

Trolleys scientifically proven to be more beneficial than backpacks for the back of the children

3 March 2017



Credit: University of Granada

Researchers at the University of Granada (UGR) belonging to the Joint University Institute for Sports and Health (Instituto Mixto Universitario Deporte y Salud, iMUDS), have scientifically proven that trolleys are more beneficial than backpacks for children's gait, and it does less damage to their backs.

The research involved a total of 78 [schoolchildren](#) aged six to 12, 43 girls and 35 boys, from public schools in Granada. All of them went for several weeks to the Biomechanics Laboratory located in the iMUDS, bringing the [backpack](#) or trolley they usually carry to school and loaded with the books and school material they must carry on a daily basis.

The scientists performed several body composition tests to determine the percentage of fat and muscle mass. They also calculated the weight of their trolley or backpack to find out the relationship with the child's body weight (BW).

The researchers placed epidermal markers on several of the participants' anatomical points, which were later captured through a 3-D motion capture system consisting of nine infrared cameras and complex computer software that allowed the researchers to determine the children's posture and the different adaptations they made to carry the trolley or backpack with loads of 10, 15 and 20 percent of the subject's body weight.

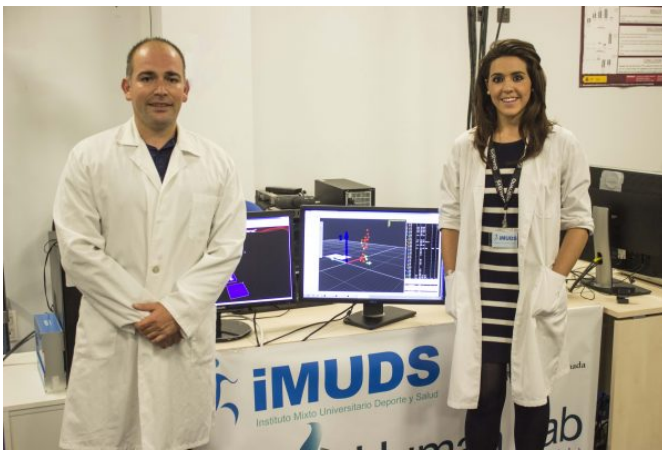
Survey among schoolchildren

"We found some alarming data," Eva Orantes, lead author of this work, explains, "23 percent of the girls are carrying in their backpack or trolley a load above 20 percent of their [body weight](#), well above what is recommended." Moreover, 47% of schoolchildren are carrying in their trolley or backpack a load above what is recommended, on a daily basis.

The UGR scientists have also conducted a survey to determine perceptions about the weight they take to class each day. Data show that 97 percent of backpackers believe their backpack is almost always heavy, compared with 85 percent of trolley

users who feel the same, even though the results of the study suggest that the weight of the trolleys is greater than backpacks.

In addition, 85.7 percent of schoolchildren who use a backpack often feel tired when they carry it, compared to 71 percent of those who carry a trolley. The incidence of back pain is greater in schoolchildren who usually use backpacks to go to school, which is 43 percent. Only 31 percent of schoolchildren who use trolleys to carry their school material report back pain.



UGR researchers José María Heredia Jiménez and Eva Orantes González, authors of this work, at the iMUDS Biomechanics Laboratory. Credit: Desiré Maya

"In light of the outcome of our work, we can say that pulling a trolley, provided it is within the load recommendations of between 10 and 15 percent of the child's weight, is more beneficial to them than using a backpack with the same weight," concludes Eva Orantes.

At present, the UGR researchers continue with the evaluation of children between 6 and 12 years old to continue this line of research. Those interested in participating should contact Eva Orantes.

Provided by University of Granada

APA citation: Trolleys scientifically proven to be more beneficial than backpacks for the back of the children (2017, March 3) retrieved 26 September 2020 from

<https://medicalxpress.com/news/2017-03-trolleys-scientifically-proven-beneficial-backpacks.html>

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