Backpack-Back pain complexity and the need for multifactorial safe weight recommendation

Ademola James Adeyemi\textsuperscript{ab}, Jafri Mohd Rohani\textsuperscript{a}, Mat Rebi Abdul Rani\textsuperscript{a}

\textsuperscript{a}Department of Materials, Manufacturing and Industrial Engineering, Universiti Teknologi Malaysia, Skudai, Johor, MALAYSIA; \textsuperscript{b}Department of Mechanical Engineering, Waziri Umaru Federal Polytechnic, Birnin Kebbi, Kebbi, NIGERIA

Abstract

The study analysed backpack-related back pain in school children by investigating the possibility of multiple interactions among causative factors, which may be responsible for the non-conclusive findings on the issue. Using data from 444 prepubescent schoolchildren, a mixed method design combining survey, observation and direct measurement strategies was implemented. Using a multivariate structural equation modelling approach, the study investigated interactions among anthropometry, posture, backpack volume, rating and back pain constructs, with each construct made of 2-4 indicators. Additionally, regression analysis was used to determine the feasibility of considering the two additional factors of age and body mass index along with the globally accepted recommendation of a load of 10-15\% of body weight. Our model demonstrated an acceptable model fit and revealed direct and indirect effects of the factors. Obese children were recommended to carry a one-third lighter load than other children. The application of systematic/multiple strategies provided an explanation for some of the issues associated with school children's backpack-related back pain.

Keywords: school ergonomics, structural equation modelling, safe weight, backpack, back pain.