Project Details	
Project Code	MRC22NMHBr Hamilton-Shield
Title	Improving health outcomes in Type 2 diabetes by stimulating positive behaviour change through virtual reality.
Research Theme	Neuroscience & Mental Health
Summary	Virtual reality technology has shown extensive potential to transform healthcare; from medical training during COVID-19 to rehabilitation and mental health care. This project will explore its value in improving health and wellbeing in people with type 2 diabetes. You will work closely with these individuals and learn to adapt technology to address health challenges, visit the NHS trusts and undergo a placement in industry to build cross-sector collaborations.
Description	The latest national guidelines recommend regular physical activity as fundamental to the management of type 2 diabetes mellitus (T2DM)[1]. Increasing activity levels and structured exercise improves weight control, insulin sensitivity, metabolic and mental health, and is protective against diabetes and frailty-related medical complications. Motivating people with T2DM make positive changes in activity levels can help them "enjoy the benefits that it brings"[2]. Though apps, wearable devices, and consoles offer some degree of motivation to engage in physical activity, they are not tailored to individual physical functioning or the specific challenges faced by people with T2DM. Innovative approaches should focus on three key areas[2]: 1) personalised training programmes suitable for T2DM, 2) provision of individually-tailored support (especially psychological and podiatry), 3) build confidence. This interdisciplinary project aims to explore the utility of virtual reality (VR) technology to help people with T2DM gain physical skills and confidence to become more active. VR technology can deliver a personalised exercise programme that provides real-time feedback on movement quality and increases engagement in patients who might not adhere to prescribed exercise. Collaboration between centres will ensure suitability to people with T2DM, and capture data on diabetes self-management and mental health. The student will work with experts in diabetes and physical activity (JHS, SS) to characterise the mobility difficulties faced by people living with T2DM (systematic review, YR1). The student will collaborate with people with T2DM to identify and map movements in VR that they enjoy, aids physical functioning, and encourages participation in activities available in the community or accessible from home (co-design, YR2). With MAA, the student will adapt an existing VR-system (YR2). A mixed-method pilot study will follow (YR2-3.5), informed by research led by the NIHR Bristol BRC and the CREATE lab (Bath). Forty adults with T2DM and poor glycaemic control [2] will be invited to take part in a study on the impact of a 12-week VR-enhanced activity regimen on self-management. The student will achieve inclusive participation in research by recruiting via SS's extensive community-based diabetes networks. They will learn to conduct full body functioning assessments at Cardiff's movement analysis facility and to remotely assesses cognitive function with VR as done at the CREATE lab (i.e. a novel approach that uses computer-generated simulation to better predict cognitive performance in real life settings). An improved understanding of the link between cognitive functioning and enjoyment

	of physical activity can inform innovative multicomponent interventions. The student will receive comprehensive qualitative research and systematic review training (Bristol Medical School). Throughout the project they will have access to topic relevant sessions part of the Msc in Nutrition, Physical Activity and Public Health (Bristol), cognitive assessment methods (Bath), and receive tailored training in movement analysis and applied health technology (Cardiff). By the end of the project the student will set guidelines for the customisation of VR-based activities for future research and clinical practice in diabetes management. Knowledge-transfer will focus on these VR features: i) visualisation of individual problem areas, ii) Real-time adaptation to a user's abilities and immediate feedback, iii) differential degrees of immersion and multi-sensory stimuli in computer-generated environments and effects on performance, acceptability and usability of VR. The student will share outputs with industry, academics and health professionals by presenting at the Bristol VR Lab2.0 and the BRC's Seminar Series, and will broaden horizons by visiting industry partners. [1]NICE guidelines(2015);[2] Diabetes UK Physical Activity report(2019)
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