



The Relationship between Work Ability Index (WAI), Mental Workload and Musculoskeletal Disorders (MSDs) of Firefighters in Tehran, Iran

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Dear Editor-in-Chief

Firefighters always experience incidents and injuries in societies and work in very difficult conditions to save lives and property of people. Firefighting as well as relief and rescue operations requires high physical and mental abilities for decision making and action under unpredictable and dangerous conditions. Firefighters should have a good health condition as well as high physical and mental capacity to perform stress-free tasks (1). There are many reasons for studies focusing on their physical and mental ability.

Among these reasons, it can be referred to changing the nature of work from the physical to the cognitive and perceptual nature, increasing common incidents in work environments and as a result, the increased costs imposed on communities as well as human errors related to mental workload (2). On the other hand, MSDs are one of the most important occupational health issues in today's world and are prevalent in almost all professions such as firefighters (3). The mentioned disorders

constitute nearly 48% of all diseases caused by work (4). Even though high ability in Iranian firefighters was shown in a study by Firoozeh et al, recognition of the factors influencing this ability to promote their performance in later studies was considered essential (5).

The aim of this study was to investigate the relationship between the Work Ability Index (WAI), mental workload and Musculoskeletal Disorders (MSDs) as well as their effective factors in firefighters in Tehran so that the acquired outcomes can be used to plan and use effective interventions, corrective and preventive measures in order to increase the efficiency and productivity and reduce the prevalence of MSDs.

This study was carried out on 250 firefighters in Tehran. Informed consent was taken from all participants before the study.

Data were collected using WAI and NASA-TLX questionnaires and Body Discomfort Chart (BDC). The dimensions of these questionnaires



are presented in Table 1. Data analysis was carried out using descriptive statistics, linear regression, Pearson correlation and Spearman tests.

According to the results, mean and standard deviation of the overall score for work ability was 38.85 ± 1.17 which was evaluated well. Furthermore, education level had a direct and significant relationship with the physical load domain ($P = 0.035$) while it had inverse and significant association with amount of effort ($P = 0.007$). There was an inverse relationship among age, marriage and having firefighting operations and overall WAI, although it was not significant. Moreover, none of

the demographic variables included age, work experience, education level, marital status, and also smoking did not affect total mental workload based on linear regression results.

According Table 1, the relationship between WAI and the mental workload was positive but not significant. Furthermore, WAI had a direct and significant relationship with physical load ($P = 0.002$, $r = 0.19$) and Amount of effort and endeavor ($P = 0.00$, $r = 0.23$). The results of this study also showed, the relationship between WAI with discomfort in the areas of wrist, leg, and ankle was significant.

Table 1: The relationship between WAI and mental workload in firefighters in Tehran

<i>Mental Workload</i>	<i>Intellectual and mental load</i>	<i>Physical load</i>	<i>Temporal pressure</i>	<i>Amount of effort and endeavor</i>	<i>Performance</i>	<i>Disappointment and feeling of failure</i>	<i>Total mental workload</i>
<i>WAI subscale</i>	Pearson correlation (<i>P</i> -value)						
Current work ability compared with the lifetime best	0.23(0.00)*	0.18(0.003)**	0.17(0.004)	Ns	-	-0.21(0.001)	-
Work ability in relation to the demands of the job	0.17(0.005)**	0.13(0.03)*	Ns	Ns	0.33(0.00)**	Ns	0.125(0.047)*
Current diseases diagnosed by a physician	Ns	Ns	Ns	Ns	0.16(0.011)*	Ns	Ns
Estimated work impairment due to diseases	Ns	Ns	Ns	Ns	Ns	Ns	Ns
Sick leave during the past 12 months	Ns	Ns	Ns	0.16(0.009)**	Ns	Ns	Ns
Personal prognosis of work ability 2 years from now	Ns	0.16(0.01)*	Ns	0.33(0.00)*	Ns	Ns	Ns
Mental resources	Ns	0.13(0.03)*	Ns	Ns	Ns	Ns	Ns
Total work ability	Ns	0.19(0.002)**	Ns	0.23(0.00)*	-	0.15(0.015)*	Ns

Note: NS= Not Significant

There was a reverse and significant relationship between WAI and the rate of discomfort in wrist, leg and ankle while there was a significant relationship between total mental workload and severity of neck discomfort. Despite the low level of such disorders when planning preventive measures in the workplace, even mild symptoms of musculo-

skeletal pain should be taken into account. Improvement of physical, psychosocial and social conditions to reduce MSDs is essential in boosting the ability of employees and as a result, increasing their occupational activity.

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Conflict of interest

The authors declare that there is no conflict of interest.

References

1. Kiss P, Walgraeve M, Vanhoorne M (2002). Assessment of work ability in aging fire fighters by means of the Work Ability Index Preliminary results. *Archives of Public Health*, 60(3-4):233-43.
2. Smiley A, Brookhuis K (1987). *Alcohol, drugs and traffic safety, road users and traffic safety*. Publication of Van Gorcum & Comp BV.
3. Skinner JS (2005). *Exercise testing and exercise prescription for special cases: theoretical basis and clinical application*. Lippincott Williams & Wilkins.
4. Smith D, Leggat P, Speare R (2009). Musculoskeletal disorders and psychosocial risk factors among veterinarians in Queensland, Australia. *Aust Vet J*, 87(7):260-5.
5. Firoozeh M, Saremi M, Kavousi A, Maleki A (2017). Demographic and occupational determinants of the work ability of firemen. *J Occup Health*, 59(1):81-7.