

traditional backpack, in order to minimize the impact of the side effects of its use. **Methods:** This scope review was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-analysis extension for Scoping Reviews guidelines. The MedLine®, PubMed®, PEDro and Science Direct databases were consulted concerning the Population, Concept and Context strategy, in English and Portuguese, from 1st January, 2000 to 25th June, 2020. A manual search was also carried out to cover a larger number of studies. Systematic reviews and meta-analyses, conference proceedings and technical reports were excluded. All articles were submitted to three levels of screening by three reviewers, and the disagreements were resolved through a fourth reviewer whenever necessary. Finally, a table of results was constructed that included the main characteristics of each of the articles under analysis. **Results:** 5 articles met the eligibility criteria proposed in this review. Only one study showed modifications to the traditional backpack, while the rest developed new models of school backpack (n = 4). Among the main changes proposed to the traditional backpack, there is an attempt to improve the distribution of the load inside, as well as an adjustment of its dimensions to the anthropometric characteristics of the user. It should be noted the importance given to an approach centered on the preferences of children and young people, as well as their usability. **Conclusions:** A new approach to this long-lasting problem requires a new vision for the backpack, so we should look to it as part of the solution instead of part of the problem.

Keywords: *Backpack, School Age, Prototypes*

References:

- Amiri, M., Dezfooli, M. S., & Mortezaei, S. R. (2012). Designing an ergonomics backpack for student aged 7-9 with user centred design approach. *Work*, 41(SUPPL.1), 1193–1201. <https://doi.org/10.3233/WOR-2012-0303-1193>
- Dahl, K. D., Wang, H., Popp, J. K., & Dickin, D. C. (2016). Load distribution and postural changes in young adults when wearing a traditional backpack versus the BackTpack. *Gait & posture*, 45, 90-96.
- Dianat, I., JavadiVala, Z., Asghari-Jafarabadi, M., Asl Hashemi, A., & Haslegrave, C. M. (2013). The use of schoolbags and musculoskeletal symptoms among primary school children: are the recommended weight limits adequate? *Ergonomics*, 56(1), 79–89. <https://doi.org/10.1080/00140139.2012.729612>
- Dockrell, S., Simms, C., & Blake, C. (2015). Schoolbag carriage and schoolbag-related musculoskeletal discomfort among primary school children. *Applied Ergonomics*, 51, 281–290. <https://doi.org/10.1016/j.apergo.2015.05.009>
- Gupta, I., Kalra, P., & Iqbal, R. (2019). Physiological and Biomechanical Responses in Male Schoolgoing Children Using Frameless and Internal Frame Backpacks. *Journal of Medical and Biological Engineering*, 39(2), 251–258. <https://doi.org/10.1007/s40846-018-0432-8>

P250

Backpack weight and load distribution: kinetic assessment tools in schoolchildren - scope review

Maria Castro⁽¹⁾, João Silva⁽²⁾, Gonçalo Costa⁽³⁾, Liliana Pinho⁽⁴⁾, Sandra Silva⁽⁵⁾, Vânia Figueira⁽⁶⁾

¹ Prática Clínica Privada; email: inesmcastro19@gmail.com

² Prática Clínica Privada; email: joao.silva.9@hotmail.com

³ Prática Clínica Privada; email: goncalofisio@gmail.com

⁴ CESPU: Escola Superior de Saúde do Vale do Ave; University of Oporto: Faculty of Sports; Centre for Rehabilitation Research (CIR)- Polytechnic Health Institute of Oporto; Portugal; email: liliana.pinho@ipsn.cespu.pt

⁵ CESPU: Escola Superior de Saúde do Vale do Ave; University of Aveiro: School of Health Sciences; Portugal; email: sandra.silva@ipsn.cespu.pt

⁶ CESPU: Escola Superior de Saúde do Vale do Ave; University of Oporto: Faculty of Sports; Portugal; email: vania.figueira@ipsn.cespu.pt

BACKGROUND: The backpack is the most used mean of transporting school supplies among children and young people, and the weight and distribution of the load, in its inside, is often variable. The adverse consequences, resulting from these parameters, have raised a growing concern on the part of the scientific community, parents and teachers. **Objectives:** To identify the kinetic parameters used to verify the effects of weight and load position, inside the backpack, in school aged children and young people. **Methods:** A literature search was performed, according to the PRISMA Extension for Scoping Reviews guidelines, considering the Population, Concept and Context strategy, in the electronic databases MedLine®, PubMed®, PEDro and Science Direct. Articles published between 1st January 2000 and 9th June 2020, in Portuguese and English, without restriction of geographical area, were included. The aim population was children and youth between 6 and 18 years of age, using a backpack as a mean of transporting school supplies. Systematic reviews and meta-analyses, conference proceedings, theses, technical reports and studies whose participants had neuro-musculoskeletal conditions were excluded. The general characteristics extracted from the units of analysis were recorded in a table of results. **Results:** 14 articles were considered for final analysis, in which 1 analyzed the position of the load inside the backpack and the rest (n=13) on the effects of the backpack's weight. Of the total considered (n=14), the kinetic parameters identified in the different studies were the ground forces reaction (n=10) and muscle activity (n=4). **Conclusions:** The kinetic parameters considered to verify the effect of the weight and the position of the load inside the backpack were, mainly, on upper and lower trapezius, spinal erector and rectus abdominus muscle activity, as well as the ground forces reaction, in different functional tasks.

Keywords: *Children, Backpack, Kinetics, Load Position, Backpack Weight*

References:

- Abaraogu, U., Ezenwankwo, E., Nwadiube, I., Nwafor, G., Ugwuiele, B., Uzoh, P., Ani, I., Amarachineke, K., Atuma, C., & Ewelunta, O. (2017). Immediate responses to backpack carriage on postural angles in young adults: A crossover randomized self-controlled study with repeated measures. *Work*, 57(1).
- Abdelraouf, O., Hamada, H., Selim, A., Shendy, W., & Zakaria, H. (2016). Effect of backpack shoulder straps length on cervical posture and upper trapezius pressure pain threshold. *Journal of Physical Therapy Science*, 28(9).
- Adeyemi, A., Rohani, J., & Abdul Rani, M. (2014). Back pain arising from schoolbag usage among primary schoolchildren. *International Journal of Industrial Ergonomics*, 44(4).
- Brzęk, A., Dworak, T., Strauss, M., Sanchis-Gomar, F., Sabbah, I., Dworak, B., & Leischik, R. (2017). The weight of pupils' schoolbags in early school age and its influence on body posture. *BMC Musculoskeletal Disorders*, 18(1).
- Dalleau, G., Damavandi, M., Leroyer, P., Verkindt, C., Rivard, C., & Allard, P. (2011). Horizontal body and trunk center of mass offset and standing balance in scoliotic girls. *European Spine Journal*, 20(1).

P251

Carrying backpack: motor tasks and kinematic assessment tools on schoolchildren - scope review

Joana Lima⁽¹⁾, Cláudia Rodrigues⁽²⁾, Kátia Campinho⁽³⁾, Francisco Pinho⁽⁴⁾, Liliana Pinho⁽⁵⁾, Sandra Silva⁽⁶⁾

¹ Prática Clínica Privada; email: inesmcastro19@gmail.com

² Prática Clínica Privada; email: joao.silva.9@hotmail.com

³ Prática Clínica Privada; email: goncalofisio@gmail.com

⁴ CESPU: Escola Superior de Saúde do Vale do Ave and Institute of Research and Advanced Training in Health Sciences and Technologies (iinfacts) ; IPCA: School of Technology and Applied Artificial Intelligence Laboratory (2Ai), Portugal; email: francisco.pinho@ipsn.cespu.pt