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Authors: Alexis Herbaut, Pascale Chavet, Maxime Roux, Nils Guéguen, Franck Barbier, Emilie Simoneau-Buessinger

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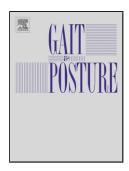
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#### THE INFLUENCE OF SHOE AGING ON CHILDREN RUNNING BIOMECHANICS

Alexis Herbaut<sup>1,2</sup>, Pascale Chavet<sup>3</sup>, Maxime Roux<sup>2</sup>, Nils Guéguen<sup>2</sup>, Franck Barbier<sup>1</sup>, Emilie Simoneau-Buessinger<sup>1</sup>

<sup>1</sup>Laboratoire d'Automatique, de Mécanique, et d'Informatique industrielles et Humaines (LAMIH) – UMR CNRS 8201, Université de Valenciennes et du Hainaut-Cambrésis (UVHC), Valenciennes, France

<sup>2</sup>SportsLab, Decathlon, Villeneuve d'Ascq, France

<sup>3</sup>Institut des Sciences du Mouvement (ISM) – UMR CNRS 7287, Aix-Marseille Université, Marseille, France

#### **Corresponding author:**

Alexis Herbaut<sup>1,2</sup>

SportsLab, Decathlon, Villeneuve d'Ascq, France

4 Boulevard de Mons, 59650 Villeneuve d'Ascq, France

herbaut.alexis@gmail.com

+337 62 94 45 26

#### Highlights

- 14 children performed a running task with new shoes and used shoes
- GRF loading rate increased by 23% in used shoes compared to new shoes
- Peak ankle and knee power absorptions decreased by 11% and 12% in used shoes

#### **ABSTRACT**

Athletic children are prone to overuse injuries, especially at the heel and knee. Since footwear is an extrinsic factor of lower limb injury risk, the aim of this study was to assess the influence of shoe aging on children running biomechanics. Fourteen children active in sports participated in a laboratory biomechanical evaluation. A new pair of shoes was provided to each participant at an inclusion visit. Four months later, the participants performed a running task and their kinematics and kinetics were assessed both with their used shoes and with a new pair of shoes identical to the first. Furthermore, mechanical cushioning properties of shoes were evaluated before and after in-vivo aging. After 4 months of use, the sole stiffness increased by 16% and the energy loss capacity decreased by 18% (p < 0.001). No ankle or knee kinematic adjustment was found at foot strike in used shoes but changes were observed later during stance. Running with used shoes produced a higher loading rate of the vertical ground reaction force (+23%, p = 0.016), suggesting higher compressive forces under the heel and placing children at risk to experience impact-related injuries. Nevertheless, the decreased peak ankle and knee power absorption in used shoes (-11%, p = 0.010 and -12%, p = 0.029, respectively) suggests a lower ankle and knee joints loading during the absorption phase that may be beneficial regarding stretch-related injuries.

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