

Application Fields and Innovative Technologies

Happy Feet: A dance exergame to encourage physical activity among older adults Jonathon Wen Hao Leong, Jun Long See, Zi Yi Tan, You Min Toh, James Chen Yong Kah. *Gerontechnology* 25(s)

Purpose Singapore's rapidly ageing population faces rising risks of chronic conditions linked to low levels of physical activity [1]. Despite national campaigns, older adults continue to report boredom, a lack of motivation, and limited social support as barriers to exercise [2]. Existing research indicates that gamifying exercise can enhance motivation and enjoyment, making it a promising approach to addressing older adults' barriers to exercise [3]. However, commercially available exergame platforms such as Wii or Kinect are often too complex or intense for seniors and have not been tailored to their abilities or cultural preferences. We developed Happy Feet, a rhythm-based dance exergame (Figure 1) co-designed with seniors to overcome these barriers and evaluated its effectiveness to increase physical activity in a pilot community trial. Here, the seniors provided inputs on the songs and background screen images as well as the speed of game play suitable for them.

Methods Happy Feet was implemented as a 12-week community-based intervention at three Singapore active ageing centres. Participants aged 60–80 years who passed the Mini-Mental State Examination and Romberg balance test were enrolled (n = 35; 33 completed). The study comprised three supervised stages (baseline: Weeks 1–3; intervention: Weeks 4–9) and an unsupervised stage (Weeks 10–12). During intervention weeks, participants attended a 30-minute play session weekly, each comprising eight Happy Feet games. Pre- and post-game heart rate was recorded via fitness trackers, and weekly total steps and moderate-to-vigorous physical activity (MVPA) minutes were logged using the Healthy365 app. Physical Activity Scale for the Elderly (PASE) and 8-item Physical Activity Enjoyment Scale (PACES-8) surveys captured self-reported activity levels and enjoyment. **Results** Mean weekly steps and moderate-to-vigorous physical activity (MVPA) minutes did not differ significantly between the baseline and intervention stages ($p > 0.05$). However, Happy Feet produced meaningful short-term activity responses during gameplay. Each 30-minute session increased participants' step count by an average of 869 steps, approximately equivalent to nine minutes of outdoor walking. Mean post-game heart rates increased by 15% (Easy), 18% (Medium), and 45% (Hard) relative to pre-game values, indicating moderate to vigorous exertion. PASE scores increased by 9.86 points during the intervention, driven mainly by engagement in moderate recreational activity. Enjoyment was high, with a mean PACES-8 score of approximately 55 out of 56, exceeding values commonly reported for other exergame interventions in older adults. Adherence was strong, with 94% of participants completing the nine-week supervised intervention phase and continued voluntary participation was observed during the unsupervised phase. **Discussion** The short-term increases in steps, heart rate, and enjoyment indicate that Happy Feet delivered meaningful "activity boosts" during each session. These effects are likely driven by rhythm-based gameplay, progressive difficulty, culturally familiar music, and supervised group sessions refined through co-design with older adults. Sustained increases in weekly physical activity were not observed, which may partly reflect a measurement dilution effect, as activity was aggregated over 24 hours across the week while the intervention itself comprised only a single 30-minute session, potentially masking localized gains during gameplay. This pilot study was also limited by its small sample size, short duration, and low frequency of intervention. Nevertheless, the findings suggest that brief, enjoyable exergame sessions may serve as a feasible complement to existing exercise programmes in community care settings. Future work should examine higher-frequency play, adaptive progression, and longer-term deployment to evaluate scalability and sustained behavior change.

Resources

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Figure 1: Two Seniors Playing Happy Feet