Department of Physical Education and Sport Sciences

Proposals for Attracting Non-EU Students

University of Limerick

MOVEMENT METRICS IN CYCLING – THE USE OF BIG DATA FOR THE PARTICIPATORY ATHLETE

EHS Research Theme = Physical Activity and Human Performance

EHS non-EU PhD

As participation events in sport continue to rise in popularity the focus of the participants moves away from single event performance (i.e. medalling) to that of continued long-term participation. The use of technology for a non-elite athlete differs from that of an elite athlete – technology in these circumstances is to make the sport more engaging by providing information to both enable the participant to accelerate over the initial learning gradient and subsequently continue to participate in sport uninjured. By promoting behavioural change with a view to decreasing attrition in sport these outcomes benefit the individual from a health, both physical and psychological, perspective and society in general by creating a healthier population. With more and more cyclists using technology to provide data on their performance the availability of performance data is widespread thus demonstrating the desire of non-elite cyclists to engage with self-improvement.

The introduction of technology into sport has resulted in numerous devices that provide the athlete with real time information about their performance; these data sets are typically massive and contain many millions of data points – commonly referred to as *big data*. However, the data is often sourced from non-validated equipment, is presented poorly and hence difficult to interpret correctly, and is often used for convenience rather than scientific reasons. This project will examine the ability of sub-elite cyclists to process such information in real-time in an attempt to make them more proficient in their event within the time constraints of someone who exercises purely for pleasure. For example, control of cadence is often proposed as a differentiator between good and average cyclists; can the provision of cadence during a cycling bout improve cadence control? In addition, unintentional movement of the bike (wobble) during cycling requires energy. As such, excessive movement that does not assist the propulsion of the bike may be detrimental to performance; a further aim is to assess the use of inertial sensors in an attempt to create a 'wobble' score for cycling. These are two examples of the type of metric which may be deemed important in cycling and the first phase of this project will be to create, identify, and rank further metrics resulting in a feedback modality best suited for the participants. This process requires the distillation of many millions of data points down to values that are valid, reliable and easy to interpret by the participant.

This project will involve development of sensor technologies to determine and subsequently measure the identified metrics. A period of time will be spent on designing the best feedback modality to provide the information to the participant; this will align with the principles of data visualisation. Furthermore, the use of these sensor technologies in a group of non-elite cyclists will be assessed to determine whether these movement metrics improve performance and engagement through behavioural changes and ultimately reduce attrition within the sport.

The impact of this research is to create a set of principles for non-elite participatory athletes in the use of technology in sport to aid extended participation and hence improve the health of the individual and the nation.

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