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Topic: Risk Assessment and Effect on Cognitive Ability due to Work related Musculoskeletal Disorder and Work Related Fatigue among the Cab drivers in Delhi and NCR Region

Keywords: Musculoskeletal disorder risk factors; Drivers; Multi-criteria decision making; Ordinal priority approach; Risk factors prioritization; cognitive impairment; structural equation modelling; Ranking of alternatives; Sensitivity analysis.

Findings

Cab drivers have been facing new challenges in the contemporary age, as driving has become one of the most complicated tasks due to the involvement of a high level of cognitive abilities and psychomotor skills. Also, cab drivers often experience loss of function in their backs, necks, and limbs. Work-related musculoskeletal diseases (WRMSD) impact almost every region of the body, particularly the back, neck, lower, and higher limbs, depending on the ergonomics and mechanical design of the work activity. Reports of drivers’ weariness was every day seen degrading the health of professional drivers which over the time got worse. Cab drivers have been facing new challenges in the contemporary age, as driving has become one of the most complicated tasks due to the involvement of a high level of cognitive abilities and psychomotor skills. Long working hours cause chronic fatigue and the possibility of musculoskeletal disorder. Additionally, other factors such as the driver age, working hours, work experience, and pre-existing musculoskeletal disorder may also affect the cognitive performance of drivers. The impact of fatigue on cognitive impairment is widely accepted. The scope of this research is to examine and research the possible MSDs risk factors associated with driving profession. Since musculoskeletal disorders and fatigue have excruciating effects on cab drivers' cognitive functioning, henceforth all major health problems have been considered in this thesis. The present study focuses on developing a robust model to observe the relationship between cognitive impairment with these factors.

Cognitive function impairment may seriously hamper humans' activities. Investigating different risk factors of cognitive function impairment has been an area of immense interest among researchers which has led to the identification of several factors. However, studies pertaining to the estimation of the importance of these factors are lacking. Getting inspired from this observation, this study presents an integrated multi-criteria decision making (MCDM) approach to estimate importance of the cognitive risk factors (CRFs). Twenty three CRFs were identified from the literature and they were grouped into four main category factors viz. individual factors, medical factors, psycho-social factors and occupational factors. Importance of the CRFs was estimated through their rank which was determined employing an integrated analytical hierarchy process (AHP)-entropy method, using pair-wise comparison matrices collected from a panel of ten experts. It was found that among the four main category factors, psycho-social factors and individual factors were the most and the least prominent respectively. Further, among the 23 CRFs, long working hours which was a sub- factor of the occupational factors and depression, a sub factor of psycho-social factors, were the most and the least important respectively. The sturdiness and reliability of the ranking result were ascertained through sensitivity analysis.

Furthermore, in driving occupation, the drivers remain at work for extended period of time and while driving they are subjected to several factors such as awkward posture, prolonged sitting, vibrations etc. which may cause different types of musculoskeletal disorders (MSDs) among them. Ordinal priority approach (OPA), which is a recently developed multi-criteria decision making (MCDM) method, has been used in this study for estimating the risk level of MSDs among drivers. The risk factors have been prioritized on the basis of their weights which have been determined using OPA method. In addition, rank of eight alternatives represented by drivers of eight different types of vehicles has also been computed using the same OPA method. Results of the study revealed that prolonged sitting, restricted posture, working hour, alcohol consumption, and uncomfortable seat were the five most important risk factors for causing MSDs among drivers. Further, it was also found that the truck drivers and taxi drivers were at the highest risk among all considered drivers. Sensitivity analysis was also performed in the study to validate the ranking results.

Eventually, a theoretical conceptual model was developed for evaluating the underline relationship of MSDs and work-related fatigue with the cognitive impairment of cab drivers.

The validity of the theoretical model was assessed by incorporating Structure Equation Modelling (SEM) approach. The study revealed that work- related fatigue, age of cab driver, and working hours per day result in 49.3 % of the variance in cognitive impairment. It is observed that work-related fatigue is the most crucial factor in regards to the cognitive abilities of cab drivers. In contrast, the driver's age and working hours per day are case sensitive and have limited influence on cognitive impairment. Besides, the dependency of cognitive impairment on musculoskeletal disorder is found to be insignificant. Furthermore, the habit of smoking is identified as an essential personal modifiable risk factor having an interaction effect. The results of the study are valuable for the development of cognitive behaviour change model.
Keywords: Musculoskeletal disorder risk factors; Drivers; Multi-criteria decision making; Ordinal priority approach; Risk factors prioritization; cognitive impairment; structural equation modelling; Ranking of alternatives; Sensitivity analysis.