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Original article

Work-related stress and mental health among bus drivers in Bangkok mass transit authority

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Abstract

Background: The work-related stress and mental health problems are increasing every year due to the changing environmental and social conditions. Bus drivers are particularly vulnerable to these problems because of their jobs and the unsafe work environment that can cause work-related stress and mental health problems.

Objective: This study aimed to investigate the prevalence and factors associated with work-related stress and mental health problems among bus drivers in the Bangkok mass transit authority.

Methods: A cross-sectional study was conducted among 329 bus drivers during February and April 2023. The instrument used in this research was a questionnaire that included personal factors, work-related factors, and work environment. Work-related stress was assessed by using the Thai JCQ-45, while mental health status was evaluated using the Thai GHQ-12. Data were analyzed using descriptive statistics, bivariate, and multiple logistic regression analyses.

Results: The response rate was 86.6%. The prevalence of high work-related stress was 30.4% and the prevalence of individuals at risk of mental problems was 19.5%. Factors associated with work-related stress included female gender (aOR 2.1, 95% CI: 1.1 - 4.3), physical exercise at least 5 days per week (aOR 0.32, 95% CI: 0.1 - 0.9), high physical job demands (aOR 7.5, 95%CI: 4.0 - 14.0), high social support (aOR 0.1, 95% CI: 0.0 - 0.4). Factors associated with the risk of mental health problems were working more than 48 hours per week (aOR 2.1, 95% CI: 1.1 - 4.0) and high hazard at work (aOR 3.8, 95% CI: 31.9 - 7.5). Moreover, employees with high work-related stress had a 1.8 times higher risk of mental health problems (95% CI: 1.0 - 3.1) compared to those with low work-related stress.

Conclusion*:* Bus drivers are at risk of work-related stress and mental health problems. Therefore, organizations should promote policies regarding work-related stress and mental health problems to ensure that employees can work happily and maintain good mental health.

Keywords: Bangkok mass transit authority, bus driver, mental health, work-related stress.

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Stress is a condition that can occur to everyone at any stage of life. It manifests when triggered by environmental and societal factors. It is an emotional state that arises from the mind, encompassing both mental and physical aspects. This happens when a person perceives an inability to control the situation, which is particularly evident among the working-age population. This age group carries various responsibilities encompassing work, financial matters, and family. According to a survey conducted by the Thai national statistical office in 2019, approximately 70.0% of the entire working-age population in the country is at risk of experiencing stress. [1] The major causes of stress primarily stem from work-related or occupational issues.

Work-related stress refers to an individual's response to demands from their job and pressure that does not align with their competence, as defined by the International Labour Organization (ILO). This problem has been recognized by the ILO as a severe form of sickness impacting industrial business sectors. [2] Consistent with previous studies, work-related stress has been linked to adverse physical health outcomes, such as cardiovascular diseases [3] and musculoskeletal disorders. [4] It has also been linked to psychological impacts, especially depression and anxiety. [5] Furthermore, work-related stress correlates with increased absenteeism, job turnover rates, and decreased employee productivity. [6] Based on Karasek R's job demand-control theory, a well-known framework explaining work-related stress, it is observed that jobs with high-stress levels arise from high psychological job demand coupled with low job control. [7]

Mental health issues have grown increasingly significant each year. According to a survey by the World Health Organization (WHO) in 2019, it is estimated that around 970 million people globally face mental health problems, which amounts to 1 in 8 of the global population.[8] The major causes of mental health issues are cumulative long-term stressors.

Professional bus drivers are high risk occupation for both physical and psychological health impacts. This is due to the unsafe working conditions and working environment in which they operate. Factors include physical aspects such as noise, vibrations, and extreme temperatures; chemical exposure to and pollution; ergonomic issues; psychological stressors such as extended periods of driving, shift work, and coping with various environmental and traffic conditions. However, limited studies exist that delve into work-related stress and the mental health status of professional drivers. The purpose of this research study was to examine the prevalence and factors related to work-related stress and mental health conditions among professional drivers.

Materials and methods

A cross-sectional descriptive study was employed as the research methodology. The target population group refers to the regular passenger bus drivers of the Bangkok Mass Transit Authority (BMTA), totaling 5,402 individuals. The sample size was calculated using the formula for the sample size for finite population [9], resulting in 299. Considering a dropout or non-response sample rate of 20.0%, a minimum of 374 subjects needed to be included in the study. A multistage cluster sampling technique was used, involving the division of groups along all bus routes and work shifts.

Measurements

All subjects received a self-administered questionnaire that consists of 5 parts: 1) demographic data; 2) work-related data; 3) work environment; 4) the Thai job content questionnaire (Thai-JCQ 45), to assess work-related stress and, was developed by Karasek R.[7] and translated by Phakthongsuk P. [10] with a Cronbach's alpha coefficient of 0.86; and 5) the general health questionnaire (Thai-GHQ 12), to assess the risk of mental health problems, was developed by Goldberg DP. [11] and translated by Nilchaigowit T. [12] with a Cronbach's alpha coefficient of 0.84.

Statistical analysis

Statistical analysis was conducted using STATA version 16.0. Descriptive statistics, including frequency, percentage, median, interquartile range (IQR), and range (min-max), were used to describe the data. Bivariate analysis was performed using the Wilcoxon rank sum test, Chi-square test, and Fisher's exact test. In the multivariable analysis, factors with a $P < 0.25$ from the bivariate analysis were selected for inclusion in the model. These factors were analyzed using multiple logistic regression, and results were presented as crude odds ratios (OR), adjusted OR, and 95% confidence intervals (95% CI). A $P < 0.05$ was considered statistically significant.

The study has been approved by the Institutional Review Board (IRB), the Faculty of Medicine, Chulalongkorn University (COA no. 27/66).

Results

Data were collected during February and April 2023, including 329 bus drivers, resulting in an 86.6% response rate. The median age was 46 years, the median working experience was 14 years, and the median income was 19,530 Baht/month. The majority were male (75.7%), married or living together (64.4%), current smokers (53.8%), occasional alcohol drinkers (51.7%), and exercised less than five days a week (88.1%). Approximately 54.1% drove air-conditioned buses, 61.1% worked the morning shift (5:00 - 13:00), 31.1% experienced bus accidents during work in the past one year, and 14.6% reported passenger verbal violations in the past six months. The most common work environment problem was dust-related issues (55.0%) **(Table 1)**.

Table 1. Demographic, work-related, and environmental factors of samples (n = 329).

Factors	Median (IQR)	Min - max
Age (year)	46 (21, 53)	18 - 60
Experience (year)	14 (5, 42)	1 - 46
Income (Baht/month)	19,530 (14,000, 32000)	10,170 - 40,000
Factors	**n (%)**	
Gender		
Male	249 (75.7)	
Female	80 (24.3)	
Marital status		
Single	99 (30.1)	
Marriage or living together	212 (64.4)	
Divorced	18 (5.5)	
Underlying disease		
No	234 (71.1)	
Yes	95 (28.9)	
Smoking		
No	152 (46.2)	
Yes	177 (53.8)	
Alcohol drinking		
Never	137 (41.6)	
Sometimes	170 (51.7)	
Everyday	22 (6.7)	
Exercise		
Less than 5 days per week	290 (88.1)	
At least 5 days per week	39 (11.9)	
Bus type		
non-air conditioned	151 (45.9)	
Air conditioned	178 (54.1)	
Shift		
Evening shift (13:00 - 21:00)	128 (38.9)	
Morning shift (5:00 - 13:00)	201 (61.1)	
Working hour		
48 hours or less per week	171 (52.0)	
More than 48 hour per week	158 (48.0)	
Income		
Not sufficient	175 (53.2)	
Sufficient	154 (46.8)	
Second job		
No	314 (95.4)	
Yes	15 (4.6)	
Bus accident in past 1 year		
No	227 (69.0)	
Yes	102 (31.0)	
Passenger verbal violation in past 6 months		
No	210 (63.8)	
Yes	119 (36.2)	
Work environment problem in past 3 year*		
Hot temperature	118 (35.9)	
Smell	98 (29.8)	
Noise	124 (37.7)	
Vibration	105 (31.9)	
Dust	181 (55.0)	

* The subject may select more than 1 answers

Table 2. Number and percentage of work-related stress and job characteristics (n = 329).

Job characteristics	n (%)
Work-related stress (High strain[a])	100 (30.4)
No work-related stress (Non-high strain)	229 (69.6)
Active job[b]	65 (19.8)
Passive job[c]	96 (29.1)
Low strain[d]	68 (20.7)

[a]low job control, high psychological job demand; [b]high job control, high psychological job demand; [c]low job control, low psychological job demand; [d]high job control, low psychological job demand.

Prevalence of work-related stress and mental health problems

In this study, we classified work-related stress into two groups based on four job characteristics in the job demand-control model. Work-related stress means individuals who have a high-strain job (30.4%). No work-related stress (69.6%) includes active job (19.8%), passive job (29.1%), and low-strain job (20.7%) **(Table 2).** The prevalence of bus drivers who at risk for mental health problems classified by GHQ-12 was 19.5%.

Factors associated with work-related stress

Multivariable analysis showed that factors associated with work-related stress included being female (aOR 2.1, 95% CI: 1.1 - 4.3), exercising at least five days per week (aOR 0.3, 95% CI: 0.1 - 0.9), having high physiological job demand (aOR 7.5, 95% CI: 4.0 - 14.0), and receiving social support (aOR 0.1, 95% CI: 0.0 - 0.4) **(Table 3).**

Factors associated with mental health problems

Multivariable analysis showed that factors associated with the risk of mental health problems were working more than 48 hours per week (aOR 2.1, 95% CI: 1.1 - 4.0) and experiencing high hazard at work (aOR 3.8, 95% CI: 31.9 - 7.5) **(Table 3).**

Relationship between work-related stress and mental health

The relationship between work-related stress and mental health was analyzed using Chi-squared and logistic regression. The results show that work-related stress was statistically significantly associated with the risk of mental health problems (OR 1.8, 95% CI: 1.0 - 3.1) **(Table 4).**

Discussion

Work-related stress

The study found that the prevalence of work-related stress among bus drivers was 30.4 % consistent with similar research by Useche SA, that investigated work-related stress among bus drivers in Columbia and reported a work stress prevalence of 29.1%. [13] Because the nature of the duties of bus drivers are often similar, even when in different countries. However, the prevalence was higher compared to other professions. For instance, the prevalence was 26.9% for hospital personnel [14], 24.6% for sleep technicians [15], 22.3% for lawyers [16], and 16.3% for teachers. [17] This is because the role of a bus driver, demands adherence to rigid schedules and exposure to potentially hazardous environments.

In gender and work-related stress, females have a significantly increased work-related stress compared to males aligned with the study by Yingratanasuk T. [17] and the study by Kim SY. [18], which found that females have a positive relationship with work-related stress. Because females may confront gender-specific societal issues, such as gender segregation and inequality. [19]

In psychological job demand and work-related stress, individuals with high physical job demands have significantly increased work-related stress aligned with the study by Thitaree K. [14] High physical job demands refer to job characteristics that involve inappropriate posture or physically demanding tasks. Apart from physical health impacts, such as musculoskeletal disorders, it also affects mental health, including stress due to demanding tasks.

Table 3. Factors associated with work-related stress and risk for mental health problems: bivariate analysis and multiple logistic regression (n = 329).

Factors	Work-related stress		Risk for mental health problem	
	Crude OR (95% CI)	Adjusted OR (95% CI)	Crude OR (95% CI)	Adjusted OR (95% CI)
Age	1.0 (0.99 - 1.04)	-	1.0 (0.98 - 1.03)	-
Experience	1.0 (0.99 - 1.03)	-	1.0 (0.97 - 1.02)	-
Income	1.0 (0.99 - 10.1)	-	1.0 (0.99 - 1.01)	-
Gender				
Male	Ref		Ref	-
Female	1.9*(1.1 - 3.2)	2.2*(1.1 - 4.3)	1.4 (0.8 - 2.6)	-
Martial status				
Single	Ref		Ref	Ref
Marriage or living together	0.6 (0.4 - 1.0)	0.6 (0.3 - 1.2)	1.3 (0.7 - 2.4)	1.1 (0.5 - 2.2)
Divorced	0.8 (0.3 - 2.4)	0.6 (0.1 - 2.1)	2.6 (0.9 - 0.8)	2.0 (0.6 - 7.3)
Underlying disease				
No	Ref	-	Ref	-
Yes	1.1 (0.7 - 1.8)	-	0.9 (0.5 - 1.6)	-
Smoking				
No	Ref	-	Ref	-
Yes	0.8 (0.4 - 1.3)	-	0.9 (0.5 - 1.6)	-
Alcohol drinking				
Never	Ref	-	Ref	Ref
Sometimes	0.7 (0.4 - 1.1)	-	0.7 (0.4 - 1.3)	0.7 (0.4 - 1.4)
Everyday	1.1 (0.4 - 2.8)	-	1.7 (0.7 - 4.7)	2.3 (0.7 - 7.1)
Exercises				
< 5 days per week	Ref	Ref	Ref	-
≥ 5 days per week	0.5 (0.2 - 1.1)	0.3*(0.1 - 0.9)	0.9 (0.4 - 2.1)	-
Bus type				
non-air conditioned	Ref	-	Ref	-
Air conditioned	1.0 (0.6 - 1.6)	-	1.0 (0.6 - 1.8)	-
Shift				
Evening shift	Ref	Ref	Ref	Ref
Morning shift	1.9*(1.1 - 3.1)	1.9 (1.0 - 3.8)	0.7 (0.4 - 1.2)	0.7 (0.4 - 1.4)
Working hour				
≤ 48 hour per week	Ref	Ref	Ref	Ref
> 48 hour per week	0.9 (0.6 - 1.4)	0.9 (0.5 - 1.8)	2.5*(1.4 - 4.3)	2.1*(1.1 - 4.0)
Income				
Not sufficient	Ref	-	Ref	-
Sufficient	0.8 (0.5 - 1.2)	-	0.6 (0.3 - 1.0)	0.5 (0.3 - 1.1)
Second job				
No	Ref	Ref	Ref	-
Yes	2.8 (1.0 - 7.8)	3.6 (1.0 - 13.2)	1.0 (0.3 - 3.8)	-
Other factors				
High physiological job demands	7.8*(4.6 - 13.2)	7.5*(4.0 - 13.9)	2.4*(1.4 - 4.1)	1.6 (0.8 - 3.0)
High job security	0.1*(0.0 - 0.3)	0.3 (0.1 - 1.0)	0.2*(0.1 - 0.6)	0.5 (1.6 - 1.8)
High social support	0.1*(0.0 - 2.3)	0.1*(0.0 - 0.4)	0.7 (0.3 - 1.3)	1.2 (0.5 - 2.9)
High hazard at work	2.2*(1.4 - 3.6)	1.5 (0.8 - 2.7)	4.1*(2.3 - 7.3)	3.8*(1.9 - 7.5)
Bus accident				
No	Ref	-	Ref	-
Yes	0.8 (0.6 - 1.2)	-	1.1 (0.6 - 2.0)	-

Table 3. (Cont.) Factors associated with work-related stress and risk for mental health problems: bivariate analysis and multiple logistic regression (n = 329).

Factors	Work-related stress		Risk for mental health problem	
	Crude OR (95% CI)	Adjusted OR (95% CI)	Crude OR (95% CI)	Adjusted OR (95% CI)
Passenger verbal violation				
No	Ref	Ref	Ref	Ref
Yes	1.9*(1.2 - 3.1)	1.4 (0.8 - 2.6)	1.9 (1.1 - 3.8)	1.5 (0.3 - 1.1)
Work environment				
Hot temperature	1.2 (0.8 - 1.9)	-	1.9*(1.1 - 3.4)	1.1 (0.5 - 2.5)
Cold	3.0 (0.8 - 11.3)	2.3 (0.4 - 11.8)	3.5 (0.9 - 13.3)	2.0 (0.4 - 9.8)
Smell	1.4 (0.9 - 2.4)	0.9 (0.5 - 1.8)	2.2*(1.2 - 3.8)	0.8 (0.3 - 2.3)
Noise	1.3 (0.8 - 2.1)	-	2.0*(1.2 - 3.5)	0.7 (0.2 - 2.0)
Vibration	1.3 (0.8 - 2.1)	-	2.2*(1.3 - 3.9)	2.0 (0.8 - 5.1)
Dust	1.1 (0.7 - 1.7)	-	2.7*(1.5 - 5.0)	2.0 (0.8 - 4.6)

*Statistically significant ($P < 0.05$)

Table 4. Association between work-related stress and risk for mental health problems: Chi-squared (n = 329).

Work-related stress	Mental health		*P*-value
	At risk (n = 64)	No risk (n = 265)	
Work-related stress	38 (59.4)	191 (72.1)	0.047*
No work-related stress	26 (40.6)	74 (27.8)	

* Statistically significant ($P < 0.05$)

In exercise and work-related stress, exercising at least five days a week has significantly reduced work-related stress aligned with the study by Wu YH, *et al.* [20], which found that higher exercise frequency is associated with lower work-related stress. This is because frequent exercise and high physical activity help reduce psychological stressors and stress-inducing hormones, as well as promote both physical and mental well-being, enhancing work efficiency.

In social support and work-related stress, high social support has a significantly reduced work-related stress when compared to individuals with low social support, which aligned with the study by Thitaree K [14], which found that social support has an opposite relationship with work-related stress. This is because receiving social support within the workplace from supervisors and colleagues promotes a positive work environment. Additionally, good organizational relationships lead to increased decision-making confidence and reduced effects from stressors.

In mental health problems, the study found that the prevalence of work-related stress among bus drivers was 19.5 %, which is lower compared to the study by Koohpaei A, *et al.* [21], which studied mental health problems among bus drivers in Iran and showed a prevalence of 36.0%. Similarly, the study conducted by Mody N. [22] on bus drivers in Los Angeles revealed a prevalence of 27.5%. This discrepancy might be attributed to the fact that bus drivers in the BMTA have support from bus conductors, who assist in passenger care and preliminary issue resolution, as noted in Hatami A's study [23] on drivers in Korea. Additionally, these differences may arise from varying population characteristics and work environments in each study.

In working hours and mental health, working more than 48 hours per week has a significantly increased risk of mental health problems aligned with Saragih F, *et al.*'s study [24] due to extended working hours, leading to fatigue, insufficient sleep, and subsequently affecting mental health and work efficiency.

In hazards at work and mental health, high hazards at work have a significantly increased risk of mental health problems aligned with Joh K, *et al.*'s study [25], which showed the correlation between work hazards and mental health issues due to feelings of insecurity and stress-inducing factors. Such conditions trigger the release of stress hormones and, over time, may negatively impact mental health.

In relationship between work-related stress and mental health, the study showed that individuals experiencing high work-related stress have a significantly increased risk of mental health problems, which is statistically significant compared to those experiencing low work-related stress. This aligns with the findings of Stansfeld SA, *et al.* [26], suggesting that the body's response to stress involves the Hypothalamic-pituitary-adrenal (HPA) axis, leading to the secretion of cortisol. Additionally, the autonomic nervous system is stimulated to prepare the body to face stressors. Prolonged exposure to stress beyond an individual's coping capacity may disrupt the HPA axis, leading to mental health problems. [27]

It is noted that there are several limitations. This study follows a cross-sectional descriptive research design, which can indicate prevalence, relationships between various factors, and the magnitude of these relationships. However, it cannot establish causal relationships between different factors. The research instrument was a self-administrative questionnaire that relied on self-reported responses, which may be affected by recall bias and social desirability bias. To address this, the researchers tried to clearly explain the study's objectives and purpose to the sample group, fostering confidence in maintaining data confidentiality.

Conclusions

Bus drivers are among the professions that carry the risks of work-related stress and mental health problems. Factors that are positively associated with work-related stress include gender and physical job demands, while factors that are negatively associated with work-related stress include exercising and social support. Factors related to mental health problems include long working hours and hazards at work. The study also showed a significant association between work-related stress and the risk of mental health problems. Therefore, organizations should promote policies addressing work-related stress and mental health problems that include providing knowledge training and techniques for managing stress and emotions, particularly for female employees. Additionally, improving workplace conditions, promoting physical activity, conducting communication training to foster positive relationships within the organization, and allocating tasks appropriately are needed to ensure good physical and mental health among employees.

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Conflict of interest statement

Each of the authors has completed an ICMJE disclosure form. None of the authors declare any potential or actual relationship, activity, or interest related to the content of this article.

Data sharing statement

All data generated or analyzed during the present study are included in this published article. Further details are available for noncommercial purposes from the corresponding author on reasonable request.

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