

EDITORIAL

A Short Review of Subjective Measures in Mental Workload Assessment

KHALIL TAHERZADEH CHENANI¹, FARZAN MADADIZADEH^{1*}

¹Research Center of Prevention and Epidemiology of Non-Communicable Disease, Department of Biostatistics and Epidemiology, School of Public Health, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

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Dear Editor In Chief,

The workload define as the cost that a human operator pays to achieving the desired performance level and performing a task with particular needs 1. The mental workload is used as a significant variable to identify the individual's performance level 2. Measuring mental workload is very important because its results can use to identifying the appropriate automation level and also improve the individual's performance level 3. The main aim of this letter is to provide an overview of the mental workload measurements. It will focus on four most practical indices such as The NASA Task Load Index (NASA-TLX); Subjective workload assessment technique (SWAT); Bedford Scale; Rating Scale Mental Effort (RSME).

Corresponding author: Farzan Madadizadeh

E-mail: f.madadizadeh@ssu.ac.ir

1- NASA-TLX: THE NASA TASK LOAD INDEX

NASA-TLX is a multidimensional assessment tool which is widely used to measures the perceived amount of workload to evaluate the team, (rating and weighting) : firstly, the individual raed then rate the total received workload by 5 points steps system, or task performance. This technique was developed in 1988 by the Human Performance Group at NASA's Ames Research Center.

NASA TLX measures subjective mental workload in two steps within a 100-points range in six subjective sub-scales such as Mental Demand, Physical Demand, Temporal Demand, Performance, Effort and Frustration Level secondly, in 15comparisons, compare the importance of each of the mentioned sub-scales with the other ones and select the more important option among the two. At the end, the sum of each

score of the sub-scales (on a scale of 100) should be multiplied by the selected number of sub-scales in the pairwise comparisons then divided to the number 15 to calculate the total workload received 4

2-Subjective Workload Assessment Technique (SWAT)

This technique was developed in 1988 by Reid, G.B., and Nygren to evaluate the mental workload. In this technique, individuals are asked to evaluate a job's mental workload according to the dimensions of time load, mental effort load, and psychological stress load. After evaluation, each of these dimensions has three related questions that are given to the individual, and the individual must express his or her mental evaluation scale based on a 100-point scale 5.

3-Bedford Scale

It is a unidimensional ranking scale designed in 1984 by Roscoe, A.H. for the mental workload measurement while performing a task in the flight environment. Using this scale, the ability to complete the task is determined based on whether the task's workload is bearable and satisfactory or not. To assess the needed mental effort to achieve the optimal performance level, the evaluator must select a number on a scale of 1 to 10 that best describes the mental effort required 6.

4-Rating Scale Mental Effort (RSME)

It is a unidimensional tool developed in 1985 by Zijlstra and Doorn to measure the mental workload. RSME consists of a 150 mm long line with 9 anchor points describing different levels of mental effort. These nine points, respectively, include Absolutely no effort, Almost no effort, A little effort, Some effort, Rather much effort, Considerable effort, Great effort, Very Great effort and Extreme effort 7.

In a nutshell, the workload is the physical and mental hardship amount that a person endures during or after work 2. Today, many researchers in various fields are interested in measuring workload. In this study, a simple review of existing tools for measuring the mental workload was carried out. Hope this material pave the way for further research

in the field of the mental workload and medical research.

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CONFLICT OF INTERESTS

There was no conflict of interest in this study.

REFERENCES

1. DiDomenico, A. and M.A. Nussbaum. Interactive effects of physical and mental workload on subjective workload assessment. *Int J Ind Ergonom* 2008;38(11-12):977-83.
2. Charles, R.L. and J. Nixon. Measuring mental workload using physiological measures: a systematic review. *Appl Ergon* 2019. 74:221-232.
3. Wang, P., W. Fang, and B. Guo. A measure of mental workload during multitasking: Using performance-based Timed Petri Nets. *Int J Ind Ergonom* 2020. 75:1-14.
4. Hart, S.G. and L.E. Staveland. Development of NASA-TLX (Task Load Index): Results of empirical and theoretical research. *Advances in psychology* 1988;52:139-183.
5. Reid, G.B. and T.E. Nygren. The subjective workload assessment technique: A scaling procedure for measuring mental workload. *Advances in psychology* 1988;52:185-218.

6. Braby, C., D. Harris, and H. Muir, A psychophysiological approach to the assessment of work underload. *Ergonomics* 1993;36(9):1035-1042.
7. Widyanti, A., A. Johnson, and D. de Waard, Adaptation of the rating scale mental effort (RSME) for use in Indonesia. *Int J Ind Ergonom* 2013;43(1):70-76.