JAMDA xxx (2017) 1–7

JAMDA

journal homepage: www.jamda.com

Original Study

Feasibility and Effects of a Physical Activity Program Using Gerontechnology in Assisted Living Communities for Older Adults

Martine Lauzé MSc(c), Dominic D. Martel MSc(c), Mylène Aubertin-Leheudre PhD *

Département des Sciences de l'activité physique, Université du Québec à Montréal, Montréal, Québec, Canada

Keywords:
Gerontechnology
exergames
physical activity
nursing homes
home-based exercise program
older adults
functional capacities

A B S T R A C T

Background: The number of older adults residing in assisted living communities is increasing. Despite the benefits of physical activity (PA) on physical and cognitive capacities, and the opportunities for being active offered in these living environments, this population is highly sedentary and more at risk of physical decline. This study aimed to assess the feasibility, the acceptability, and the effects of PA intervention using gerontechnology in assisted living communities.

Methods: Forty-two older adults in 4 assisted living communities were recruited and randomly assigned to an exercise intervention group (EX) or a control group (CON) using a 2:1 ratio. The EX group followed a 12-week PA program (2 sessions per week) using gerontechnology. Body composition, health status, quality of life, and functional capacities were evaluated at baseline, 12 weeks, and 24 weeks after baseline.

Results: Differences between groups were observed in the number of reported comorbidities (EX: 3.1 ± 1.6 vs CON: 5.0 ± 1.8; $P = .007$), SF-36 total score (EX: 80% ± 10% vs CON: 66% ± 15%; $P = .004$), and Short Physical Performance Battery (SPPB) total score (EX: 9.1 ± 1.8 vs CON: 7.5 ± 1.4; $P = .006$) at baseline. The EX group completed 89% ± 17% of the 24 prescribed sessions and realized 67% ± 13% of them in autonomy, reaching a quality level of 87% ± 6%. Of the EX participants, 93.8% enjoyed the exercises a lot or well, and 92.8% of them rated the exercises as being either easy or a little difficult. Changes between baseline and follow-up were statistically different between groups for walking speed (EX: +0.10 ± 0.20 vs CON: −0.04 ± 0.16 m/s; $P = .04$) and the SPPB score (EX: +1.1 ± 2.0 vs CON: −0.4 ± 1.6; $P = .03$).

Conclusion: We found that PA intervention using gerontechnology in assisted living communities for older adults was feasible and acceptable, but more importantly induced improvement in functional capacities and walking speed, which is the main predictor of mortality in the elderly population.

Aging of the population is observed worldwide. Even though life expectancy has increased significantly in the past decades, people can expect to live approximately 10 years with some functional limitations.[1] As functional capacities decline, older adults require assistance to accomplish their activities of daily living (ADLs), leading them to move to new living environments, such as senior housing, nursing homes, or health care facilities. In Canada, 30% of individuals older than 85 years reside in this type of living environment.[2]

Even if this type of housing offers exercise facilities and recreational activities, residents are not physically active. It has been observed in the United States that nursing home residents spend from 84% to 94% of their day in sedentary positions (ie, sitting or lying[3]). This phenomenon also was observed in France, where only 9% of residents were engaging in at least 2 weekly 30-minute exercise sessions.[4]

Even though it has been proven that physical activity (PA) is effective in maintaining functional capacities and even reducing the risk of major mobility disabilities in frail and nonfrail elderly individuals,[5,6] older adults mention many barriers that prevent them from engaging in a physically active life, namely poor health, fear of injury, and lack of motivation.[7]

Given the evidence that older adults can benefit from being physically active,[8] there is a need to facilitate the practice of PA

M.L. is founder of and has shares in NeuroMotrix.

M.L. and M.A.L. are supported by the Fonds de la Recherche en Santé du Québec. This study was funded by MITACS-FQRNT.

The authors declare no conflicts of interest.

* Address correspondence to Mylène Aubertin-Leheudre, PhD, Département des Sciences de l'activité physique, Université du Québec à Montréal, 141 avenu Président-Kennedy, SB-4615, Montréal, Québec H3C 3P8, Canada.

E-mail address: aubertin-leheudre.mylene@uqam.ca (M. Aubertin-Leheudre).

http://dx.doi.org/10.1016/j.jamda.2017.06.030
1525-8610/© 2017 AMDA – The Society for Post-Acute and Long-Term Care Medicine.

among all elderly individuals, including those living in assisted living communities. Innovative approaches, such as the use of gerontechnologies, should be brought forward to alleviate some barriers. In that way, exergames (exercises through video games) show good potential for older adults.[9,10] For example, these studies showed similar improvement in functional capacities as traditional interventions[9] and led to a higher degree of motivation because older adults perceived the PA as a game rather than an exercise.[10] However, not all type of exergames or supporting technologies are adapted to the needs of older adults in assisted living communities. Recommended guidelines to meet the specific needs of this population include exergames that are adaptable in terms of complexity, range of motion, and intensity.[11] In addition, technology needs to provide automated reminders and feedbacks to contribute to the feeling of control, autonomy, and self-efficacy.[11] Moreover, motion capture camera systems are well suited for older adults because they do not require equipment, such as wireless handheld controllers, a board, or a mat that might interfere with their ability to perform movements.[12] Finally, a system that can be used independently by older adults, and allows for individualized settings and distance supervision, can enhance participation, as it promotes autonomy and provides opportunity for high-quality intervention and follow-up by health professionals.[13] However, as shown in a recent review,[9] most studies on exergames PA intervention have been conducted in laboratory or clinical settings using commercialized games and very few through a motion capture camera system. To our knowledge, only one pilot study has been conducted in a nursing home and showed that older adults were able to exercise independently using gerontechnology based on a motion capture system in a remote supervision framework. This 4-week interventional study led to an improvement of functional capacities and an increase of PA level (by design).[14] Nevertheless, at this point, it remains difficult to draw any conclusion on the feasibility and effectiveness of exergames for older adults in assisted living communities.

Thus, the purpose of the study was to explore the feasibility, the acceptability, and the physical effects of a 12-week PA intervention using gerontechnology (Jintronix [Montréal Québec, Canada]; exergames) in assisted living communities.

Methods

Design and Sample

This randomized controlled trial was a multicenter study conducted in 4 assisted living residences for older adults located in the city of Montréal (Québec, Canada). After having signed formal consent, 42 volunteers were randomly assigned to either an exercise intervention group (EX) or a control group (CON) using a 2 for 1 ratio (see Figure 1).

Inclusion criteria were as follows: (1) age 65 years and older, (2) independent in travels within the residence, and (3) able to stand without assistance for at least 1 minute. People with severe mobility impairments and those practicing PA at moderate or vigorous intensity for at least 30 minutes more than twice a week were excluded. Participants who were randomly assigned to the EX group completed a Physical Activity Readiness Questionnaire (PAR-Q+) and/or obtained a medical authorization when necessary. All procedures were approved by the Université du Québec à Montréal research ethics board.

Intervention

EX group participants undertook a 12-week exercise program using gerontechnology (2 voluntary sessions per week [free choice of day and time]). The technology included a computer with Jintronix software installed and a motion capture device (Kinect; Microsoft, Redmond, WA) mounted on a TV screen. The system was installed in a common room of the residence, accessible to the participants at any time. The exercise program was the same for everybody, but adapted to each person's fitness condition. Each session lasted approximately 45 minutes, and comprised a warm-up, 7 aerobic exercises, 8 resistance and balance exercises, and a cool-down period, as previously described.[15] The Jintronix software allows personalized adaptation of exercises in terms of speed, range of motion, precision, number of repetitions, and duration. Therefore, individual parameters were set to reach a light to moderate intensity level in the core portion of the session (aerobic and resistance and balance exercises). The technology also provides guidance through continuous visual and audio cues while performing exercises as well as live feedbacks allowing the

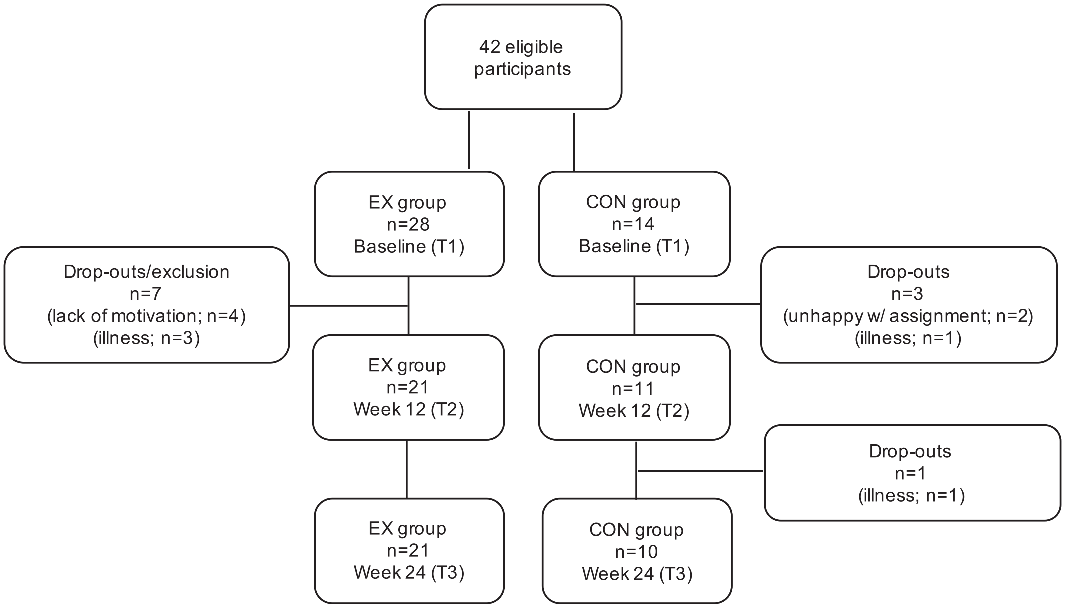

Fig. 1. Flow diagram of the intervention study.