries, focuses on preventing work-related injuries should include injury work absence and related costs [3]. In the USA alone in 2007, the total estimated cost for occupational illnesses and injuries was approximately $250 billion [4] where more than three quarters of the total cost was injury related [4]. In Korea, more than US$16 billion were estimated as the economic burden including indirect loss due to occupational injuries and diseases in 2008, which were about 1.67 % of the country's gross domestic product. The increasing costs of work-related injuries are directly associated with lost work days for medical treatments and required recovery time. A prevention strategy focusing on injury absence is a priority for occupational safety, as injury absence may significantly affect the family, damage work morale and productivity, cause increases in workers' compensation costs, and ultimately require many public health resources for injury reduction.

In light of the increasing costs related to workplace injuries, it is imperative to first understand the association between work organization factors and work-related injury absence. Work organization factors may influence a worker to make a conscious choice to be absent from work due to injury. The decision may be mandatory by the company or voluntary as a choice by the injured worker, which both depend on the severity of the injury.

Workplace psychosocial factors are interactive results between work organization factors and workers' capacities, needs and experiences. Workplace psychosocial factors have been linked to work-related absence due to health outcomes, such as the common cold, depressive symptoms, and myocardial infarction [5–8]. Additionally, they have been associated with overstrain injuries, such as musculoskeletal disorders [9–14]. Few psychosocial factors, such as safety practices and social isolation, have been studied for their relationship to injury absence [1, 2]. Some studies focused on psychosocial factors influencing the duration of disability and return-to-work after injury [15, 16]. This relationship between psychosocial factors and injury absence in the workplace remains unclear.

One study evaluating factors affecting absence due to ill health or injuries in miners revealed different absence mechanisms [1]. It was suggested that return to work following injury-related absence is determined by complete recovery, while return to work following illness absence may occur before all symptoms have completely disappeared [1]. The study population in this previous research was in miners who typically have robust fitness and work environments that are very different from general workplace settings. This finding about the different absence mechanisms due to illnesses or injuries in other occupations is unclear.

The present study aimed at examining 14 selected psychosocial factors in the workplace including 8 factors that have been linked to work-related absence due to illness and musculoskeletal problems [5–8] and 6 other exploratory factors related to sexual harassment and discrimination, age discrimination, threat of violence, and work-life balance that may potentially be risk factors. Data were drawn from a nationally representative sample of the Korean working population.

Methods

Subjects and Procedure

Data were derived from the First Korean Working Conditions Survey (KWCS), conducted in 2006 by the Korea Occupational Safety and Health Agency [17]. The survey population was a representative sample of the actively working population aged 15–65 (in Korea, the legal work age is 15 years). “Economically active” refers to subjects who were either employees or self-employed at the time of the interview. Those who were retired, unemployed, housewives, or students were not included in the survey. The basic design of the survey was a multistage random sampling of the enumeration districts used in the 2005 population and housing census [17]. Data collection was performed by Gallup Korea from 26 June to 26 September 2006. Because of difficulties in conducting a face-to-face interview, many households could not be sampled. This resulted in a total of 46,498 visited households, in which 10,043 face-to-face interviews were performed. The reasons for the unsuccessful interviews included unavailability after three visits (n=14,680); disqualified interviewees at the time of visit, such as minors (n=2,671); no actively employed person aged 15–64 years in the household (n=12,192) or refusals (n=6,972).

A survey weighting method was employed to approximate the actively working population. That is, the sample’s data distributions for age, sex, region, locality, size, economic activity and occupation were approximated to those of the active working population distributions at the time of the survey. For comparison, sociodemographic characteristics of the sample and total working population in Korea are shown in Table 1.

In this study, we excluded the subjects that were employed for less than 1 year (n=1,585) to insure that the risk data collected for the preceding year were consistent with their injury data. Additional data exclusions included those missing absence day data (n=5), those who (n=530) reported injury at work but did not take time off for the injury, and those who (n=63) answered with conflicting injury absence information (i.e., they did not report injury but took time off due to injury). Because of the small sample size (N=4) for the age group

from 15 to 18, we decided to also exclude them from the study. The reason for excluding "minor" injury cases (*n*=530) was to minimize potential recall errors. Generally, people tend to forget random mishaps that may not be relevant to psychosocial factors in the workplace. Injuries that required at least one day of absence from work were considered to be serious and hence the focus of this study. The data exclusion criteria resulted in a final sample size of 7,856 respondents.

The survey instrument (i.e., questionnaire) contains questions about hours of work, physical risk factors, work organization, and the effect of work on health. The survey methodology and questionnaire of the first KWCS were almost identical to the Fourth European Working Conditions Survey (EWCS) conducted in 2005 [18]. The detailed survey methodology for the first KWCS is reported elsewhere [17].

Study Variables

Injury-Related Work Absence—Injury-related work absence was investigated using two questions: (1) Did you get injured at work during the previous 12 months? (2) During the past 12 months, how many days in total were you absent from work because of injury related to work? Among the respondents (*n*=7,856), those who answered "yes" to question (1) and more than or equal to 1 day of absence to the question (2) were used as the injury-related work absence group. Those who answered "no" to question (1) and 0 day to question (2) were used as the reference group.

Workplace Psychosocial Factors—Descriptions of work organization factors, response options, and response criteria are shown in Table 2. In all, 14 work-place psychosocial factors were included in the questionnaire. The subjects were asked to answer "yes" or "no" about their experiences of discrimination regarding age and sex, sexual harassment, threat of violence, and violence at work during the past 12 months. Job insecurity, cognitive work demands, emotional work demands, and job autonomy were measured with a 5-point scale. Job satisfaction and work-life balance were measured with a 4-point scale. Social support at work and work intensity were measured by the sum of two items, both with 5-point scales. The Cronbach's α values for social support at work, work intensity, and job autonomy were 0.87, 0.83, and 0.73, respectively. Using the combination of exposure to work intensity and job autonomy, job strain was categorized into four levels including low strain, active, passive, and high strain groups [19].

Potentially Confounding Variables—Previous studies have demonstrated a significant association of sociodemographic, health, and occupational factors with work absence [11, 20–22]. These factors were selected and included in our data analysis as potentially confounding variables. The potentially confounding variables related to sociodemographics and health behavior were sex, age group, educational level, income per month, smoking status, alcohol consumption, and presence of illness. Occupation-related variables included job type, which was classified into ten categories according to the Korean Standard Classification of Occupation [23], type of employment, working hours per week, employment contract, and work schedule. The response levels for these potentially confounding variables are presented in Table 4.

Statistical Analyses

A series of univariate and multiple logistic regression analyses were conducted individually to examine the associations of psychosocial factors with work-related injury absence. All the workplace psychosocial variables, except job strain, were dichotomized into two groups, as shown in Table 2. We first assessed the relationship between potential confounding variables and absence due to injury using a univariate analysis. Second, to examine the strength of this relationship among the confounding variables, a forward stepwise multiple logistic regression analysis ($p \leq 0.1$ for inclusion of confounders) was conducted. Third, we included the 14 workplace psychosocial variables to form the final model with three incremental adjustment levels of confounding variables including sociodemographic, health behavior, and occupational factors, although some of the factors might not be significant in the multivariate analysis. Model A (sociodemographic factors only) was adjusted for sex, age group, education level, and income; model B (sociodemographic and health behavior factors) included confounding variables for model A + smoking status, alcohol consumption, and presence of illnesses; model C (sociodemographic, health behavior, and occupational factors) included confounding variables for model B + employment status, job type, employment contract, working hours, and work schedule. The level of significance for all statistical analyses was $p<0.05$ (two-tailed test). The statistical analyses were performed using SPSS version 19.

Results

The characteristics of the study respondents are shown in Table 3. The respondents included 4,611 male and 3,245 female workers. The 1-year prevalence of injury absence was 1.37 % (95 % confidence interval (CI), 1.11–1.63 %). The mean and standard deviation of age of the respondents were 45.5 and 10.4, respectively. Overall, about 40 % held a college degree or higher; and 67 % earned a monthly income of greater than 1 million Korean won. About one third of the respondents were current smokers and about 70 % were current alcohol drinkers. The four dominant job types were professional/technical (20.3 %), clerical (17.4 %), sales (11.8 %), and service (11.3 %). About a quarter of the respondents reported one or more physical symptoms/disorders; about one third were self-employed or an employer and most (93 %) worked on a shift schedule. More than half of the respondents worked 45 h or more/week.

The covariates associated with injury absence are shown in Table 4. The univariate logistic regression analyses revealed that male gender, low education level, high income level, former/current smoking, increased alcohol consumption, presence of illness, job type, long working hours (≥45-h/week), and shift/night work were significant factors associated with injury absence. In the stepwise multivariate logistic regression analyses, male gender, education level, presence of illness, job type, and shift/night work schedule remained significant. Among all job types, skilled workers in Korea were at a near fourfold risk of injury absence, compared with low risk managers.

The relationships between workplace psychosocial factors and injury absence are shown in Table 5. Univariate logistic regression analyses showed that 9 of the 14 workplace psychosocial factors were significantly associated with injury absence. However, after

controlling for three sets of confounding variables (i.e., model C), of the nine significant variables, only violence at work, threat of violence, job autonomy, and job strain remained significant. Among the four job strain subgroups, the high job strain, and active subgroups (both of which were defined in part by increased work intensity), were significantly associated with injury absence in model A, controlling for sociodemographic variables only. After additional adjustments for health behavior variables in model B, only the high job strain subgroup remained significant. When controlling for sociodemographic, health behavior, and occupational variables, the high job strain subgroup was the only variable whose association remained significant. Similarly, work intensity and injury absence were significantly associated in models A and B. This significant association, however, was not found after controlling for additional occupational factors.

Discussion

In this study, the overall prevalence of work-related injury absence was 1.4 % and was 6.4 % if minor injuries without absence were included. According to the Korean Ministry of Employment and Labor, the occupational injury rates in the Korean working population had declined steadily until the mid-1990s. In 1995, a rate (0.99 %) below 1 % was recorded for the first time in Korean history. Since 1995, the rates have been fluctuating somewhere between 0.7 and 1 % and have been in a stalemate for the past decade without any significant improvements. Data from the KWCS suggest underreporting of the official occupational injury rates in Korea, which is in agreement with underreporting in other countries [24–26].

Even with the 6-month longer survey period in this study, the cumulative injury absence rate is still lower than the rates (7–27 %) reported in a previous study using the same injury absence definition [2]. The discrepancies are mostly likely attributed to the different working populations studied. Overall, our study results derived from a wide range of occupations provide implications for national public health policy to mitigate the injury absence rates and associated costs.

There were two key findings in the present study. The first key finding was a significant association between violence at work and work-related injury absence. A study of nurses' aides revealed that those who had been exposed to threats or violence at work had an increased risk of poor sleep compared with those without such exposures [27]. With fear acting as a mediator, the experience of violence is known to adversely affect workers' health both mentally and physically [28]. Even when a person is not a direct victim of violence, being a witness to a threatening act has been reported to exert negative effects, such as anxiety, illness symptoms, and negative occupational outcomes [29]. Aside from the evidence of the effect of workplace violence on personal health, workplace violence has been linked to workplace psychosocial problems [30, 31] and economic losses [32]. Our study finding contributed to an additional association between workplace violence and work-related injury absence. This finding remained significant after controlling for sociodemographic, health behavior and occupational factors, indicating a problem across different work-place settings in Korea. Because of the nature of the cross-sectional study design, the association cannot be used to demonstrate a causal relationship. Generally, work

absence is likely to result from violence-related injuries, but workers who return to work from injury may be at risk of being subject to workplace threats of violence. In Korea, if a worker's injury is perceived to have been not traumatic, his/her absence to recover from injuries may be perceived as being lazy or someone without adequate work ethics. The small number of cases in the exposure (0.6 %) groups for both work violence variables in this study demonstrated workplace violence to be a rare event in Korea, compared with other types of workplace psychosocial factors. This small percentage resulted in a wide range of the confidence interval for the ORs of the workplace violence variables, indicating a large variability in the sampled workplace settings. The sparse literature on the relationship between work violence and injury absence can probably be attributed to the limited cases and the rarity of workplace violence. Further research is needed to delineate whether workplace violence is a main causal factor for injury or injury absence in the Korean working population.

The second key finding was a significant association between increased job strain/low job autonomy and prevalence of work-related injury absence. Because work intensity was not significantly associated with injury absence in model C, adjusted for all the assessed confounding variables, the relationship between the active group (defined by high work intensity and high job autonomy) and injury absence in model C was consequently weakened. The decreased association of work intensity with injury absence in model C was likely a consequence of additional adjustments for occupational factors, such as working time and schedule, which are highly correlated with work intensity. The association of high job strain with injury absence, on the other hand, remained significant in model C. The significant relationship was due to a stronger association of job autonomy and injury absence, as indicated by its significant association in model C, compared with the weakened association of work intensity with injury absence. Low job autonomy was significantly associated with sickness absence in several previous studies [11, 33–35]. Our study finding indicates a similar effect of low job autonomy on injury absence. Among the four job strain groups, only the high job strain group was significantly associated with injury absence in the fully adjusted model (i.e., model C). This finding corroborates the results of several studies on sickness absence in different occupations [35–38], risk of injury related to workplace musculoskeletal problems [12, 39], and risk of occupational injury in Korean workers [33].

Similar to the violence variables, high job strain (primarily driven by low job autonomy in this study) may have a reverse relationship with injury absence. This is because job strain is likely to be affected by the status of injury. If injured workers return to work before fully recovering, it is possible for them to have less control over job tasks because of limited physical capabilities. This situation leads to a decrease in job autonomy and potentially an increase in perceived work intensity. A combination of both factors may have played a role in the development of observed high job strain.

Generally, low social support is correlated with an increased risk of injury in previous studies [40–42]. Low social support of the study respondents, however, was significantly associated with decreased odds of injury absence in models A and B and had a borderline significance (p=0.055) in model C. To further delineate the conflicting associations, we stratified the social support group to investigate the association of job strain subgroups and

injury absence. The passive subgroup (adjusted odds ratio (aOR)=3.74 (CI= 1.22–11.49) for model C) and high job strain subgroup (aOR=3.81 (CI=1.31–11.06) for model C) in the low social support group showed statistically significant relationships with injury absence, while the four job strain subgroups in the high social support group did not have any statistically significant associations with injury absence. The results from the additional analyses suggest a complex interactive effect of job strain with different levels of social support. Numerous studies have shown contradicting results regarding low social support and the occurrence, type, and duration of sick leave [11, 37]. Our study finding may provide additional insight into the association between job strain and injury absence through social support as a moderator.

Apart from the interactive effects, some studies suggest that the statistically significant association of social support and sick leave is attenuated after controlling for confounders [43–45]. In the current study, the attenuated association of social support with injury absence in the three models may be relevant to evidence that social support often exerts a buffering effect on health outcomes and that the significant relationship disappears if controlled for related variables [43–45].

Similar to low social support, job dissatisfaction has been consistently associated with risk of injury in previous studies [41, 42, 46, 47]. In the current study, low job satisfaction was significantly associated with injury absence in model A, controlling for sociodemographic variables only. The strength of the association was incrementally attenuated by introducing additional health behavior variables (model B) and both health behavior and occupation variables (model C). This finding suggests that job satisfaction was likely to be a mediator in the statistical models and correlated with health behavior and occupation factors.

Among the covariates (Table 4) analyzed in the study, the multivariate logistic regression analysis revealed that male gender, education level, presence of illness, job type, and shift/night work schedule were significantly associated with injury absence. These findings are generally in agreement with the literature. Male gender and lower education levels are known to be main risk factors for workplace injury and work absence in many studies [41, 48, 49]. Similar to workers in other counties, Korean workers involved in a shift/night work schedule exhibited an increased risk of work absence [8, 50–52]. Job type/title/occupation has been shown to be a gross risk category for injuries, sickness absence and health status [53–56] [13]. Compared with other job types, skilled workers had a near fourfold risk of reporting work-related injury absence. Skilled workers in Korea may be involved in jobs varying from operating machines, moving parts repetitively, performing tasks with awkward postures, etc. These job tasks are considered to have a high risk for sprains/strains or musculoskeletal disorders, potentially leading to work absence for treatment and recovery [17]. In a previous investigation into work absence due to injury and health problems using the same KWCS dataset, musculoskeletal problems and stress were the two leading causes of work absence [17]. The previous finding indirectly supports the speculative mechanism of injury absence. Research specifically focused on skilled workers in Korea is recommended for mitigating their risk for injuries and subsequent work absence.

Strengths and Limitations

The main strength of the present study is that findings about the relationship between the selected workplace psychosocial factors and work-related injury absence were based on a wide array of job types in different industries from a nationally representative working population. It should be recognized that our study results may be useful to policy makers, specifically in Korea, who tend to take into account a broad range of workplace factors in addition to sociodemographic characteristics. The second strength is that the survey measures were collected via face-to-face interviews resulting in very little missing data in the final analysis models, enabling us to investigate a comprehensive list of workplace psychosocial variables. This survey method, however, is still subject to interviewee recall errors. The third strength is a variety of analysis models adjusted for incremental levels of confounding variables including sociodemographic, health behavior, and occupational factors. With multilevel adjustment for confounding variables, generalizability of the study results is likely to be reliable.

A major criticism of the methodology of the present study may be the logistic regression analysis strategy for dichotomous absence data. The number of days of absence due to injury may be used as a countable measure for alternative statistical analysis models. Because of a difficulty in fitting the models to an unevenly skewed data distribution, we decided to use dichotomous absence data for the first attempt in investigating a comprehensive list of workplace psychosocial factors. This initial analysis cannot distinguish between short, medium and long spells of absence, or multiple episodes of absence in the same worker that are associated with workplace psychosocial factors. A lack of data on type and severity of injury for targeted prevention strategies presents another limitation of the study, although “minor” injury cases were excluded from the data analyses. One of the key findings—the association between workplace violence and injury absence—cannot be linked to the underlying cause of violence or threat of violence. It is unclear whether the reported workplace violence variables were attributable to interpersonal relationships, criminal activities, aggressive personalities or work organization. A significant portion of the planned households could not be sampled due to a variety of reasons provided in the Methods section. The unknown characteristics of these households may potentially bias the study results, although the overall response rate was similar to that (~25 %) for the EWCS conducted in 2005 [18]. The part-time workers included in this study may not have the same risk exposures as the full time employees. However, the percentage of these part-time workers was small (2.7 %) and unlikely to have a significant effect on the study findings. Because of the scope of the study, male and female genders were adjusted for but were not separated from the multivariate regression analyses (models A–C) to examine gender-specific associations of the workplace psychosocial factors with injury absence. Moreover, no interaction between variables was examined except for the additional analysis of investigating the effects of social support with job strain. A lack of a comprehensive examination of interactions between a large number of the independent variables in the final models may have produced some random suppression/mediating effects of some variables on other variables. Type 1 error, a false-positive result, was also likely to occur because of the large set of comparisons [57, 58]. On the basis of the exploratory nature of the study, however, concerns about type 1 error associated with multiple comparisons may not be a

serious problem with the preliminary study findings [59]. Finally, the present study was cross-sectional in design; thus, no causal interpretations can be made.

Conclusions

Our study findings contribute to the limited scientific literature on the association between workplace psychosocial factors and absence due to all work-related injuries. Evidence from the study suggests that experience with workplace violence, threat of workplace violence, low job autonomy, and increased job strain are key factors associated with an increased risk of injury absence. Our study findings also indicate that effects of low social support on injury absence may be moderated by a non-linear interaction with job strain. Among all job types, skilled workers in Korea were at a near fourfold risk of injury absence, compared with managers in low risk jobs. A detailed subpopulation analysis to target the high risk occupations and an assessment of the interaction between significant risk factors are recommended. Interventions for reducing injury absence in Korean workers should focus on improvements in job autonomy and prevention of workplace violence.

Acknowledgments

The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the National Institute for Occupational Safety and Health.

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Table 1

Dermographic characteristics of the participants in Korean Working Condition Survey, 2006.

	Sample (%)[a]	Population (%)
Age group		
15–24	5.4	7.4
25–34	23.3	23.7
35–44	32.0	27.7
45–54	25.0	23.5
55–65	14.3	17.6
Sex		
Men	57.9	58.0
Women	42.1	42.0
Education		
Below middle school	19.7	24.3
High school	41.4	42.4
College/university and beyond	38.9	33.3
Industry sectors		
Agriculture, forestry, and fishing	7.4	8.3
Mining and manufacturing	21.2	17.9
Construction	6.5	7.9
Wholesale and retail trade, hotels, and restaurants	19.8	24.8
Electricity, transport, telecom, and finance	11.4	10.0
Education	8.4	7.2
Other services	25.4	24.0
Total number	10,043	23,447,000

[a] Figures of sample population are weighted

Table 2

Questions regarding workplace psychosocial factors

Variables	Questions and response options (in parentheses)	Response criteria for exposure group
Sexual harassment	Over the past 12 months, have you been subjected to sexual harassment at work? (Yes/No)	Yes
Sexual discrimination	Over the past 12 months, have you been subjected to sexual discrimination at work? (Yes/No)	Yes
Age discrimination	Over the past 12 months, have you been subjected to age discrimination at work? (Yes/No)	Yes
Threat of violence	Over the past 12 months, have you been subjected to threats of physical violence at work? (Yes/No)	Yes
Violence at work	Over the past 12 months, have you been subjected to physical violence at work? (Yes/No)	Yes
Work-life balance	In general, do your working hours fit in with your family or social commitments outside work? (very well, well, not very well, or not at all well)	Not very well or not at all well
Job satisfaction	On the whole, how satisfied are you with your working conditions in your main paid job? (very satisfied, satisfied, not very satisfied, or not at all satisfied)	Not very satisfied or not at all satisfied
Cognitive demands	You find your job intellectually demanding. (almost always, often, sometimes, rarely, or almost never)	Almost always, often, or sometimes
Emotional demands	You find your job emotionally demanding. (almost always, often, sometimes, rarely, or almost never)	Almost always or often
Work intensity	(a) Do you work at very high speed? (b) Do you work too tight deadlines? (never (0 % of time), almost never (10 % of the time), about 25 % of the time, about 50% of the time, around 75 % of the time, almost all the time (90% of the time), or always (100 % of the time))	Median split, high (36–200) and low (0–35)
Job autonomy	(a) You have influence over the choice of your working partners (almost always, often, sometimes, or rarely, 1; almost never, 0). (b) You can take your break when you wish (almost always, often, sometimes, or rarely, 1; almost never, 0). (c) Are you able to change your order of tasks (yes, 1; no, 0). (d) Are you able to choose your method of work (yes, 1; no, 0). (e) Are you able to change your speed or rate of work (yes, 1; no, 0)	Median split, high (3) and low (0–2)
Job insecurity	I might lose my job in the next 6 months (strongly agree, agree, neither agree nor disagree, disagree, or strongly disagree)	Strongly agree or agree
Job strain	Low strain group (low work intensity + high job autonomy), active group (high work intensity + high job autonomy), passive group (low work intensity + low job autonomy), and high strain group (high work intensity + low job autonomy)	Four exposure groups based on exposure to job autonomy and insecurity
Social support	(a) You can get assistance from colleagues if you ask for it and (b) you can get assistance from supervisors if you ask for it (almost always, often, sometimes, rarely, or almost never)	Rarely or almost never

Table 3

Characteristics of study population (*n*=7,856)

Characteristics	Number (%)
Work absence due to injury (yes)	108 (1.4)
Sex	
Male	4,611 (58.7)
Female	3,245 (41.3)
Age group (years)	
18–24	205 (2.6)
25–34	1,759 (22.4)
35–44	2,597 (33.0)
45–54	2,094 (26.7)
55–65	1,201 (15.3)
Highest education	
Below middle school	1,563 (19.9)
High school	3,125 (39.8)
College/university and beyond	3,168 (40.3)
Smoking status	
Never	4,246 (54.1)
Former	1,110 (14.1)
Current	2,500 (31.8)
Alcohol consumption (grams of ethanol per week)	
Nondrinker	2,242 (28.5)
0.01 to 49.9	2,715 (34.6)
50.0 to 99.9	993 (12.6)
100.0 to 299.9	1,461 (18.6)
>300.0	445 (5.7)
Presence of illness	
No	6,085 (77.5)
Yes	1,771 (22.5)
Employment status	
Employed	5,334 (67.9)
Self employed or employer	2,522 (32.1)
Income (million Korean won per month)	
<1 (approximately 820.34 €)[a]	1,806 (23.0)
1–1.99	3,052 (38.8)
≥2 (approximately 1,640.69 €)	2,998 (38.2)
Job type	
Senior manager/clerical	1,368 (17.4)
Professional/technical	1,595 (20.3)
Service	885 (11.3)
Sales	926 (11.8)

Characteristics	Number (%)
Agriculture/fisheries	624 (7.9)
Skilled	776 (9.9)
Machine operator	835 (10.6)
Unskilled	804 (10.2)
Armed forces	43 (0.6)
Employment contract	
Full time work	7,641 (97.3)
Part time	215 (2.7)
Working hours per week	
<35	734 (9.3)
35–44	2,574 (32.8)
≥45	4,543 (57.8)
Missing	5 (0.1)
Work schedule	
Nonshift (daytime)	524 (6.7)
Shift/night	7,328 (93.3)
Missing	4 (0.0)

[a] At an exchange rate of approximately 1,219 Korean won/1 € (as of 1 Aug 2006)

Table 4

Associated factors underlying risk of work absence due to injury in a representative sample of Korean workers (*n*=7,856)

Characteristics	Univariate OR (95 % CI)	*p* value	Multivariate OR[a] (95 % CI)	*p* value
Sex				
Female	1.00	<0.001	1.00	<0.001
Male	4.90 (2.78–8.64)		3.20 (1.68–6.10)	
Age group (years)				
18–24	1.00	0.232		
25–34	2.94 (0.34–25.24)			
35–44	3.03 (0.36–25.59)			
45–54	4.42 (0.53–37.27)			
55–65	2.67 (0.30–23.51)			
Highest education				
Below middle school	3.95 (2.09–7.46)	<0.001	2.21 (1.16–4.20)	0.026
High school	4.62 (2.61–8.16)		2.07 (1.02–4.19)	
College/university and beyond	1.00		1.00	
Income (million Korean won per month)				
<1 (approximately US$1,035.73)	1.00	0.021		
1–1.99	2.13 (1.21–3.75)			
≥2 (approximately US$3,107.19)	1.48 (0.81–2.68)			
Smoking status				
Never	1.00	<0.001		
Former	5.26 (3.17–8.72)			
Current	2.95 (1.82–4.76)			
Alcohol consumption (grams of ethanol per week)				
Nondrinker	1.00	0.007		
0.01–49.9	1.49 (0.84–2.67)			
50.0–99.9	2.54 (1.34–4.84)			
100.0–299.9	2.42 (1.33–4.40)			
≥300.0	2.92 (1.34–6.34)			
Presence of illness				
No	1.00	<0.001	1.00	<0.001
Yes	23.30 (13.37–40.62)		22.37 (12.74–39.28)	
Type of employment				
Employed	1.22 (0.80–1.87)	0.351		
Self employed or employer	1.00			
Job type				
Senior manager/clerical	1	<0.001	1	0.003
Professional/technical	0.59 (0.16–2.11)		0.56 (0.15–2.06)	
Service	2.50 (0.88–7.06)		1.89 (0.64–5.58)	
Sales	0.74 (0.18–3.02)		0.47 (0.11–1.99)	

Characteristics	Univariate OR (95 % CI)	*p* value	Multivariate OR[a] (95 % CI)	*p* value
Agriculture/fisheries	3.53 (1.24–10.00)		1.57 (0.50–4.93)	
Skilled	9.80 (4.03–23.88)		3.74 (1.44–9.71)	
Machine operator	9.66 (3.98–23.42)		2.60 (1.00–6.74)	
Unskilled	3.61 (1.34–9.74)		2.23 (0.77–6.46)	
Armed forces	1.09 (0.01–100.96)		0.53 (0.01–50.89)	
Employment contract				
Full time	1.00			
Part time	1.26 (0.76–2.01)			
Working hours (hours per week)				
<35	1.00	0.001		
35–44	2.61 (0.72–9.40)			
≥45	5.14 (1.49–17.68)			
Work schedule				
Nonshift	1.00	<0.001	1.00	0.026
Shift/night	3.53 (2.17–5.72)		1.89 (1.08–3.30)	

[a]Forward stepwise multiple logistic regression analysis ($p \leq 0.10$ for inclusion)

OR odds ratio, *CI* confidence interval

Table 5

Workplace psychosocial factors underlying risk of injury absence in the representative sample of Korean workers (*n*=7,856)

	Number (%)	Crude OR	*p* value	Model A[a] Adjusted OR	*p* value	Model B[b] Adjusted OR	*p* value	Model C[c] Adjusted OR	*p* value
Sexual harassment									
No	7,810 (99.4)	1	0.007	1	0.203	1	0.821	1	0.851
Yes	45 (0.6)	2.74 (1.31–5.73)		3.14 (0.54–18.27)		1.23 (0.20–7.60)		1.19 (0.19–7.34)	
Sexual discrimination									
No	7,747 (98.6)	1	0.932	1	0.689	1	0.916	1	0.912
Yes	109 (1.4)	0.93 (0.07–5.00)		1.42 (0.26–7.78)		0.91 (0.16–5.26)		0.91 (0.16–5.24)	
Age discrimination									
No	7,631 (97.1)	1	0.007	1	0.01	1	0.38	1	0.769
Yes	225 (2.9)	2.74 (1.31–5.73)		2.71 (1.27–5.77)		1.43 (0.64–3.20)		1.14 (0.48–2.68)	
Violence at work									
No	7,809 (99.4)	1	<0.001	1	<0.001	1	<0.001	1	<0.001
Yes	47 (0.6)	13.83 (6.11–31.29)		13.45 (5.59–32.38)		6.96 (2.69–17.97)		7.05 (2.69–18.50)	
Threat of violence									
No	7,811 (99.4)	1	<0.001	1	0.001	1	0.028	1	0.015
Yes	44 (0.6)	7.25 (2.54–20.73)		6.04 (2.04–17.89)		3.66 (1.15–11.63)		4.25 (1.32–13.64)	
Work-life balance									
Good	5,777 (73.5)	1	<0.001	1	0.006	1	0.985	1	0.341
Poor	2,078 (26.5)	2.37 (1.61–3.47)		1.74 (1.18–2.56)		1.00 (0.66–1.50)		0.80 (0.51–1.26)	
Job satisfaction									
High	5,445 (69.3)	1	<0.001	1	<0.001	1	0.093	1	0.209
Low	2,411 (30.7)	3.23 (2.19–4.74)		2.48 (1.66–3.71)		1.44 (0.94–2.19)		1.32 (0.86–2.04)	
Cognitive demands									
Low	4,101 (52.2)	1	0.746	1	0.147	1	0.789	1	0.388
High	3,755 (47.8)	1.07 (0.73–1.56)		1.34 (0.90–1.97)		1.06 (0.70–1.58)		1.21 (0.79–1.85)	
Emotional demands									
Low	4,406 (56.1)	1	0.702	1	0.143	1	0.819	1	0.236
High	3,450 (43.9)	1.08 (0.74–1.58)		1.34 (0.91–1.97)		1.05 (0.70–1.58)		1.31 (0.84–2.05)	
Work intensity									

	Number (%)	Crude OR	*p* value	Model A[a] Adjusted OR	*p* value	Model B[b] Adjusted OR	*p* value	Model C[c] Adjusted OR	*p* value
Low	4,300 (54.7)	1	<0.001	1	<0.001	1	0.009	1	0.087
High	3,556 (45.3)	2.88 (1.90–4.36)		2.55 (1.68–3.89)		1.80 (1.16–2.80)		1.49 (0.95–2.34)	
Job insecurity									
Low	5,269 (67.1)	1	0.349	1	0.427	1	0.517	1	0.87
High	2,587 (32.9)	1.21 (0.81–1.79)		1.18 (0.79–1.75)		1.15 (0.76–1.74)		1.04 (0.67–1.60)	
Social support at work									
High	4,398 (56)	1	0.231	1	0.016	1	0.002	1	0.055
Low	3,457 (44)	0.79 (0.53–1.16)		0.60 (0.40–0.91)		0.50 (0.32–0.77)		0.58 (0.33–1.01)	
Job autonomy									
High	4,769 (60.7)	1.00	<0.001	1.00	<0.001	1.00	<0.001	1.00	0.007
Low	3,087 (39.3)	2.42 (1.64–3.58)		2.17 (1.47–3.22)		2.01 (1.39–3.14)		1.79 (1.17–2.74)	
Job strain									
Low strain	2,871 (36.5)	1.00	<0.001	1.00	<0.001	1.00	<0.001	1.00	0.026
Active group	1,898 (24.2)	2.39 (1.28–4.44)		2.14 (1.15–4.01)		1.51 (0.79–2.89)		1.35 (0.67–2.60)	
Passive group	1,429 (18.2)	1.92 (0.96–3.85)		1.76 (0.87–3.53)		1.77 (0.87–3.63)		1.65 (0.79–3.45)	
High strain	1,658 (21.2)	5.36 (3.06–9.39)		4.41 (2.50–7.77)		3.15 (1.75–5.68)		2.38 (1.29–4.42)	

OR odds ratio, *CI* confidence interval

[a] Adjusted for age group, sex, educational level, and income

[b] Adjusted for age group, sex, educational level, income, smoking, drinking, and presence of illness

[c] Adjusted for age group, sex, educational level, income, smoking, drinking, presence of illness, type of employment, type of occuption, employment contract, working time, and work schedule