ORIGINAL ARTICLE

The Association of Demographic Characteristics, Musculoskeletal Disorders and Depression with Physical Inactivity among Bus Drivers: Using Path Analysis

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Abstract

Background: Bus drivers are vulnerable due to prolonged sitting. A sedentary lifestyle can cause many health problems for them. This study was performed with the aim of investigating sedentary behaviour and its relationship with musculoskeletal disorders (MSDs) and depression among bus drivers.
Methods: This is a descriptive-analytical cross-sectional study on 300 professional drivers selected via available sampling method. Data were collected through Demographic Questionnaire, International Physical Activity Questionnaire, Nordic Musculoskeletal Questionnaire (NMQ), and Beck Anxiety Inventory (BAI). Data analysis was performed using SPSS version 25 software, and path analysis was conducted using AMOS version 18.
Results: The findings showed that 86.7% of the participants had very little physical activity. Most reported musculoskeletal discomfort in lower back (77.3%), neck (77%), and back (60.7%). 70.3% of drivers did not show depression or had mild depression. Path analysis showed that age (P=0.477), education (P=0.416), and marital status (P=0.271) did not affect sedentary behaviours. A two-way relationship existed between pain and physical activity (P=0.001). In the group with depression, low mobility existed, but no significant relationship was found between depression and inactivity (P=0.948).
Conclusion: The results indicated that inactivity among bus drivers was almost high and significantly related to the prevalence of MSDs. While inactivity was not significantly related to depression, the rate of depression was higher in the inactive group. It is recommended that implement intervention programs, such as educational initiatives, should be held to increase physical activity and alter the lifestyle of these individuals. Increasing physical activity may reduce the prevalence of MSDs in this occupational group.

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Introduction

Physical inactivity or lack of regular physical activity is one of the important risk factors for global mortality.[1, 2] Detrimental associations have been observed between prolonged periods of inactivity and sedentary outcomes. It is estimated that physical inactivity cause about 21-25% breast and colon cancer, 27% diabetes, and about 30% ischemic heart diseases.[3] Sedentary behaviour is any behaviour in the state of wakefulness and alertness, which is characterized by an energy consumption of 1.5 metabolic equivalents (METs) in a sitting or lying position.[4]

Sedentary behaviour may not be considered as a "true" high-priority risk factor among the bus drivers.[5] However, this is one of the sedentary occupations, and most drivers of public vehicles such as buses work in a sitting posture, and the nature of their job is such that their physical activity is very limited. In addition, due to the existence of other occupational risk factors, such as being in static work postures for more than the recommended time, vibration of the whole body, occupational stress, and mental fatigue, they are more susceptible to the consequences of inactivity. Sedentary behaviours, including prolonged sitting, which is prevalent in sedentary jobs, are associated with an increased risk of cardiovascular diseases (CVD), cardiovascular mortality (CVM), diabetes, and some cancers. The consequence of these diseases is disability and the treatment costs are also high. However, limited research is available on the prevalence of sedentary behaviour and its association with health variables among bus drivers.

Different parts of the body, such as the back, neck, arms, legs, and wrists, are susceptible to musculoskeletal disorders due to long-term exposure to inactivity and sometimes in poor posture.[6-8] Many studies have shown the connection and causal relationship between physical inactivity, musculoskeletal complaints, and mental disorders such as stress, depression and anxiety.[9-11] Rajguru et al. demonstrated that the risk factors of cardiovascular diseases among bus drivers have a relatively high prevalence (93%). Also, with increasing driving time and decreasing physical activity, the chance ratio of metabolic syndrome increases, which is a risk factor for cardiovascular diseases.[12] Pradeepkumar et al. demonstrated that the prevalence of MSDs among bus drivers was relatively high (55.8%) and was significantly related to work factors and lifestyle/health.[13] In another review study, it was reported that among adults, a sedentary lifestyle was a significant risk factor for LBP,[2, 11] and prolonged sitting time and driving time were recognized as important risk factors for MSDs among the studied population.[14-16] Also, since the current study was conducted during the outbreak of the COVID-19 virus, it is likely that this issue has had a negative effect on the reduction of physical activity of people.[9, 17]

Health promotion efforts in the bus driver population have mainly focused on exercise or diet-based interventions. However, participation in health promotion programs is typically underreported, which raises more concerns about the consequences of inactivity. Understanding health risks plays an important role in motivating health behaviour change.[18] Increasing our understanding of lifestyle behaviours, particularly sedentary behaviours and physical activity, will help develop interventions which aimed at improving these behaviours in this occupational group.[19, 20] Hence, before designing effective strategies and adopting preventive strategies to improve sedentary behaviour, it is necessary to find a better insight about people related to physical activity among bus drivers. Therefore, this study was conducted to investigate the sitting behaviour of bus drivers and the effective factors.

Methods

Participants

This is a cross-sectional descriptive-analytical study. The statistical population was all the professional drivers of Kerman city (located in the southeast of Iran) who referred to the occupational medicine centre under the supervision of the Health Vice-Chancellor of Kerman University of Medical Sciences and received their health card. The research sample was selected using the available sampling method among the examined professional drivers who met the entry criteria. The inclusion criteria included being over 22 years old, being a bus driver, not having a physical disability or disability, having physical limitations due to illness, and not having cardiovascular diseases, diabetes, or congenital hypertension. Exclusion criteria of the study included drivers who had a second job. In the present study, all the participants signed the informed consent form before entering the study and voluntarily participated in the study. This study was approved by the Ethics Committee of Kerman University of Medical Sciences (ethics code IR.KMU.REC.1401.309).

Data Collection Tools

In this study, data were collected through three questionnaires as follows:

• Demographic questionnaire

In this questionnaire, there were questions about age, education level, history of diabetes, and non-congenital cardiovascular disease or use of antidepressants in the last 6 months.

• International Physical Activity Questionnaire (IPAQ)

The International Physical Activity Questionnaire (IPAQ) is used in the world to measure the level of physical activity and includes questions about physical activity related to work, commuting, housework, and free time during the last 7 days of the individual.[21] In this study, the following criterion was used to classify people's physical activity:

o Vigorous physical activity: 7 days a week or more days of the week, any combination of light and moderate activity, walking, totalling at least 3000 MET-minutes per week

o Moderate physical activity: 5 or more days per week of a combination of walking, moderate or light activity for at least 600 MET-minutes per week.

o Light physical activity: When the person does not report any activity or the reported physical activities do not meet the criteria of light or moderate physical activity. The validity of the questionnaire was confirmed in Farahani's study, and its reliability was reported as 0.83.[22]

• Beck Anxiety Inventory (BAI):

The Beck Anxiety Inventory (BAI) was designed by Beck and Stein in 1996.[23] This questionnaire is a 21-item scale where each item has four options that are graded from 0 to 3, and the subject scores the severity of each symptom using a four-level scale from the lowest degree to the most severe degree. The total score of this questionnaire ranges from zero to 63, and the cut-off point of this test is 18. The validity and reliability of the Persian version of the questionnaire have been proven.[24]

• Nordic musculoskeletal questionnaire (NMQ):

This questionnaire is used to collect data about the prevalence of MSDs in different parts of the body. It is one of the most widely used questionnaires for determining the signs and symptoms of musculoskeletal disorders, which was presented and developed in the Occupational Health Institute of the Scandinavian countries by Kuorinka et al. in 1987 to determine the prevalence of work-related MSDs.[25] The original version of this questionnaire has been translated and modified into Persian with fully proven validity and reliability.[26]

Data Analysis

IBM SPSS for Windows, version 22.0 (IBM Company, Armonk, NY, USA) was used to analyze the research data (prevalence, percentage, mean, and standard deviation). Path analysis method was used to compare demographic variables and sedentary outcomes. This is a method for testing models that can be used to obtain more complex and realistic models than multiple regression with a single dependent variable. AMOS version 18 was used for path analysis.

Results

In this study, 300 drivers were enrolled in the study. After collecting the data using descriptive statistics, which include mean, standard deviation, frequency, and percentage, the sample has been described in the investigated variables. Average age, body mass index, and number of working hours per day were 43.14±9.45, 27.07±3.97, and 9.2±2.45, respectively. In terms of education, 238 subjects (79.3%) had a diploma, and 62 (20.7%) had a university degree. 61 participants (20.3%) were single, and 239 (79.7%) were married. 101 subjects (33.7%) had heart disease, and 88 (29.3%) had diabetes. The results showed that 260 participants (86.7%) had moderate and weak activity, and 40 (13.3%) had strong activity. 211 subjects (70.3%) did not have depression or had mild depression. The results of the Nordic musculoskeletal questionnaire (NMQ) are also shown in Table 1.

Table 1: Nordic questionnaire results

Prevalence of MSDs (n (%))	
Neck	231 (77)
Shoulders	119 (7/39)
Elbows	64 (21.3)
Wrists/Hands	104 (34.7)
Upper Back	182 (60.7)
Low Back	232 (77.3)
Knees	133 (44.3)
Ankles/Feet	142 (47.3)
Thighs	112 (37.3)

Statistical Analysis

The path analysis model was used in the present research. Path analysis is one of the multivariate methods that examines the direct and indirect effects of independent variables on the dependent variable. In this regard, the causal relationship diagram is drawn between the independent variables and the dependent variable, in which the relationships and direct and indirect effects of the variables are determined, which is actually a theoretical research model. The results of fitting the proposed model with the data: GFI=0.986 / AGFI=0.921 / CFI=0.969 / RMSEA=0.069 / CMIN/DF=2.429

It shows that the model has a good fit. Therefore, direct and indirect effects can be calculated and checked.

In the model, the IPAQ questionnaire score and the number of musculoskeletal disorders in the last week and 12 months have been used.

Table 2: The results of the variable relations model

Relationship between variable			Estimate	Standardized estimate	S.E.	P value
Working Hours	<---	Marital status	-0.951	-0.156	0.390	0.015
Working Hours	<---	Education Level	1.269	0.210	0.379	<0.001
Working Hours	<---	Age(years)	-0.038	-0.146	0.018	0.037
Depression	<---	Age(years)	0.019	0.043	0.026	0.461
BMI	<---	Age(years)	0.135	0.321	0.027	<0.001
IPAQ	<---	Marital status	-289.347	-0.111	263.083	0.271
IPAQ	<---	Education Level	-192.391	-0.074	236.631	0.416
IPAQ	<---	Age(years)	-29.983	-0.269	42.150	0.477
IPAQ	<---	Working Hours	-4.261	-0.010	54.669	0.938
BMI	<---	Working Hours	0.213	0.132	0.119	0.073
Depression	<---	Working Hours	0.171	0.098	0.102	0.093
Pain in the last 12 months	<---	Age(years)	0.013	0.082	0.009	0.142
Pain in the last 12 months	<---	BMI	-0.051	-0.131	0.022	0.018
Pain in the last 12 months	<---	IPAQ	-0.001	-0.433	0.000	<0.001
Pain in the last 12 months	<---	Working Hours	-0.005	-0.007	0.034	0.89
Pain in the last 7 days	<---	pain.12	0.415	0.494	0.046	<0.001
Pain in the last 7 days	<---	BMI	-0.018	-0.054	0.018	0.316
Pain in the last 7 days	<---	Age(years)	0.001	0.008	0.007	0.881
Pain in the last 7 days	<---	Depression	0.007	0.024	0.015	0.639
Pain in the last 7 days	<---	Working Hours	-0.016	-0.031	0.027	0.546
Pain in the last 7 days	<---	IPAQ	0.000	-0.014	0.000	0.798
IPAQ	<---	BMI	170.113	0.642	277.096	0.539
BMI	<---	IPAQ	-0.003	-0.680	0.003	0.364
IPAQ	<---	Depression	-2.410	-0.010	37.231	0.948
Depression	<---	IPAQ	0.000	-0.114	0.000	0.338

BMI: Body Mass Index; IPAQ: International Physical Activity Questionnaire; pain.12: Pain in the last 12 months; pain.7: Pain in the last 7 day

Direct Effects of the Variables on Each Other

The results of the model showed that pain in the last 12 months (P<0.001) had a greater effect on the amount of physical activity (IPAQ). Body mass index (P=0.018) was also an effective factor on pain in the last 12 months. Also, it was revealed that age was effective on body mass index and daily working hours. Marital status and level of education were also effective on daily working hours (Table 2).

Indirect Effects of the Variables on Each Other

Body mass index had an indirect effect on pain in the last 7 days (P=0.001), pain in the last 12 months (P=0.008), and the level of physical activity (P=0.049). Also, pain in the last 12 months had an indirect effect on pain in the last 7 days (P=0.025).

General Effects

Education status (P=0.004), marriage status (P=0.014), and age (P=0.021) generally affected the number of working hours. Based on the standard coefficients given in Table 1, the education status variable is a more effective factor. Age (P<0.001) and level of physical activity (P<0.001) were effective on body mass index, and the effect of physical activity was greater due to its larger standard coefficient. The amount of physical activity (P=0.009) and body mass index (P=0.001) were effective on the pain in the last 12 months; the effect of the amount of physical activity was greater. Body mass index (P=0.002) and the presence of pain in the last 12 months (P<0.001) were effective on the presence of pain in the last 7 days, and pain in the last 12 months was a more effective factor. No significant relationship was observed between depression and any of the variables. The full description of the relationships between the variables are displayed in Figure 1.

Discussion

The results showed that the majority of the studied driver population (86.7%) had moderate and poor activity. The highest prevalence of musculoskeletal discomfort was related to the lower back (77.3%), neck (77%), and back (60.7%). 211 subjects (70.3%) were not depressed or had mild depression.

Age (P=0.477), education (P=0.416), and marital status (P=0.271) did not affect sedentary behaviors. Body mass index was also a factor related to the presence of pain in the last 12 months. There was a bidirectional relationship between pain and physical activity. There was no significant relationship between depression and any of the variables.

Mbakwem et al. reported a 50.9% lack of physical activity among the population of bus drivers.[27] In another study in the population of bus drivers, 75.2% of the participants were physically inactive, while 24.9% were involved in regular exercise.[28]

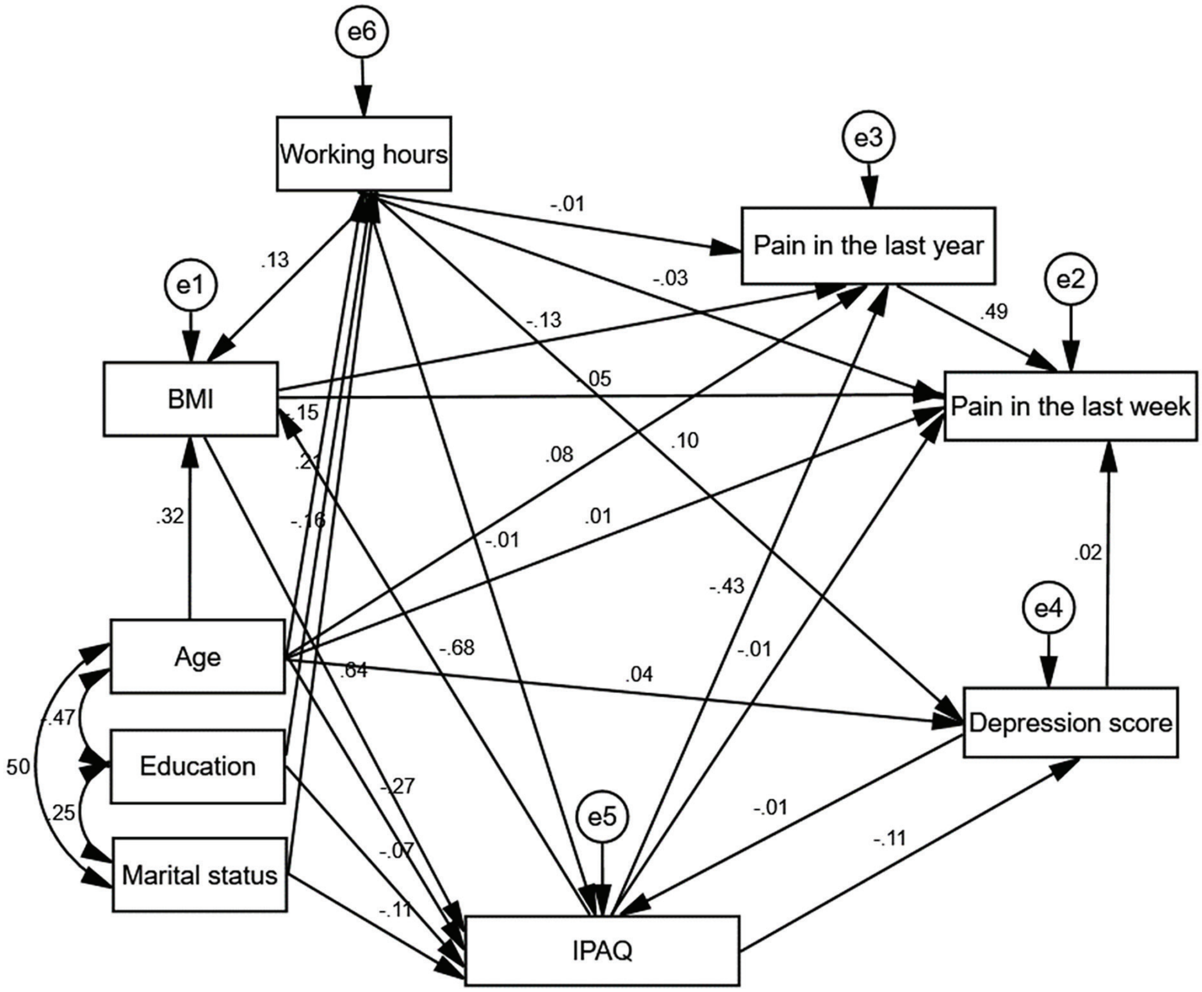

Figure 1: The final path model illustrates direct and indirect effects and causal paths linking variables with inactivity. BMI: Body mass index; IPAQ: International Physical Activity Questionnaire

Ragland et al. showed that inactivity was a health risk for drivers, and only 20 to 40% of the drivers followed the recommendations related to physical activity.[29] Mohsen and Hakim showed that most of the bus drivers did not do any regular physical activity.[30] The results of the level of inactivity in the present study are reported to be slightly higher than some previous studies, but it is not much different from some studies. In Tamrin et al.'s study on bus drivers, the overall prevalence of MSDs was 81.8%, and the highest prevalence of MSDs was reported in the lower back (58.5%) compared to other body parts.[6, 31] Another study reported that about 55.8% of the bus drivers had experienced work-related musculoskeletal disorders (WMSDs).[13] In a study among bus drivers, the prevalence of MSDs in the lower limbs was reported as 51.2%.[32] The results of these studies are almost consistent with the present study. In a study, the prevalence of depression among bus drivers was reported as 9.7%.[33] In another study, it was shown that common mental disorders, such as alcohol abuse, major depression, anxiety symptoms, and burnout syndrome in public transport drivers, had a higher rate than in the general population.[34] The results of another study showed that bus drivers were significantly more extroverted, psychotic, and neurotic than the general population.[35] The prevalence of depression in the present study was lower than in the studies. Douma et al. reported that prolonged sitting was effective as an ergonomic risk factor in the occurrence of back pain among police drivers.[36] Lee et al. showed that MSDs had a strong relationship with insufficient physical activity.[37, 38] Szeto et al. also stated that prolonged sitting is associated with musculoskeletal discomfort.[39] In a review study, it was shown that sitting at work significantly increased the chance of lower back pain (LBP).[40-42]

The results of the present study showed that there was no relationship between mental disorders and inactivity. In their study, Uddin et al. showed that insufficient physical activity was associated with high psychological distress in young adults.[43, 44] Many studies have shown the relationship and causal relationship between physical inactivity of musculoskeletal complaints and mental disorders such as stress, depression, and anxiety.[45-47] Although inactivity was not related to mental disorders (depression), the prevalence of depression was higher in the group with more inactivity. In their study, Venkata et al. did not observe a relationship between depressive symptoms and the level of physical activity measured.[48] Also, O'Connor et al. did not find convincing evidence to show that exercise is effective in preventing or treating depression disorders.[49] In another study, increasing physical activity improved VO2max in sedentary people by 12.6% but did not lead to improvements in the profile of mood states (POMS) or general well-being (GWB) scores more than the control group.[50] Kroeders et al. also showed that while depression symptoms were not related to physical activity, patients with anxiety symptoms spent most of the day lying down.[51]

The present study showed that inactivity was related to MSDs. This can be due to long-term maintenance of a posture. According to ergonomic recommendations, no body position should be maintained continuously because the lack of movement and stability in itself is a possible cause of musculoskeletal disorders. Drivers face the risk factors of musculoskeletal disorders in these areas due to the long-term maintenance of a fixed working position and static pressure on the neck and back muscles. Prolonged sitting increases the risk of back pain and sarcopenia.[52, 53] Improper sitting can play a role in increasing the stress in the disc[54] and weakness of the back muscles.[55] The benefits of physical activity include reducing the pressure on the intervertebral disc, increasing blood circulation, and reducing lactic acid in the muscles.[56] In a recent study, no significant relationship was observed between inactivity and depression. This lack of relationship can probably be because the depression score of the participants was low, and the severity of depression was not high. Also, the number of drivers who had depression should be more to be able to talk with more certainty about the relationship or lack of relationship between depression and inactivity. It is suggested that the interventional methods in the group of drivers who have depression and the control group should be performed to investigate this relationship.

According to the results of the present study, it is suggested that more studies should be conducted in this field to reduce the costs caused by accidents and treatment of disorders with training programs and ergonomic interventions,[57] reduce disorders, and increase the health of people working in this area.

Conclusion

The results of this study showed that the majority of bus drivers participating in the study had very little mobility. The highest prevalence of musculoskeletal discomfort was related to the lower back, neck, and upper back. Age, education, and marital status did not affect sedentary behaviours. There is a two-way relationship between pain and the level of physical activity. In the group with depression, the prevalence of inactivity was high, but no significant relationship was found between depression and inactivity.

It is suggested that organize educational programs should be designed to increase awareness and make changes in the lifestyle of these people to reduce the prevalence of chronic diseases and musculoskeletal disorders.

Authors' Contribution

All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by F.A., N.H., F.M., and S.H. The first draft of the manuscript was written by F.A., and it was reviewed and edited by N.H. All authors read and approved the final manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

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