

PP: DEMENTIA & TECHNOLOGY

Exploring the physical, social and educational benefits of virtual reality exergame for people with dementia through co-designing to promote hand hygiene and influenza vaccine uptake

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Purpose The purpose of this project is to develop an educational exergame for people with dementia (PWD) and their caregivers to practice effective handwashing through the use of virtual reality (VR), while delivering educational content related to infection control, and evidence-based resources to educate them about the importance of influenza vaccination. Our objective aims at examining the meaning and value of utilizing educational and social exergaming for PWD in the community and institutional settings, and to explore its physical, social, and educational benefits, including hand hygiene practices and influenza vaccine uptake. **Method** The Behavior Change Wheel (Michie et al., 2020; Michie et al., 2011) was used to guide the understanding of factors that influence the adoption of educational learning in hand hygiene and influenza vaccination, which include three domains: (a) modelling (learning through imitation); (b) education (gaining knowledge), and (c) training (practicing skills). Using mixed methods approaches, this project is comprised of co-designing, developing, and pilot-testing the feasibility of exergame. An advisory committee group (12 members) was recruited from Oshawa Senior Community Centre and Durham Region Long-Term Care (LTC) Homes, where they acted as expert panels to provide consultations related to co-designing of exergame. **Results and Discussion** The development team collaborated with the advisory members (including public health and infection control practice consultants; occupational therapy/rehabilitation consultants, accessibility consultations, health/service providers, older adult with cognitive impairment and their caregivers) to engage in the co-design process. This allowed for the incorporation of user feedback to guide each iteration of technology development with the goal of ensuring the solution is feasible, usable, robust, accessible, and culturally-sensitive from the beginning of conceptualization until implementation. Prior to co-design session, the research team hosted virtual Idea Jam sessions with the team members to provide a forum for discussion about the development of exergame intervention, and the implementation approach. During the co-design phase, the process was guided by the Consolidated Framework For Implementation Research (CFIR) (Michie et al., 2011) to allow the advisory stakeholders to explore the relevant factors that would facilitate or hinder the development, implementation, and evaluation of VR exergame for PWD, while taking into consideration of their cultural contexts (Figure 1). Major milestones in this phase included content development, such as co-creating and co-designing interactive storyboards for the exergame components, visual assets, and aesthetics. High-level prototyping and iterative design of accessibility features enabled equity and inclusion considerations to address the needs of PWD with physical disability and cognitive impairment. Additional considerations included game mechanics, successful hand tracking interactions based on user's diverse ranges of upper limb mobility, as well as analysis and characterization of VR motion capabilities and signal processing for users with different levels of hand motor skills. There is an urgent need for proactive interventions directed at PWD to mitigate their risk for having "vaccine-preventable" infections. Our solution is an interactive educational and social exergame, which is designed as a preventative measure to mitigate the risks of infectious diseases, as well as presenting opportunities for PWD and their caregivers to engage in physical activity and cooperative gaming to promote their social connectedness and mental well-being.

References

- Keith, R. E., Crosson, J. C., O'Malley, A. S., Crompton, D., & Taylor, E. F. (2017). Using the Consolidated Framework for Implementation Research (CFIR) to produce actionable findings: a rapid-cycle evaluation approach to improving implementation. *Implementation Science*, 12, 1-12. <https://doi.org/10.1186/s13012-017-0550-7>
- Michie, S., Atkins, L., West, R. The behaviour change wheel: a guide to designing interventions. Accessed Feb 10, 2020 at <http://www.behaviourchangewheel.com/about-wheel>.
- Michie, S., Van Stralen, M. M., & West, R. (2011). The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implementation science*, 6, 1-12.

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Figure 1. Virtual reality handwashing exergame for people with dementia