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ORIGINAL ARTICLE

Assessment of the psychosocial work environment of professional drivers

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Abstract

Aim Along with globalization in recent periods, psychosocial risks at the workplace have been classified as considerable developing risks for human mental and physical health. These risks exist both in developed and developing countries. The current study aims to assess the psychosocial work environment of professional drivers in a multidimensional concept.

Subject and methods The study population consisted of 645 Iranian professional drivers. Psychosocial factors were examined in five domains including job demand, job content, interpersonal relationship, work–individual interface and general and mental health through the validated Persian medium-size version of the Copenhagen Psychosocial Questionnaire (COPSOQ).

Results Among 26 psychosocial scales, sensory demands (91.3) and cognitive demands (70.3) got the highest average scores in professional drivers. Logistic regression was applied to evaluate the association between psychosocial work environment indexes and self reported health and well being of drivers. This study showed that poor psychosocial work environment in job demand, job content, work–individual interface as well as having a car accident history was associated with unfavorable health outcomes for the participants, after adjustment for age, marital status, education level, vehicle type and smoking.

Conclusion It is worth focusing on drivers' working schedule and their psychosocial work environment.

Keywords Commercial drivers · Psychosocial factors · COPSOQ · General and mental health

Introduction

Most adults around the world spend much of their waking hours at work. Work has numerous advantages for the person including economic benefits. At the same time, at the work place, people are exposed to a variety of chemical, physical, biological, ergonomic and psychosocial hazards (Concha-Barrientos et al. 2004). Due to globalization in recent periods and technical and organizational alternations, as well as some demographic and socioeconomic changes, psychosocial risks at the workplace have been classified as considerable developing risks for an individual's mental and physical health (EU-OSHA 2007; NIOSH 2002). Psychosocial risks lead to work-related stress, which is defined by WHO in 2003 as an adverse reaction of people, when they believe that demands and pressures of work are not matched to their abilities and knowledge (WHO 2003).

Work-related stress is intensely increasing over the world and is designated by WHO as a "world wide epidemic". Almost one out of three of Europe's workers and approximately one quarter of the working population in the USA suffer from work-related stress (EU-OSHA 2002; Kumar and Pragadeeswaran 2011). The EU member countries gave top

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priority to psychosocial issues among work environmental factors (Work 2000). In current years, these risks have not been limited to the developed world, and there is a rising concern in developing countries as well (Kortum 2007); however, despite available evidence, the policy of prevention and management of psychosocial risks has not gotten high priority in policy-making agenda yet (WHO 2008).

Most researchers agree that an essential instrument for studying psychosocial factors and practical prevention is a well-validated standardized questionnaire. The COPSOQ (Copenhagen Psychosocial Questionnaire) is a theory-based questionnaire that is not limited to a single theory, and is a relatively novel and comprehensive questionnaire, consisting dimensions of psychosocial factors related to job, individual, organization and person–work levels in the work environment (Kristensen et al. 2005).

Many studies using this questionnaire have shown an association between unfavorable psychosocial factors in the work environment and personal or organizational outcomes including BMI changes (as a predictor of life style and health behavior), sickness absences, cognitive stress symptoms, general and mental health, ITL (intention to leave) and WIF (work interfering with family conflict) in workers (Albertsen et al. 2010; Fuss et al. 2008; Gram Quist et al. 2013; Li et al. 2010; Rugulies et al. 2010).
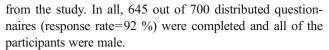
A survey on urban bus drivers using two specific models of job strain (job demand/control and effort/reward) indicated that occupationally induced stress is not only associated with organizational outcomes such as high possibility of accident involvement, stronger desire to leave the job, more criticisms by passengers, work absence, but also is related to personal negative health habits like higher level of alcohol consumption (Tse 2004).

In the current study, we assessed the psychosocial work environment of professional drivers in a multidimensional concept. These concepts were categorized into five main domains including job demand, job content, interpersonal relationship, work–individual interface and general and mental health. In addition, we evaluated any relationship between unfavorable psychosocial conditions of the work environment and poor general and mental health in drivers, which was measured by the fifth domain of COPSOQ questionnaire.

Material and methods

Study population and data collections

The participants were recruited from drivers who attended the occupational medical clinic of Baharloo hospital to participate in a training course for professional drivers. The survey was conducted from September 2013 to February 2014. Drivers with less than 1-year experience in this job were excluded

from the study. In all, 645 out of 700 distributed questionnaires (response rate=92 %) were completed and all of the participants were male.

Oral and written information about purpose of the study was provided by an occupational physician. The drivers had 40 minutes to complete the questionnaires, and participation was voluntary.

Measurements

The first part of the questionnaire contained demographics, work patterns and health behaviors. These questions included participant's age, marital status, level of education, smoking and drinking alcohol. Another series of questions included details on the professional background such as working hours, years worked as a professional driver, type of vehicle, whether they work between 7:00 pm to 6:00 am and shift work numbers per week. In addition, there was a question about accidents: In the last 24 months have you been involved in any traffic accident in which you were judged to be responsible?

The psychosocial work environment was examined via items and scales derived from the medium size version of the first version of Copenhagen Psychosocial Questionnaire (COPSOQ; Kristensen et al. 2005; Pejtersen et al. 2010). The validated Persian version of this questionnaire was adopted from a study by Arsalani et al. (2011). The use of scales instead of single items is an advantage of the COPSOQ questionnaire. The medium-size version used in this survey comprised 26 scales with 95 items. For most items, five response categories either qualified by intensity (from "to a very large extent" to "a very small extent") or frequency (from always to never/hardly ever) were available. The direction of the scores follows the type of scale used (Li et al. 2010; Pejtersen et al. 2010).

Wording of the survey questions and internal correlation of the questionnaire were verified (Cronbach alpha = 0.82), which shows an acceptable internal validity.

Personal outcome of psychosocial hazards was evaluated by measuring the engagement of the drivers in harmful health behaviors like alcohol use and smoking as well as self-reported health and well being which was measured using six scales— general health, mental health, vitality, behavioural stress, somatic stress, and cognitive stress—of the last domain of COPSOQ questionnaire with 26 items (4–5 items in each scale). In addition, car accident history within the last 24 months was assessed for evaluating its association with psychosocial hazards.

Statistical analyses

All categorical items described in the preceding, derived from the Persian COPSOQ version. The scale range was from 0 (minimum value, e.g., do not agree at all") to 100 points (maximum value, e.g., "fully agree"). Non-response items were coded as missing values. All of the items had equal

weight. The score for each scale was calculated as the mean of values for each single item, if at least half of the single items had valid answers; therefore, all of the 95 items and 26 scales had a theoretical score from 0 to 100. In order to assess the combined effects of psychosocial work environment factors, we computed job demand index, job content index, interpersonal relationship index, work–individual interface index and health and well-being index, by adding together the values of scales in each domain after adjusting for the scoring direction. This resulted in scores from 0 to 500 for domains containing five scales (job demand and job content), 0–800 for interpersonal relationships and leadership domain with eight scales, 0–200 for person–work interface with two scales and 0–600 for the health and well being domain with six scales. A higher score indicates more unfavorable psychosocial conditions in the workplace (Kristensen et al. 2005; Li et al. 2010; Moncada et al. 2010; Reiner Rugulies et al. 2007).

As there were multiple dependent and independent variables in this study, multivariate analysis of variance (MANOVA) was used. Applying MANOVA, we combined the multiple dependent variables in a linear manner to produce a combination which separated the independent variable groups in an appropriate manner. Then analysis of variance (ANOVA) was performed on the newly developed dependent variables. All scales from the same questionnaire were included in MANOVA to overcome the multiple-testing problem. These scales were related, but may represent different aspects of the dependent variable. Wilks' Lambda demonstrates the amount of variance accounted for in the dependent variable by the independent variable; the smaller the value, the larger the difference between the groups being analyzed. The partial eta squared is an estimate of the amount of effect size attributable to between-group differences, ranging from 0 to 1, where 1 is the strongest (Kaufman and McLean 1998).

The Chi-square test with $p < 0.05$ was used to analyze group differences. In the analysis process, the variables including traffic accidents in the last 24 months (yes or no), smoking (yes or no) and health and well being (favorable and poor) as well as psychosocial working exposures (below and above the median value) (Kristensen et al. 2005) were dichotomized. Bivariate logistic regression analyses with 95 % confidence interval (CI) calculated the dichotomized outcome and exposure variables which were significantly related.

Ethical considerations

A written informed consent was obtained from all participants with verbal explanation about the objectives of the study. Participation was voluntary and confidentiality was guaranteed through the anonymous questionnaire. This study has been approved by the Ethics Committee at the Research Division of the Ministry of Health in Tehran (IRB No. 383)

Results

A total of 645 completed questionnaires were analyzed. Frequency of demographic characteristics, work patterns and health behaviors (smoking and alcohol use) are shown in Table 2. All participants were male, with the average age of 36 years old (±8.6) ranging from 22 to 64, and 81 % ($n=519$) of the drivers were married. Regarding education level, 50.7 % of them were under high school diploma. In addition, 28.3 % of the drivers were current smokers and 5.4 % of them indicated that they consumed alcohol.

In total, 52.4 % of the participants were working at least two nights per week (from 7:00 pm to 6:00 am). The years of work experience and the mean working hours per week were 10.4 years (range 1–47 years) and 61 h/week (20–150 h) respectively. Lastly, 63.4 % of all participants were truck drivers and 109 out of 645 drivers mentioned that they had a car accident during the preceding 24 months.

Mean and standard deviation of 26 scales of the questionnaire are shown in Table 1. Among the 26 psychosocial scales, it was the sensory demands scale (91.3) and the cognitive demands scale (70.3) that received the highest average scores for professional drivers. The association between all background variables and the five psychosocial work environment indexes were analyzed by univariate and multivariate tests, which are shown in Table 2.

Drivers who smoked had a poor general and mental state of health compared to non-smokers, which was statistically significant (p-value < 0.05). In addition, drivers with a history of car accidents during last 24 months had a higher job demand index and worse state of health and well-being (p-value$=0.03$ and p-value<0.00 respectively) compared to other drivers. As expected, drivers who were working more than 50 h/week had a higher job demand index (p-value<0.00).

Wilks' lambda Sig.<0.00 showed that there was a statistically significant difference between psychosocial work environment indexes in two groups of the study population (with and without a history of car accidents during the last 24 months), considering other independent variables. In addition, 0.11 of the effect size was attributable to between-group differences (partial eta squared$=0.11$).

In order to identify any possible relationship between work environment psychosocial indexes and the self-reported health of the drivers, participants were divided into two groups according to their scores (favorable and unfavorable). Univariate analysis showed that all independent variables—job demand index, job content index, work–individual interface index as well as history of car accidents during the last 24 months— were significantly associated with drivers self-reported state of mental and general health (p-value<0.01).

Logistic regression was applied to evaluate this association and demonstrated that poor psychosocial work environment in

Table 1   Average scores and standard deviations of the COPSOQ scales in professional drivers (*n*=645)

Context and level of domains	Scales	No. of questions	Percent of responses	Mean (SD)
D1: Type of production and tasks (work place)	1. Quantitative demands	4	99.5 %	51.7 (20.8)
	2. Cognitive demands	4	99.7 %	70.3 (16.4)
	3. Emotional demands	3	97.8 %	41.4 (23.5)
	4. Demands for hiding emotions	2	99.4 %	38.7 (25.2)
	5. Sensory demands	4	97.8 %	91.3 (12.9)
D2: Work organization and job content	6. Influence at work	4	98 %	68.8 (20.8)
	7. Possibilities for development	4	65.9 %	69.3 (18.3)
	8. Degree of freedom at work	4	95.2 %	53.7 (21.6)
	9. Meaning of work	3	94.1 %	68.7 (18.9)
	10. Commitment to the work place	4	96 %	62 (19.5)
D3: Interpersonal relations and leadership	11. Predictability	2	99.2 %	57.6 (23.4)
	12. Role clarity	4	98.1 %	67.5 (18.3)
	13. Role conflicts	4	95.8 %	45.6 (21.3)
	14. Quality of leadership	4	98 %	53.8 (25.8)
	15. Social support	4	98.3 %	47.1 (22.8)
	16. Feedback at work	2	97.8 %	47.9 (26.8)
	17. Social relations	2	49.5 %	43.2 (24.8)
	18. Sense of community	3	94.9 %	78.7 (19.4)
D4: Work–individual interface	19. Insecurity at work	4	95.5 %	53.8 (38.5)
	20. Job satisfaction	4	95.3 %	56 (20.6)
D5: Health and well-being (individual)	21. General health	5	93.6 %	73.7 (17.1)
	22. Mental health	5	94 %	68.3 (19.3)
	23. Vitality	4	94.1 %	66.7 (19.4)
	24. Behavioural stress	4	96 %	27.6 (24.4)
	25. Somatic stress	4	96.3 %	10.1 (16.9)
	26. Cognitive stress	4	96.1 %	16.6 (20.7)

job demand, job content, work–individual interface as well as car accident history were associated with an unfavorable state of health of the participants after adjustment for age, marital status, education level and smoking; R^2 value equivalent to 0.21 was obtained after this adjustment to predict health and well being (Table 3).

Discussion

In this study, we assessed psychosocial factors in professional drivers using the COPOQS questionnaire, which is developed based on main job stress theories, and includes dimensions of psychosocial hazards related to modern work life. From a theoretical point of view, the major inadequacy in this questionnaire is related to the effort–reward imbalance level (Kristensen et al. 2005), as there is no item regarding the financial or non-financial rewards that workers receive based on their efforts.

We observed the most missing data in the quality of leadership scale because, in Iran, most of the drivers, particularly truck and taxi drivers, are self-employed. However, the

number of valid responses was sufficient to rely on the analysis results (*n*=319).

The sensory demands (91.3) and cognitive demands scales (70.3) received the highest average scores for Iranian professional drivers compared to the Danish general population, which can be due to the importance of precise vision, constant attention, concentration and sometimes making quick decisions in driving; however, similar to our findings, Danish drivers also were in poor condition regarding the cognitive demand scale (Kristensen et al. 2005).

In addition, compared to the Danish general population, Iranian drivers were in poor condition regarding scales of social relationship and social support, which can be considered as a result of the fact that drivers are not working in a social work environment (Kristensen et al. 2005).

Our results showed that a considerable number of drivers were not optimistic enough to believe that they can improve their professional skills. Degree of freedom at work scale was lower among bus drivers compared to truck and taxi drivers, because bus drivers have more restricted working programs and they directly deal with passengers.

Table 2 Univariate and multivariate tests of significance for psychosocial work environment indexes. Sigma-restricted parameterization and effective hypothesis decomposition of all background variables in association with each index are presented by *LS-means and SE*

			Univariate analysis of variance (LS-means and SE)					Multivariate tests	
		Number (%)	Job demand index (0–500)	Job content index (0–500)	Interpersonal relationships and leadership index (0–800)	Work–individual interface index (0–200)	Health and well-being index (0–600)	Wilks' lambda Sig.	Partial eta squared (effect size)
Overall mean		645	293.27(65.43)	178.02(61.13)	346.31(100.71)	97.43(47.68)	144.13(89.04)		
Age	≤40	435 (73.2)	312.21(14.55)	194.56(14.42)	359.72(22.76)	86.50(9.74)	131.02(20.01)	0.08	0.06
	>40	159 (26.8)	324.33(17.54)	224.66(17.39)*	378.10(27.45)	106.84(11.74)*	174.04(24.13)*		
Education	Under diploma	325 (50.7)	316.14(16.42)	206.51(14.26)	365.50(25.68)	91.67(9.62)	153.09(22.57)	0.58	0.02
	Diploma and Upper	316 (49.3)	320.39(14.38)	212.70(16.27)	372.32(22.50)	101.67(10.98)	161.97(19.78)		
Marital status	Not married	122 (19)	309.80(18.45)	200.91(18.28)	350.29(28.86)	87.91(12.34)	130.27(25.37)	0.28	0.04
	Married	519 (81)	326.73(13.39)	218.31(13.27)	387.53(20.95)	105.42(8.96)	174.78(18.42)*		
Smoking	No	458 (71.7)	315.88(16.38)	200.22(14.86)	357.41(23.45)	93.31(10.03)	161.43(26.45)	0.67	0.02
	Yes	181 (28.3)	320.65 (14.99)	219.00(16.24)	380.41(25.63)	100.03(10.96)	190.85(26.89)*		
Alcohol	No	599 (94.6)	330.90(10.12)	200.08(10.03)	356.04(15.84)	105.42(6.77)	153.72(13.92)	0.05	0.07
	Yes	34 (5.4)	342.63(24.45)	219.14(24.23)	381.78(38.25)	87.92(16.36)	151.34(33.62)		
Vehicle type	Truck	405 (63.4)	327.43(15.40)	216.11(15.26)	366.32(24.09)	90.94(10.30)	166.88(21.18)	0.03	0.06
	Bus	120 (18.8)	317.31(17.11)	209.43(16.96)	349.72(26.76)	96.67(11.45)	147.77(23.52)		
	Taxi	114 (17.8)	310.06(17.08)	203.28(16.93)	390.69(26.73)	102.40(11.43)	142.93(23.49)		
Professional driving experience	≤10	411 (67.8)	312.44(15.76)	213.90(15.62)	364.08(24.66)	98.57(10.55)	160.74(21.68)	0.53	0.03
	>10	195 (32.2)	324.09(15.86)	205.32(15.72)	373.74(24.81)	94.77(10.61)	144.32(21.81)		
Working hours per week	≤50	240 (40.2)	299.18(16.03)	214.35(15.89)	365.00(25.08)	96.41(10.73)	151.08(22.05)	0.01	0.10
	>50	357 (59.8)	337.36(14.67)**	204.86(14.54)	372.82(22.95)	96.93(9.82)	153.98(20.17)		
Night shifts per week	≤2	202 (47.6)	312.20(15.96)	215.32(15.82)	375.02(24.97)	102.26(10.68)	157.28(21.95)	0.25	0.04
	>2	222 (52.4)	324.34(14.71)	203.90(14.58)	362.80(23.02)	91.08(9.84)	147.77(20.23)		
Car accidents	No	534 (83)	304.19(13.64)	201.54(13.52)	362.48(21.34)	99.58(9.13)	126.89(18.76)	0.00	0.11
	Yes	109 (17)	332.34(17.61)*	217.68(17.45)	375.34(27.55)	93.76(11.78)	178.17(24.21)**		

* *p*-value<0.05, ** *p*-value<0.01

Interestingly, well-educated drivers were generally in poor psychosocial condition as compared to less educated drivers, which can be due to the fact that well-educated people have more expectations of their jobs.

Results of our study support the idea that poor psychosocial factors have a negative impact on personal health behaviors like smoking, as a predictor of general and mental health, which requires special attention, because smoking increases the risk of developing cardiovascular diseases and cancers.

Table 3 Logistics regression with self reported health and well being as dependent variable

	B	SE	Sig	Exp(B)	95 % CI	
Job demand	1.50	1.04	0.14	4.50	0.59	34.39
Job content	1.09	0.29	0.00	2.98	1.69	5.26
Work−individual interface	1.50	0.39	0.00	4.46	2.07	9.66
Car accident history	1.16	0.33	0.00	0.31	0.16	0.60
Age	0.02	0.02	0.29	1.02	0.98	1.06
Marital status	0.12	0.37	0.75	1.13	0.54	2.35
Education level	0.20	0.29	0.49	0.81	0.46	1.45
Smoking	0.42	0.30	0.16	0.65	0.36	1.18

We found no relationship between psychosocial hazards and alcohol consumption, which can be due to the prohibition of alcoholic beverages in Iran as an Islamic country; accordingly, we assume that the actual rate of alcohol consumption could be more than 5.3 %.

There was a positive correlation between working hours per week and the job demand index. In addition, according to the results of this study there was a direct relationship between traffic accident rates of the drivers and quantitative demands of their job. Iranian law requires the limitation of working hours per week for drivers. Transportation is a business where safety is the issue of concern in all societies and must be a priority; therefore, the link between job strain and accidents should warrant attention.

In our study, there was also a positive correlation between accident rates and poor health and stress symptoms in drivers. On the other hand, it should be brought to attention that we have car accident history of the drivers for 24 months preceding the study but only have their present psychosocial data. Therefore, it should be cautiously concluded as to whether drivers with a poor psychosocial condition have more car accident history or whether having a history of car accidents could result in an unhealthy state regarding psychosocial conditions.

A number of previous studies have reported an association between psychosocial stressors in drivers regarding their well-being and organizational performance (Bonde 2008; Fischer et al. 2005; van den Berg et al. 2009; Wieclaw et al. 2008) and the results of our study lend further support to this statement. We observed that unfavorable general and mental health as well as behavioural, somatic and cognitive stress symptoms are associated with psychosocial work environment indexes. In logistic regression analysis, job content index and the work–individual interface index as well as a history of car accidents were significantly associated with the self-rated health and well-being of the participant drivers, after adjustment for age, marital status, education level and smoking. This means that drivers with an unfavorable psychosocial work environment and with a history of car accidents in the last 24 months reported a poor level of health and well-being and more stress symptoms. It is supported by numerous other studies that long working hours is strongly correlated with the health and safety of workers, injury rates, adverse events and human errors (Caruso et al. 2006; Dembe et al. 2005; Olds and Clarke 2010).
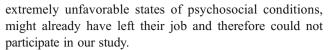
Our results indicate that 50 % of the drivers in this survey were working more than 56 h/week and 25.6 % of them worked more than two nights per week as a 24-h shift. This issue should be considered cautiously, given the fact that fatigue is verified as an absolute cause of traffic accidents.

Limitations of the study

The sample size of this study was 645, which is less than identical studies that have been conducted on other careers like health care workers or office workers (sample size of more than 1,000). This can be due to the nature of this job whereby drivers were not informed enough to complete the questionnaire; on the other hand, compared to other studies regarding drivers with a smaller sample size (about 200–300), our sample size is acceptable.

Considering the fact that Baharloo Hospital is the largest referral hospital for professional drivers in Iran, our study population can be representative of our target population, which shows a degree of external validity in this study. However if we could have recruited the participants from all parts of Iran, we would have had higher external validity.

As the COPSOQ is a long questionnaire with 95 items, we were not able to do some extra tests and evaluations, but we believe that the comprehensive measurement of psychosocial hazards in the work place to be a strong point of this study. In assessment of psychosocial factors, the reliance on self-reported conditions could be argued; however, unfortunately, there are limited objective indicators for carrying out such measurements on people. In addition, the healthy worker effect should be taken into account. Drivers suffering from

extremely unfavorable states of psychosocial conditions, might already have left their job and therefore could not participate in our study.

The self-reported accident rates might be less than the actual amount. We recommend for in future research that this kind of data be collected from the police. Lastly, cross-sectional studies do not scientifically explain cause and effect relationships; however, an acceptable sample size can empower the previously mentioned hypothesis.

Conclusion

This research provides further support regarding the negative effects of the psychosocial hazards of the work environment on individual and organizational outcomes. The personal outcomes were evaluated by measuring the engagement of the drivers in harmful health behaviors such as alcohol consumption and smoking as well as by their self-reported state of general and mental health and level of stress symptoms.

In the current study, the link between job stress and organizational outcomes like accidents was an important finding, but as we conducted a cross-sectional questionnaire based study, more objective and cohort studies in the future are warranted to better understand this relationship. On the other hand, considering the importance of this subject, it is worth focusing on the drivers' working schedule and their psychosocial work environment.

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