Leo Lundy

Department of Mechanical, Manufacturing and Biomedical Engineering, Trinity College, The University of Dublin, Ireland.

Co-Authors

Professor Richard B Reilly
Department of Mechanical, Manufacturing and Biomedical Engineering, Trinity College, The University of Dublin, Ireland. & School of Medicine, Trinity College, The University of Dublin, Ireland.

Dr. Neil Fleming
Human Performance Laboratory, School of Medicine, The University of Dublin, Ireland.

Dr. Alejandro Lopez Valdes
Global Brain Health Institute, Trinity College Institute for Neuroscience and Trinity Centre for Biomedical Engineering.

Dr. Clodagh O'Keeffe
Dublin Neurological Institute, Eccles St, Dublin, Ireland.

Mind Over Miles: Cognitive Functioning and Health in Multi-Marathon Runners

Multi-marathoners are endurance athletes who complete numerous marathons over extended periods, often achieving hundreds of finishes. This study examined whether multi-marathoning is associated with domain-specific cognitive benefits, particularly in executive function, attentional control, and cognitive resilience, while also exploring potential cognitive trade-offs. Theoretical frameworks included Cognitive Reserve Theory, Lifespan Theory of Cognitive Development, and the Exercise-Cognition Interaction Model. A cross-sectional study assessed 130 multi-marathoners (mean age = 53.3 years; 57% male) using the Sustained Attention to Response Task (SART), Choice Reaction Time (CRT) test, and Mini-Mental State Examination (MMSE). Cognitive performance was compared to normative data from The Irish Longitudinal Study on Ageing (TILDA). Principal Component Analysis (PCA) and K-Means clustering identified cognitive subgroups. Results showed that multi-marathoners had significantly fewer SART omission errors and faster CRT cognitive and motor reaction times than TILDA controls (all $p < 0.001$). MMSE scores were significantly higher overall ($p < 0.001$), with similar patterns by gender. Clustering revealed two cognitive subgroups: one with superior attentional control, response inhibition, and decision-making efficiency (associated with higher educational attainment) and another with greater cognitive variability and lower educational attainment. No significant differences were observed in age or gender distribution between clusters. Findings support the Exercise-Cognition Interaction Model, showing that multi-marathoning is linked to enhanced executive function. Differences between cognitive subgroups underscore the moderating role of cognitive reserve, particularly education, in shaping outcomes. These results suggest that while endurance training supports cognitive resilience, individual variability must be considered when promoting long-term brain health among endurance athletes.

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Biography

Leo Lundy is a computer scientist and serial entrepreneur who returned to academia to explore his lifelong passion: multi-marathoning. With over 400 marathon completions personally, he specialises in the psychology and cognitive performance of endurance athletes as they age. His research applies latent class analysis to identify hidden cognitive perforamnce subgroups within this high-performing population. Leo's work aims to document the lived realities of multi-marathoners and influence policy to make the sport safer and more sustainable. He combines technical expertise, statistical precision, and first-hand experience, and has presented his findings at major international conferences in sport science globally.

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