

INFLUENCE OF INDIVIDUAL GAIT AND SHOE DESIGN FACTORS ON TREAD WEAR

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ABSTRACT

Slipping events, which originate at the shoe-floor interface, contribute to 40-50% of fall-related injuries. Increased shoe tread wear leads to higher risk of slipping. To develop new slip prevention strategies, improved knowledge of factors contributing to shoe wear is needed. The aim of this research is to explore individual gait and shoe design factors that influence tread wear. In this analysis, shoes were worn down naturally (NW) and artificially (AW). Shoe tread wear rates were determined by dividing the volumetric wear rates by the distance walked in the shoes (NW) or the distance the shoes were slid abrasively (AW). Our findings show that shoe tread wear rates are influenced by the peak required coefficient of friction during gait, but not by the peak normal force during gait. Shoe outsoles with more tread coverage were associated with lower wear rates. Surprisingly, the material hardness of the shoe outsole was not associated with the wear rate. These factors influencing shoe tread wear rates can act to guide gait analysis for shoe recommendations and can impact shoe design.

Keywords: Footwear, tread, wear, fluid dynamics, friction, gait parameters

Topic: Shoe wear

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