# Co-production of Virtual Reality Games for Upper Limb Rehabilitation for People with MS

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With virtual reality (VR) and gaming being an emerging rehabilitation tool, there is a need to develop evidence based, specifically tailored games to be suitable to the needs of people with multiple sclerosis (MS). This study aimed to develop a suite of VR exercise-based games for upper limb rehabilitation in people with MS using the Oculus Quest headset. A co-production method was facilitated by four online focus groups conducted with ten people with MS and eight MS-specialists. The focus groups were recorded and transcriptions were analysed by using theme-based content analysis which influenced the design and requirements of the games. People with MS wanted a variety of upper limb targets, to focus on strength, and a personalised approach to their rehabilitation. MS-specialists also proposed offering choice to patients and having games reflect functional activities. From these findings the application “VR Handy Rehab”, was developed using Unity, it initially includes three games: (1) A piano game that targets individual finger movement; (2) a catch a falling star game to replicate grasp and release of the hands and (3) a whack-a-mole game to target elbow flexion and extension. These games come with changeable speed settings and difficulty to adjust to the variable needs of people with MS. The games either use the hand tracking provided by the Oculus Quest or the Touch controllers to interact within the virtual environments. This is the first study to co-develop VR games with, and for, people with MS and will be trialled this year within a randomised controlled feasibility study.