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The use of a virtual reality video dance game for the training of motor control in elderly

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09/02/2011	No longer recruiting	[ ] Protocol
Registration date	**Overall study status**	[ ] Statistical analysis plan
10/03/2011	Completed	[ ] Results
Last Edited	**Condition category**	[ ] Individual participant data
10/03/2011	Signs and Symptoms	[ ] Record updated in last year

Plain English summary of protocol
Not provided at time of registration

Contact information

Type(s)
Scientific

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Additional identifiers

Protocol serial number
N/A

Study information

Scientific Title
The use of a virtual reality video dance game for the training of motor control in elderly: a two-groups pre-test post-test controlled experimental design

Study objectives
The effect of a physical training program that includes a dance simulation computer game on relative dual task costs of walking as opposed to usual care exercise interventions for older people living in a residential care facility.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Ethics Committee of the Canton of Zurich [EK-Nr. 02/2009 (ETH)] approved on 24th March 2009

Study design
Two-groups pre-test post-test controlled experimental design

Primary study design
Interventional

Study type(s)
Treatment

Health condition(s) or problem(s) studied
Geriatrics related conditions

Interventions
1. Computer Game Exercise Program:
Participants allocated to computer game (CGame) underwent a regimen of twice weekly progressive resistance training of the core and lower extremities muscle groups, progressive postural balance training and progressive computer game dancing for twelve weeks.

The muscle groups for the strength training were chosen because of their importance in functional activities and were trained in standing position. During standing participants were secured with ropes they could hold on to (Redcord AS, NO-4920 Staubo, Norway). The ropes were fixated on the ceiling or on frames. The focus of exercise was on functional activities of daily living such as walking, standing up from a chair, sitting down or stair climbing. The aim for each exercise was to perform two sets of 15 repetitions. To maintain the intensity of the stimulus during training, the load was increased at each training session, as tolerated by the participants, with the help of sand filled cuffs worn on the ankle or waist. The increase of load was controlled using a Borg exercise-intensity scale for verbally assessing proper intensity.

Balance exercises were performed with a maximum of four individuals training at the same time. All exercises could be adjusted to the individual mobility level. The intensity was gradually increased and previously formulated recommendations were applied: participants performed 1-2 sets of 3-5 different exercises emphasising dynamic postures with progressive difficulty as tolerated.

Stimuli in the dancing game were five dance songs with no lyrics (90130 beats per minute [BPM]; mean = 115 BPM). Songs were edited into 30 seconds (30-s) segments and individualised files comprising dance steps synchronised to the music were created. Each 30-s segment was triplicated, resulting in five stimuli, each 1 min 30 s in length, and each containing 3 identical repeats of a song and step-sequence pairing. Songs were then paired with visual cues instructing the participant how to dance to that track. A scrolling display of arrows moving upwards across

the screen cued each move and the participant had to make the indicated step when the arrows reached the top of the screen. The symbolic arrow sequences were generated for all five tracks. StepMania (www.stepmania.com), a freeware program similar to the video game Dance Dance Revolution (Konami Digital Entertainment, Inc., Redwood City, CA), was used for step file modification and training. Participants performed dance training on a dance pad connected by USB to a desktop computer and with projection of the symbolic arrows on a wall with a beamer. There was a one minute break between dances. Electronic sensors in the dance pad detected position and timing information that was then used to provide participants with real-time visual feedback.

A room in every residential care facility that was easily accessible to the older people was dedicated for the set up of the training equipment. All classes started with 5-10 minutes of warm-up activities, followed by 10-15 minutes of strength training exercises, 10-15 minutes of balance skills training, 1.5-7.5 minutes of computer game dancing and 5-10 minutes of cooling-down activities. Training sessions lasted 45-60 minutes and were separated by at least one day of rest. All exercise sessions were supervised individually by two qualified exercise trainers.

2. Conventional Exercise Program:
All participants in the usual care (UCare) exercise program underwent a regimen of once a week 30 to 45 minutes of training under the guidance of qualified leaders in Sports for Seniors (Seniorensportleiter). This is a qualification received from the Swiss Federal Office of Sport (BASPO; www.baspo.admin.ch) and acknowledges that the exercise leader has been educated and is qualified to develop and implement health enhancing physical activity programs for adult populations. Participants in UCare were training in a group on a chair where the seats were aligned circularly. The chairs were used to secure participants for exercises that were performed in standing. Every training session was partitioned in three parts; warm-up, strength & balance and cool-down. The 5-10 minutes warming-up activities were flexibility exercises that were sometimes combined with cognitive activities (e.g., memorizing animal names whilst throwing each other a ball). The strength and balance part took approximately 20-25 minutes and focused on muscle exercises for the arms and the lower extremities (1-2 sets per exercise were performed with a maximum of eight repetitions per set). The 5-10 minutes cool-down phase consisted of relaxation exercises. The program can be considered as representative for the usual care offered in residential care facilities. A room in every residential care facility that was easily accessible to the older people was dedicated for the set up of the training.

Intervention Type
Other

Phase
Not Applicable

Primary outcome(s)
1. Gait was measured with a GAITRite instrumented walkway (CIR Systems, USA) before and after twelve weeks of training. The GAITRite system provided temporal (time) and spatial (distance) gait parameters via an electronic walkway connected to the serial port of a personal computer. The GAITRite walkway contained sensor pads encapsulated in a roll-up carpet with an active area of 7.3 m long. As the subject walked through the walkway, the sensors captured each footfall as a function of time and transferred the gathered information to a personal computer to process the raw data into footfall patterns. The GAITRite walkway was extended with a 2.5 meter carpet at the end and beginning of the active area to eliminate the effect of acceleration or deceleration and allow for steady state gait assessment.

2. For each subject the relative dual task costs (DTC) of walking was calculated, as percentage of loss relative to the single-task walking performance, according to the formula DTC [%] = 100 * (single-task score - dual-task score)/single-task score.

Key secondary outcome(s))
1. Physical performance (ETGUG)
The Expanded Timed Get-up-and-Go (ETGUG) test measures the overall time to complete a series of functionally important tasks. The ETGUG test is a sensitive and objective assessment of physical function.

2. Fear of falling:
The Falls Efficacy Scale International (FES-I) questionnaire was used as a measure of concern about falling to determine the transfer effects of training to activities of daily living. This scale assesses both easy and difficult physical activities and social activities with a scale of: 1 = not at all concerned, 2 = somewhat concerned, 3 = fairly concerned, 4 = very concerned.

Completion date
31/12/2009

Eligibility

Key inclusion criteria
1.Residential status
2. Age over 65 years
3. Signed informed consent statement
4. Ability to walk 6 m and stand upright for at least 5 minutes

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Senior

Sex
All

Key exclusion criteria
1. Severe cognitive impairment (Mini-Mental State Examination below 22 points)
2. Rapidly progressive or terminal illness, acute illness or unstable chronic illness
3. Had impaired vision that prevented them to watch a wall screen projection

Date of first enrolment
01/02/2009

Date of final enrolment
31/12/2009

Locations

Countries of recruitment
Switzerland

Study participating centre
ETH Zurich, HIT J 32.3
Zurich
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Sponsor information

Organisation
Swiss Federal Institute of Technology Zurich (ETH Zürich) (Switzerland)

ROR
https://ror.org/05a28rw58

Funder(s)

Funder type
Government

Funder Name
Swiss Federal Institute of Technology Zürich (ETH Zürich) (Switzerland)

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Not provided at time of registration