Commercial and customized exergames improve balance in older persons in a community center: a pilot study.

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Introduction

Of all people over 65 years 30-50% fall at least once a year. These falls may cause people to cut down on their activities of daily living, which may in turn have a negative impact on their wellbeing. Regular physical activity can reduce the risk of **falling** significantly.
Older persons have to perform activities of moderate intensity for 30 minutes each day, according to global **physical activity guidelines**. They also have to engage in strength and balance exercises twice a week. Research has shown that the vast majority of this population does not comply with those health guidelines. Physical activity programs, are therefore needed to activate elderly.
Community centers offer a variety of activities to older persons living in the neighbourhood, including physical activity programs. These programs consist of traditional exercises and are often performed in large groups. However, the adherence to such exercise programs is low, mainly due to a lack of motivation. Previous research has shown that motivation can be increased by using exergames, or active video games (AVG). Furthermore, several studies have found a positive influence of exergaming on balance and cognition. Most exergame studies have used commercial exergames, but these exergames are not tailored to the elderly population. It is hypothesized that customized exergames, which are specifically designed for older persons, might be even more effective.
In this study we developped two physical activity programs which use **exergames**. One program uses commercial KINECT exergames (Microsoft). One program uses customized MIRA exergames (MIRA rehab, www.MIRArehab.com). We evaluated the feasibility of both programs and its influence on participants' balance, cognition, and fear of falling.

Methods

Participants:

- N=17 (7 males, 10 females, mean age=76,00 years, range=67-88 years)
- Inclusion criteria: 65+, no epilepsy, no dementia, able to walk 10 m and stand up 5 min. without help, permission of general physician to perform physical activity, not living in a long term care facility
- Randomized into 2 groups: KINECT program (N=8), MIRA program (N=9)

Measurements:

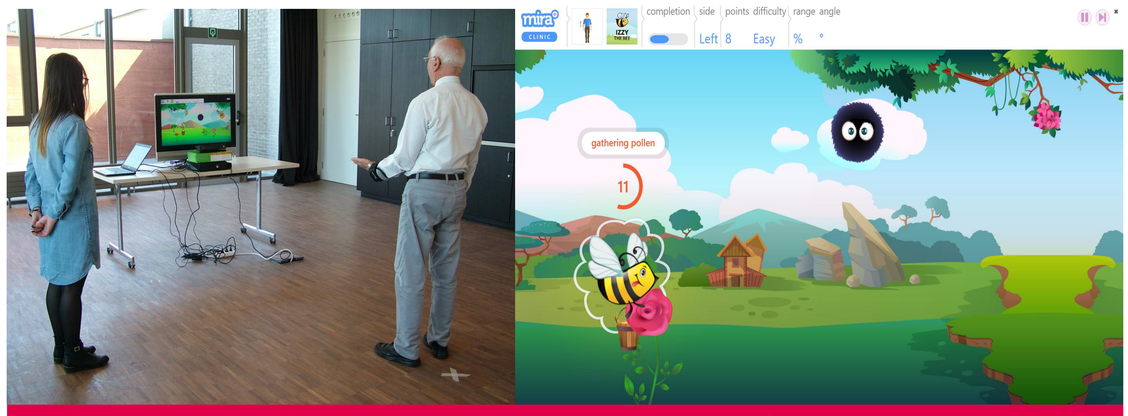
Balance	Berg Balance Scale (BBS) (Berg et al., 1992); Timed up and go (TUG) Podsiadlo & Richardson, 1991)
Fear of falling	Fals Efficiency Scale International (FES-I) (Prevention of Falls Network Europe)
Cognition	STROOP color-word Test (Stroop, 1935); Digit span task (Wechsler,2005); Dual task (TUG + counting back from 50)

Programs:

- **Games** were selected to influence fall prevention risk indicators: balance (B), strength (S), mobility (M) , flexibility (F), endurance (E) and cognition (C); selection feedback was given by physiotherapists; games were pretested by the population
- **Frequency**: 1,5 hour/session; 2 sessions/week; 8 weeks; played in small groups (2 à 4 players)

❖ MIRA program

- 12 Customized exergames (MIRA Rehab)



Games	Movement	Indicators					
		B	S	M	F	E	C
Animals	Side taps	x		leg			x
Forest Leaves	Lateral Weight Shifting	x		trunk			x
Catch	Hip frontal flexion	x		leg			
Grab	Functional reach	x		arm, trunk	x		
Seasons	General shoulder			arm			x
Jugger	Full Body turn	x		trunk			
Izzy the bee	Elbow flexion		arm				
Atlantis	Elbow flexion		arm				
Memory scape	General shoulder			arm			x
Piano	Sit to stand		leg			x	
Move	General shoulder			arm			x
Fishing	Walk in place			leg		x	

❖ KINECT program:

- 7 Commercial KINECT games (Microsoft)

		Indicators					
		B	S	M	F	E	C
Bowling	Mini game pin rush		leg	arm		x	
Soccer	Mini game super saver	x	leg	arm, trunk	x		
	Mini game target kick	x	leg	leg	x		
Boxing	3 rounds		leg, arm	arm		x	
Skiing	2 runs	x	leg	arm, trunk			x
Golfing	3 holes	x		arm, trunk			x
Dancing	Just dance barry white	x		arm, leg, trunk	x	x	x

Results

- **High satisfaction** with both programs
- Exergames of both programs were **fun, not too difficult, varied** and **moderately intense**
- **No adverse effects** were reported in both groups
- **High adherence** in both groups
- Both programs **improved balance** (see Table 1)
- Cognition and fear of falling did not improve
- **Attitude towards physical activity** became **more positive** in both groups (see Table 2)

Table 1: Means (M), standard deviations (SD) and repeated measures analyses (RM)

	KINECT		MIRA		RM
	M1 (SD)	M2 (SD)	M1 (SD)	M2 (SD)	
			Balance		
BBS	50,50 (4,04)	52,75 (3,11)	52,44 (3,13)	54,11 (1,83)	F(1,15)=18,92 p=0,001
TUG	10,60 (2,68)	9,61 (2,66)	9,28 (1,30)	8,22 (0,99)	F(1,15)= 17,93 p=0,001
			Cognition		
Inhibition	57,32 (27,34)	54,48 (31,61)	46,65 (17,03)	48,21 (29,52)	/
Working memory	12,50 (2,20)	12,50 (1,51)	12,78 (2,05)	12,44 (2,46)	/
Switching	5,49 (12,05)	6,29 (12,53)	9,25 (15,28)	4,02 (10,08)	/
			Fear of falling		
FES-I	27,50 (9,35)	29,88 (8,59)	24,89 (6,95)	23,44 (4,64)	/

Table 2: Self-reported effects

	KINECT	MIRA
Thinking more often about physical activity	87,5%	77,8%
Increased liking of physical activity	85,7%	88,9%
Increased ability to perform physical activity	87,5%	66,7%
Increased wellbeing	71,4%	77,8%
Increased confidence to perform physical activity	71,4%	77,8%
Increased endurance	66,7%	77,8%
Increased awareness of the importance of physical activity	62,5%	88,9%

Conclusions

- Playing exergames has the potential to improve balance in elderly in a community center
- Playing exergames has positive effects on the participants' attitude towards physical activity
- No difference occurred between commercial and customized exergames
- Confirmation of these findings in a larger study sample is recommended

References

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