

Effects of mental workload on manufacturing systems employees: A mediation causal model

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Received 9 March 2022

Accepted 5 December 2022

Abstract.

BACKGROUND: Although some research has been done in the Mexican manufacturing industry regarding mental workload, none has explored its association with physical fatigue, body weight gain, and human error simultaneously.

OBJECTIVE: This research examines the association between mental workload and physical fatigue, body weight gain, and human error in employees from the Mexican manufacturing systems through a mediation analysis approach.

METHODS: A survey named Mental Workload Questionnaire was developed by merging the NASA-TLX with a questionnaire containing the mental workload variables mentioned above. The Mental Workload Questionnaire was applied to 167 participants in 63 manufacturing companies. In addition, the mental workload was used as an independent variable, while physical fatigue and body weight gain were mediator variables, and human error was a dependent variable. Six hypotheses were used to measure the relationships among variables and tested using the ordinary least squares regression algorithm.

RESULTS: Findings indicated that mental workload significantly correlates with physical fatigue and human error. Also, the mental workload had a significant total association with human error. The highest direct association with body weight gain was provided by physical fatigue, and body weight gain had an insignificant direct association with human error. Finally, all indirect associations were insignificant.

CONCLUSION: Mental workload directly affects human error, which physical fatigue does not; however, it does affect body weight gain. Managers should reduce their employees' mental workload and physical fatigue to avoid further problems associated with their health.

Keywords: Body weight gain, human error, manufacturing systems, mental workload, physical fatigue

1. Introduction

Currently, scientific and technical breakthroughs are assisting in improving the quality of life in the workplace by reducing physical risk factors such as manual materials handling, vibration, repetitive movements, force application, and awkward body

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