

Theoretical Issues in Ergonomics Science

Computational modelling in sport: A hybrid simulation of the runner as a complex adaptive system

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Abstract:

Running-related injuries, specifically overuse injuries, are complex and multifaceted. A different way of thinking is required to fully comprehend why, and how, these injuries occur. The systems thinking perspective offers tools and techniques to capture system-wide interactions in causal, closed-loop structures which may be studied and quantified in a practical way. The value of systems thinking in sport may only realise when pragmatic models follow descriptive, qualitative models. This article instantiates a qualitative, systems thinking perspective of the runner as a complex adaptive system with a hybrid simulation model. The approach is substantiated with principles from physics and physiology and is partially driven by data from a running watch. Results demonstrate that the scientific, reductionist method may be augmented with dynamic, closed-loop thinking and simulation modelling.