World Academy of Science, Engineering and Technology
International Journal of Humanities and Social Sciences
Vol:12, No:8, 2018

Musculoskeletal Pain, Work Characteristics and Presenteeism among Hotel Employees

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Open Science Index, Humanities and Social Sciences Vol:12, No:8, 2018 publications.waset.org/10009349/pdf

Abstract**—**Musculoskeletal problems in the hotel sector have been little studied. The aim of this study was to examine relationships of musculoskeletal pain and work characteristics with presenteeism, i.e., feeling sick but going to work anyway. Data of a self-reported questionnaire were collected from 1,101 employees, who joined the study on a voluntary basis from four hotels in northern Taiwan. The results showed that respondents who were female, were younger, had a higher educational level, and worked in the real-service department had higher presenteeism. There were significant positive associations between presenteeism and heavy loads, frequent beatings or hits of hard objects, improper bench height, employees' lower limb and lower back pain. Our study results imply that knowledge of work characteristics and employees' musculoskeletal problems could be advantageously used to reduce presenteeism in the workplace.

Keywords**—**Musculoskeletal pain, absenteeism, presenteeism, hotel employees.

I. Introduction

MUSCULOSKELETAL problems are common diseases in the workplace and can cause disability if they are ignored. The World Health Organization (WHO) noted that musculoskeletal disorders lead to considerable costs for public health systems and has emphasized the importance of ergonomics and worker protection in the workplace [1]. Musculoskeletal pain is the health condition with the third highest prevalence in the workplace after sleep disorders and pressure in Europe [2]. Musculoskeletal problems are not necessarily easily diagnosed and might lead to long-term absenteeism and impaired working ability. Before absenteeism, presenteeism should garner attention as a warning to prevent long-term disability.

Many employers, including hotels, should improve their ergonomic environment and pay attention to workers' musculoskeletal problems. Although musculoskeletal pain is a common health condition, only a few studies have surveyed musculoskeletal problems among hotel workers. In recent years, the tourism and catering industry has rapidly grown in Taiwan. According to Taiwanese statistics, the rate of increase of the working population in the tourism and catering industry was the highest in the service sector, and there are nearly 360,000 people employed by this industry [3]. But only a few studies have investigated musculoskeletal pain in hotel workers in Taiwan. More studies are needed to promote workplace health.

There are quite different types of jobs within hotels, such as house cleaning, cooking, gardening, administrative work, and baggage handling, and thus workers have different sites of musculoskeletal pain depending on their job. Only a few previous studies in Taiwan examined risk factors which can cause neck, shoulder, elbow, and back pain in housekeeping sector workers who stoop, clean, do heavy lifting, and lean forward while working, and those who carry a cleaning cart or stoop for prolonged periods have particularly higher risks [4]-[6]. Working in the front office often causes high prevalence of neck, back, and lower-limb pain due to standing for long periods, prolonged use of a computer, and inadequate rest periods [7], [8]. Working in administration departments often causes high prevalence of neck, shoulder, upper-limb, and low-back pain like in the front office [9], [10]. Overall, studies showed that hotel staff in Taiwan had quite high potential risks for musculoskeletal pain [11]. Working in the food and beverage department often causes high prevalence of neck, shoulder, and low-back pain, because cooking and preparing ingredients are mostly done by hand, and workers have to stand for long periods [12]-[14]. For cooks, obesity is one potentially improvable risk factor associated with multipart musculoskeletal pain [14]. Working in the housekeeping department often causes high prevalence of neck and back pain [15]. Before these kinds of pain problems cause absenteeism, presenteeism should be resolved.

In fact, the main illness causing presenteeism is musculoskeletal pain. Presenteeism is defined as when one thinks one should take sick leave when feeling ill or uncomfortable but still goes to work [16], [17]. Burton et al. found that arthritis resulted in greater physical working restrictions than cardiovascular diseases [18]. Musculoskeletal problems not only affect the working quality but also cause presenteeism, which significantly increased the risk of absenteeism and low self-reported health in the next two years [19], [20]. But until now and to our knowledge, no study has focused on hotel worker's presenteeism and musculoskeletal problems.

The aim of this study was to examine associations of musculoskeletal pain and work characteristics with presenteeism among hotel staff.

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II. Methods

A. Study Population

We collected data from employees of four hotels in Taipei in October to December 2013. Hotel A had over 1000 employees, B had nearly 700, C had nearly 400, and D had only 190 employees. The total number of employees in these four hotels was 2,393, and we respectively collected 605, 347, 155, and 63 samples, resulting in an average response rate of 60%.

The study was approved by the Joint Institutional Review Board of Taipei Medical University.

B. Data Collection

Our self-reported questionnaire had four parts: sociodemographic variables, productivity, work characteristics, and musculoskeletal pain.

Sociodemographic variables included the self-reported age, gender, height, weight, educational level, job title, and department. Educational level was categorized as less than junior high school, senior high, university, and higher than a master's degree. Age and weekly working hours were a self-administered score. The job title was categorized as a general employee, first-line manager, and middle and top manager. The department was categorized according to the front office, food and beverage department, housekeeping department, administration department (including human resources, finance, accounting, marketing, and information department) and other departments (including engineering and security department).

Productivity variables included presenteeism and absenteeism. The measure of presenteeism was based on a single question which assessed how often employees had come to work during the previous month despite being ill. Seven response categories consisted of none to five times and more than five times. The question was modified from the work of Aronsson et al. and Johns [16], [21]. The measure of absenteeism was also a single question about how many days employees had been absent or taken sick leave from work during the last month. Five response categories consisted of zero to three days and more than three days. We set the recall period as one month so that we could more easily compare our results to the local literature [12].

To determine work characteristics in the hotel sector, we referenced a few local studies and discussed this with some hotel staff [6], [11], [22]. We set 11 characteristics: vibration to the whole body, hand vibration, repetitious work, excessively heavy tools, heavy lifting, an unnatural working posture, long-duration standing, frequently hitting or patting a hard object, being asked to work fast, prolonged computer use, and an inappropriate working station height. So there were 11 items with a dichotomous answer of "yes"/"no".

We used the Nordic Musculoskeletal Questionnaire (NMQ) Chinese version to assess musculoskeletal pain. This tool asks whether one has had musculoskeletal pain during the last year with a dichotomous answer of "yes"/"no" for nine positions: the neck, shoulder, elbow, hand, upper back, lower back, thigh and buttocks, knee, and foot (including the ankle). This tool was developed in 1987, and it was found to have good reliability and validity [9], [23], [24]. Compared to medical records, the NMQ had > 80% goodness of fit with good criterion validity, and it also had good reliability of about 77%. For the 7-day recall period, the NMQ had a sensitivity of 66%~92% and a specificity of 71%~88%, with the neck, shoulder, and hand having the highest sensitivity and specificity.

C. Statistical Analysis

Presenteeism was dichotomized as "without presenteeism" and "with presenteeism." Chi-squared tests were used to assess relationships of presenteeism with sociodemographic variables, work characteristics, and musculoskeletal pain. After conducting univariate and bivariate analyses, variables were selected to construct multivariate models with logistic regressions. Each model was adjusted for gender, age, educational level, hotel, and department as covariates. Multivariate models were analyzed at a 95% significance level ($p < 0.05$). These analyses were conducted using PASW 20.0 software for Windows (SPSS, Chicago, IL, USA).

III. Results

In total, 1,101 workers completed the questionnaires; there were 46.5% male, with a mean age of 39.8 years; 55.0% had an educational level above university; 23.1% were overweight; and 17.4% were obese. As to their work, 13.1% worked in the front office, 21.6% in the housekeeping department, 46.3% in the food and beverage department, 11.0% in the administration department, and 7.9% in other departments; 67.5% were general employees, and 21.5% were first-line managers. As to productivity, 91.7% had no absenteeism during the last month, and 6.2% had one day; 70.0% had no presenteeism, while 12.3% had one time.

All variables showed significant differences between "without presenteeism"' and "with presenteeism" except the job title (Table I). Respondents who were female, were younger, and had a higher educational level had more presenteeism; hotel A had more presenteeism than the other three hotels; and the administration department had more than other departments. Those who had absenteeism during the last month also had more presenteeism than those without absenteeism.

Table II describes work characteristics: 76.8% employees have to stand for long periods, 62.4% do heavy lifting, 51.9% do repetitive work, 42.4% experience prolonged computer use, 38.6% have to use an unnatural working posture, 27.6% frequently hitting or patting a hard object, and 31.0% worked with inappropriate working station height. Employees with one of these work characteristic had higher presenteeism than those who had none of them.

There were 72.2% employees who had musculoskeletal pain in at least one body part (Table III). After we combined positions as the upper trunk (including the neck, shoulders, and upper back), lower trunk (low back, thighs, and buttocks), upper limbs (elbows and hands), and lower limb (knees and feet), those who self-reported having musculoskeletal pain in any body part had higher presenteeism than those with no musculoskeletal pain.

Our bivariate analysis showed that gender, age, educational level, department, and hotel were significantly associated with work characteristics and musculoskeletal pain, but not the BMI. Then we performed a univariate analysis with adjustment for covariates and found that the work characteristic of "prolonged computer use" became non-significant. Therefore, we excluded the BMI and prolonged computer use from the subsequent regression analysis.

We had five models after the logistic regression analysis (Table IV). Model 1 had only covariate variables with a predictive ability of 11.5%: those who were female, younger, and had a higher educational level had higher presenteeism, and those who worked in the administration department had higher presenteeism than others. Model 2 found that those who had to do heavy lifting, frequently hit or patted a hard object, and had an inappropriate working station height had significantly higher presenteeism. Model 4 found that those with lower-trunk and limb musculoskeletal pain had higher presenteeism. As to absenteeism, model 3 and model 5 found that these variables had much lower predictive ability for absenteeism, but those who had to do heavy lifting had less absenteeism, and those who worked in an unnatural working posture had higher absenteeism. There was no association between musculoskeletal pain and absenteeism.

TABLE I
DESCRIPTION OF SOCIODEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS [BMI = BODY MASS INDEX]

	With presenteeism		Without presenteeism		Total		*p* value
	n	%	*n*	%	*n*	%	
Gender							< 0.001**
Male	117	23.0	392	77.0	509	46.5	
Female	213	36.0	379	64.0	592	53.8	
Age (years)							< 0.001**
18~29	134	43.8	172	56.2	306	29.4	
30~39	90	32.0	191	68.0	281	27.0	
40~49	45	26.0	128	74.0	173	16.6	
50~64	48	17.6	224	82.4	272	26.2	
≥ 65	0	0.0	8	100.0	8	0.7	
Education							< 0.001**
≤ Junior High	18	13.6	114	86.4	132	12.3	
Senior High	94	26.7	258	73.3	352	32.7	
≥ University	215	36.3	377	63.7	592	55.0	
Job Title							0.076
General staff	197	28.2	501	71.8	698	67.5	
First line manager	83	37.4	139	62.6	222	21.5	
Medium or top manager	29	28.7	72	71.3	101	11.0	
Hotel							0.029*
A	188	33.0	381	67.0	569	51.7	
B	76	23.6	246	76.4	322	29.2	
C	47	31.5	102	68.5	149	13.5	
D	19	31.1	42	68.9	61	5.5	
Department							0.007**
Front office	39	27.7	102	72.3	141	13.1	
Housekeeping	56	24.1	176	75.9	232	21.6	
Food & beverage	163	32.8	334	67.2	497	46.3	
Administration	44	37.3	74	62.7	118	11.0	
Other	16	18.8	69	81.2	85	7.9	
BMI							
Underweight	27	9.1	35	5.0	62	6.2	0.023*
Normal	166	55.7	369	52.3	535	53.3	
Overweight	57	19.1	175	24.8	232	23.1	
Obese	48	16.1	127	18.0	175	17.4	
Absenteeism							< 0.001**
Yes	57	63.3	33	36.7	90	8.3	
No	267	26.6	724	73.4	991	91.7	

* $p < 0.05$; ** $p < 0.01$.

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TABLE II
ASSOCIATIONS BETWEEN PRESENTEEISM AND WORK CHARACTERISTICS

	With presenteeism		Without presenteeism		Total		*p* value
	n	%	*n*	%	*n*	%	
Vibration to the whole body							0.356
Yes	42	34.4	80	65.6	122	12.2	
No	267	30.3	614	69.7	881	87.8	
Hand vibration							0.331
Yes	22	26.2	62	73.8	84	8.4	
No	288	31.3	632	68.7	920	91.6	
Repetitious work							< 0.001**
Yes	195	37.2	329	62.8	524	51.9	
No	118	24.3	367	75.7	485	48.1	
Excessively heavy tools							0.010*
Yes	126	36.1	223	63.9	349	34.6	
No	186	28.2	473	71.8	659	65.4	
Heavy lifting							< 0.001**
Yes	226	35.8	405	64.2	631	62.4	
No	88	23.1	293	76.9	381	37.6	
Unnatural work posture							< 0.001**
Yes	146	37.5	243	62.5	389	38.6	
No	164	26.5	456	73.5	620	61.4	
Long-duration standing							< 0.001**
Yes	267	34.1	516	65.9	783	76.8	
No	51	21.5	186	78.5	237	23.2	
Frequently hitting or patting a hard object							< 0.001**
Yes	111	40.1	166	59.9	277	27.6	
No	199	27.3	529	72.7	728	72.4	
Being asked to work fast							0.710
Yes	22	28.9	54	71.0	76	7.6	
No	287	31.0	639	69.0	926	92.4	
Prolonged computer use							0.006**
Yes	152	35.6	275	64.4	427	42.4	
No	159	27.5	420	72.5	579	57.6	
Inappropriate work station height							< 0.001**
Yes	140	44.9	172	55.1	312	31.0	
No	171	24.6	524	75.4	695	69.0	

* $p < 0.05$; ** $p < 0.01$.

TABLE III
ASSOCIATIONS BETWEEN PRESENTEEISM AND MUSCULOSKELETAL PAIN

	With presenteeism		Without presenteeism		Total		*p* value
	n	%	n	%	n	%	
Any part							< 0.001**
Yes	281	35.3	514	64.7	795	72.2	
No	49	16.0	257	84.0	306	27.8	
Upper trunk							< 0.001**
Yes	241	39.2	374	60.8	615	55.9	
No	89	18.3	397	81.7	486	44.1	
Lower trunk							< 0.001**
Yes	196	40.7	286	59.3	482	43.8	
No	134	21.6	485	78.4	619	56.2	
Upper limb							< 0.001**
Yes	141	38.6	224	61.4	365	33.2	
No	189	25.7	547	74.3	736	66.8	
Lower limb							< 0.001**
Yes	186	42.0	257	58.0	443	40.2	
No	144	21.9	514	78.1	658	59.8	

Upper trunk (including the neck, shoulders, and upper back), Lower trunk (low back, thighs, and buttocks), Upper limbs (elbows and hands), Lower limb (knees and feet). * $p < 0.05$; ** $p < 0.01$.

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TABLE IV
LOGISTIC REGRESSION OF HOTEL WORK CHARACTERISTICS AND MUSCULOSKELETAL PAIN [OR = ODDS RATIO, 95%CI = CONFIDENCE INTERVAL]

33	Hotel work characteristics			Musculoskeletal pain	
	Presenteeism		Absenteeism	Presenteeism	Absenteeism
	Model 1 OR (95%CI)	Model 2 OR (95%CI)	Model 3 OR (95%CI)	Model 4 OR (95%CI)	Model 5 OR (95%CI)
Gender					
Male	1.00	1.00	1.00	1.00	1.00
Female	1.91** (1.41~2.58)	2.35** (1.67~3.29)	1.84* (1.08~3.14)	1.56** (1.14~2.15)	1.28 (0.80~2.06)
Age	0.97** (0.95~0.98)	0.97** (0.95~0.99)	0.97* (0.95~1.00)	0.97** (0.96~0.99)	0.98 (0.96~1.01)
Education					
≤ Junior High	1.00	1.00	1.00	1.00	1.00
Senior High	2.00* (1.07~3.74)	2.21# (0.99~4.13)	1.19 (0.47~3.04)	2.12* (1.11~4.04)	1.35 (0.58~3.16)
≥ University	2.04* (1.05~3.94)	2.08# (0.99~4.38)	0.76 (0.27~2.08)	2.07* (1.04~4.11)	0.99 (0.40~2.49)
Hotel					
A	1.37 (0.69~2.71)	1.05 (0.51~2.17)	1.22 (0.40~3.69)	1.64 (0.81~3.34)	1.31 (0.45~3.84)
B	1.26 (0.61~2.60)	0.869 (0.40~1.85)	0.85 (0.26~2.73)	1.25 (0.59~2.64)	1.03 (0.33~3.20)
C	1.28 (0.59~2.78)	0.57 (0.24~1.33)	0.51 (0.13~2.07)	1.24 (0.56~2.77)	0.91 (0.26~3.40)
D	1.00	1.00	1.00	1.00	1.00
Department					
Administration	1.00	1.00	1.00	1.00	1.00
Housekeeping	0.61# (0.35~1.05)	0.48* (0.25~0.91)	0.48 (0.18~1.26)	0.48* (0.27~0.86)	0.66 (0.27~1.61)
Food & beverage	0.71 (0.43~1.16)	0.58# (0.33~1.04)	0.64 (0.27~1.52)	0.66 (0.39~1.11)	0.94 (0.42~2.07)
Front office	0.50* (0.28~0.88)	0.47* (0.25~0.87)	0.42 (0.15~1.20)	0.42** (0.23~0.76)	0.48 (0.17~1.32)
Other	0.45* (0.22~0.92)	0.41* (0.19~0.89)	1.04 (0.37~2.92)	0.44* (0.21~0.93)	1.18 (0.44~3.15)
Repetitious work					
Yes		1.15 (0.82~1.61)	0.64 (0.38~1.09)		
No		1.00	1.00		
Excessively heavy tools					
Yes		0.99 (0.68~1.45)	1.66 (0.92~3.01)		
No		1.00	1.00		
Heavy lifting					
Yes		1.78** (1.20~2.66)	0.45* (0.24~0.83)		
No		1.00	1.00		
Unnatural work posture					
Yes		1.12 (0.78~1.61)	2.02* (0.16~3.55)		
No		1.00	1.00		
Long-duration standing					
Yes		0.89 (0.56~1.42)	1.04 (0.52~2.10)		
No		1.00	1.00		
Frequently hitting or patting a hard object					
Yes		1.60* (1.08~2.35)	1.62 (0.90~2.93)		
No		1.00	1.00		
Inappropriate work station height					
Yes		1.72** (1.22~2.43)	0.95 (0.55~1.63)		
No		1.00	1.00		
Upper-trunk pain					
Yes				1.28 (0.88~1.85)	1.05 (0.61~1.81)
No				1.00	1.00
Lower-trunk pain					
Yes				1.65** (1.17~2.31)	0.96 (0.57~1.61)
No				1.00	1.00
Upper-limb pain					
Yes				1.09 (0.78~1.53)	1.14 (0.69~1.89)
No				1.00	1.00
Lower-limb pain					
Yes				2.24** (1.62~3.11)	1.05 (0.64~1.73)
No				1.00	1.00
R^2	0.115	0.191	0.088	0.200	0.028

CI, confidence interval; OR, odds ratio.
$0.1 < p < 0.05$; * $p < 0.05$; ** $p < 0.01$.

IV. DISCUSSION

In this study, 1,101 workers completed our questionnaires, and results showed that 30.0% of workers had had presenteeism, 8.3% had had absenteeism, and 72.2% had experienced musculoskeletal pain during the past month. Musculoskeletal problems in the hotel sector still an important issue in Taiwan. According to Taiwan Ministry of Labor's

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survey in 2014, the hotel sector had near 20% prevalence rate about occupational lumbar disc disease, occupational carpal tunnel syndrome and occupational shoulder tendonitis, and it was third highest occupation, second only to manufacturing and construction [25]. Until now, although musculoskeletal pain is a concern as an important health problem, most research only focused on certain jobs, e.g., health care, builders, and drivers but not employees in the hotel sector. So this study seems to be the first to examine associations of musculoskeletal pain and work characteristics with presenteeism.

We found that those who were female, younger, and had a higher educational level had higher presenteeism. These results were similar to those of other studies in other industries [26]-[28]. Aronsson et al. found that back and neck pain were highly associated with presenteeism in several industries, especially administrative staff and machine operators [29]. One study found that white collar workers were more willing to engage in presenteeism but not absenteeism in contrast to blue collar workers [30]. This might explain why administration department employees had higher presenteeism than those in other departments. Furthermore, among variables which were significantly associated with the presenteeism in the univariate analysis but non-significant in the multi-variable analysis, we thought it still an important factor about the association between presenteeism and musculoskeletal pain, e.g. repetitious work.

We found that lower-limb and lower-body pain were associated with higher presenteeism, in contrast to some of the literature. Howard et al. found that people with an upper-limb injury had higher presenteeism, even when they already had medical care, and their presenteeism was higher than their absenteeism [26]. We thought the difference might have been caused by the difference between "pain" and "injury". In this study, musculoskeletal pain might be closer to a subjective health complaint, but not injury or chronic diseases that decrease the comparability between studies. In fact, most musculoskeletal disorders in presenteeism studies focused on work-related musculoskeletal disorders (WMSDs) or other chronic musculoskeletal diseases like low-back pain and arthritis. For those workplaces with complex work characteristics, e.g., hotels, manufacturing, and services, screening for musculoskeletal pain due to every kind of work in different departments is important to reduce the prevalence of long-term musculoskeletal pain.

Based on our results, some recommendations are proposed. The hotel sector should pay more attention to employees' musculoskeletal disorders, especially in the administration department. In Taiwan, most hotels have fewer administrative staff but heavy workloads, so the staff always have to use computers for prolonged periods. Compared to other departments, administration department staff had higher presenteeism, which indicates that they might have more fatigue than others, and their health problems cannot be ignored. Furthermore, hotel sector employers should improve ergonomics of the workplace to prevent health problems. Although there were lower risks and lower presenteeism in housekeeping than administration departments, this might be because it is easier to support each with that kind of work than with administration work. For example, a past study found that presenteeism was lower for some work with higher alternatives [28]. In future research, more study of the associations of musculoskeletal pain and work characteristic risk factors with presenteeism is needed, including different pain locations associated with presenteeism, long-term musculoskeletal pain with presenteeism and absenteeism, and hotel sector employee's presenteeism to improve worker's health especially those with a complex nature of work.

A major limitation of our study is the cross-sectional design which did not allow us to draw causal relationships of musculoskeletal pain with presenteeism, so longitudinal research is needed. Second, the recall period of our measurement tools might have limited our results, since the NMQ covers 12 months but our question about presenteeism was in the previous one month. It is still inconclusive as to how long of a recall period for measuring presenteeism is optimal, and it is still difficult to test. For absenteeism, the reliability could be tested by comparing company records with self-reported answers but not for presenteeism. Absenteeism had good reliability with a 12-month recall period, but had lower reliability than six months and one month [31], [32]. Most patients with musculoskeletal disorders like work-related musculoskeletal disorders have little absenteeism, with about 4.6 days a year, so they have a lower recall bias than other diseases which require more rest [33], but it is quite different with presenteeism. Aronsson et al. found 53% of respondents who had at least one day of presenteeism in a year, and 13% had more than five days [16]. Johns found that there were on average 17.29 days per person per year, but the median was three days with a 6-month recall period [21]. It was noted by us that presenteeism had a less-stable and higher recall bias with a long recall period. In our study, 30% of respondents had at least one day of presenteeism in one month, and 1.5% had more than five days, but we cannot assume that this can be extrapolated to one year for comparison with the literature. Therefore, to increase the reliability of the study, we thought that a short recall period was better than a longer one.

The strength and uniqueness of this study lie in the fact that it is the first to cover this topic in the literature. It should be helpful for worksite health promotion work in the hotel sector in Taiwan, but to extend these results to more hotels, we think that more research is still needed. In addition, the NMQ used good reliability and validity and might help us correctly understand the current situation to have better health promotion work.

V. Conclusion

This study explored associations of musculoskeletal pain and work characteristics with presenteeism in four hotels in Taipei, Taiwan, and the results indicated that respondents who were female, were younger, had a high educational level, and worked in the administration department had higher presenteeism. Heavy loads, frequent beatings or hits of hard objects, and improper bench height were significantly associated with presenteeism. Moreover, presenteeism was higher for

employees with lower-limb and lower-trunk musculoskeletal pain. It would be advantageous to prevent musculoskeletal pain and improve work characteristics in order to influence presenteeism in a positive direction.

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