Balance gaming: Video game balance training in elderly

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The objective is 1) to examine the effect of an exergaming balance intervention in older adults; 2) evaluate the intrinsic or extrinsic motivation in older adults to join a training intervention using an interactive gaming device.

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Other condition
Study type	Interventional

Summary

ID

NL-OMON35074

Source
ToetsingOnline

Brief title
Balance training in the elderly

Condition

- Other condition

Synonym
impaired dynamic balance, postural control

Health condition

Afname van de houdingscontrole of verslechtering van balans agv het ouder worden

Research involving
Human

Sponsors and support

Primary sponsor: Universitair Medisch Centrum Groningen
Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: Balance training, Elderly, Video gaming

Outcome measures

Primary outcome

Changes of scores on the generic functional balance tests:

- Berg Balance Scale

- Standing quiet with feet parallel and in tandem stance (FICSIT-4 balance

scale)

- Figure of eight test

Changes in postural control quantified by measures of anterior-posterior (AP)

and medio-lateral accelerations (Lamoth et al., 2009b):

- Root mean square as a measure of the amplitude

- Coefficient of variation to quantify trunk variability

- Sample entropy indexes the regularity or smoothness of the trunk accelerations

- Local stability exponents quantifies the stability of the trunk

accelerations.

Secondary outcome

General intake questionnaires:

- Falls Efficacy Scale (FES) measures fear of falling. The total FES score is

the sum of all activities, the higher the score the more fear of falling is

present.

- The Physical Activity Scale for the Elderly (PASE), measures the amount of physical activity of the preceding week and. A higher score indicates more physical activity.

Before and after the start of the intervention period the self-regulation questionnaire for exercise (SRQ-E) adapted for elderly and balance and eight visual analogue scales (VAS) will be administered to evaluate intrinsic and extrinsic motivation to use interactive games for physical training.

Study description

Background summary

The expanding aging population has ignited a growing interest in the prevention of balance problems to reduce the risk of falling as falling can result in loss of independence, significant morbidity or death. Physical activity has an important influence on health status, especially for older adults. Especially balance training can be of help to enhance the recovery of function and/or long-term maintenance of postural control in the normal aging population. While there are many health and social benefits from a range of exercise regimes, it is primarily balance training that has been shown to impact significantly on reducing falls in older adults. Balance training could not only improve function, but also the confidence of elderly patients and they will be more likely to maintain healthy levels of physical activity, which in turn will help to enhance their balance control and prevent fall incidents. New technology-based techniques, such as exergames (exercise and video games) appear quite promising for balance training, Especially because these systems motivate people to practice and become more and more cost-effective, portable and user-friendly.
Recovery of function and long-term maintenance are strongly influenced by matching training and environmental conditions to function. By playing a balance game people do not pay attention to their movements but on the outcome of their movements in the projected environment. This environmental focus might facilitate the learning process. Lack of interest or attention span can also impair the potential effectiveness of the therapeutic exercise. Attention and

motivation to practice can be enhanced by using exergames for balance training. Playing videogames while exercising motivates people to practice simple movements over and over again because they want to improve their high score to progress to the next game level. Finally, research indicated the importance of adapting the exercise interventions to the performance level of the older adults, that is to provide individualized training. Especially exergames can be adapted easily to the performance level of individual users. Notwithstanding the recently increased attention in the gaming industry and media for the use of computer games as a form of exercise (e.g. Nintendo Wii-balance board), evidence for its beneficial effect on postural control and stability is still scarce.

Study objective

The objective is 1) to examine the effect of an exergaming balance intervention in older adults; 2) evaluate the intrinsic or extrinsic motivation in older adults to join a training intervention using an interactive gaming device.

Study design

The study is an exploraty study. Subject data will be analysed by means of an interrupted ABA time series design (ITS) .In this desging, a numer of baseline measurements (baseline time-serie) isfollowed by an intervention period, and again followed by a period of no intervention with only measurements. In this desging, a numer of baseline measurements (baseline time-serie) isfollowed by an intervention period, and again followed by a period of no intervention with only measurements . Although an ITS is a within-subject design, it should not be confused with a cross-over design where a carry-over or treatment-interaction can severely weaken the power of a trial. In the ITS design, data are collected at many consecutive points in time before, during and after a treatment is introduced. Analyis of these measurements or so-called time-series data, praticular the direction of the time-series for each phase provide information about the origin of the change. Separating potential reasons for effects into those essentially related to the intervention and those only accidentally related is the principal task in analyzing time-series experiments. The time-series experimental design can be regarded as an extension in both directions (the past and the future).of the pretest-posttest experiment. The pretest-posttest design, however is disreputable because so many influences other than the treatment can account for a change in scores from pre to post. A great advantage of the interrupted time-series experiment is that it includes preintervention and postintervention observations and thus permits separating intervention effects from other trends in a time series. Repeated measurements of the dependent variables under baseline condition are required to obtain a stable baseline pattern. In the baseline A1 we expect a fluctuation around a fixed level over time because our participants

are healthy subjects who do not receive treatment and will not naturally cure or decline over such a short period, but random fluctuations or cyclical effects in level over time can always occur. Generally, the greatest threat to validity is that an event other than the balancetraining occurs at the same time as the intervention, thereby making causal inferences impossible. To control for this, we will ask participants to report their daily physical activity.
The established baseline trends (A1 and A2) are used to assess whether the intervention (B1) has an effect significantly greater than the underlying trend which is observed at baseline. This involves specific statistical analyses to separate the unaccountable variation of indices across time from the determinant effects of the intervention. We will apply linear regression analysis and the autocorrelation function will be estimated to adjust for trends in combination with maximum likelihood methods. In addition different contrast analysis of the phases will be performed.
Baseline phases: Before the intervention, in the baseline phase (A1), a secular trend is established based on 6 measurements to detect a period trend. The baseline phases (A1 and A2) before and after the intervention will last 3 weeks. Each week, 2 measurements will take place with 2 days in between.
Intervention phase includes a 6 week exergaming training program on the SensBalance Board, with three times a week a session of 20-min. In addition each week one measurement session is performed before the training session using the same tests as during the baseline phase. With exception of the first session which also includes an intake, none of the training and measurement sessions will last longer then 30 minutes.

Intervention

The intervention will include three 20 min exergaming sessions per week for a period of 6 weeks. The sessions will be performed on the SensBalance Board (Sensamove®, Utrecht, Netherlands). The balance board provides real time feedback about balance performance on a screen in front of the participant in the form of a labyrinth or maze game. By shifting weight on the board the maze presented on the screen can be tilted and a ball can be moved through the maze on the screen (see Fig 2).
During the first session the basic level will be used. In the following sessions, like in regular computer games the program will be adjusted to the participant*s level by increasing the difficulty of the gaming level (there are 10 levels of difficulty). These individual training adjustments ensure that the training will be challenging for all individual participants during the whole program. The SensBalance Board will be situated at the Hoornse Heem 100m from the service apartment complex.

Study burden and risks

Risk assessment: The measurements and training are non-invasive. The apparatus

is used in physical therapy rehabilitation practice. Physical therapists working for over a year with older patients (e.g. parkinson patients) on this apparatus ensured safety and reported minimal cardiovascular load for patients using this apparatus. Therefore, the risks associated with participation of healthy elderly can be considered negligible and also the burden can be considered minimal. We ask people to visit us regularly (2 to 3 times a week) in a period of 12 weeks. Our experience (and that of other people working with exergames) is that people enjoy playing the video games and working with new technology, in addition to the social aspect. To minimize the effort to attend we will plan the visits with the participants and organized a location on a walking distance of only 100m from the participant*s home. The measurements consist of a functional performance test battery which assesses balance. These are standardized clinical tests, easy to administer within 30 minutes. Reliability and validity of these tests have been established for healthy elderly. In addition trunk sway is measured during these functional performance tests with a light small sensor module (64x64x13 mm) which is fixed with an elastic belt over the clothes at the trunk at the level of segment L3.

Benefits: The intervention is an exercise intervention. In general, elderly benefit from moderate exercise both in terms of physical improvement and social participation. The computer assisted exercise (exergaming) is a new form of exercise. Preliminary results of a similar study in Aberdeen shows a trend in improving balance after a 4-week intervention with the Wii-fit. In addition, based on interviews, it was shown that elderly were more motivated to exercise with the computer assisted apparatus. Based on these results we expect elderly to benefit from the intervention, resulting in an improved balance.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

To qualify, individuals are healthy older adults aged between 65 and 85 who are living independetnly in a senior appartement. Subjects are able to walk without aids to a nearby shop (100 m) , have the hand function to use the interface and grasp the safety bar of the balance apparatus, understand verbal instructions and have the visual ability to perceive the information presented on the screen of our apparatus..

Exclusion criteria

Criteria for exclusion are elderly with orthopaedic or neurological disorders which prevent them from walking without aids or pressing the buttons on our interface, with visual deficiencies that prevent them from perceiving information on the display, or with cognitive impairment that prevent them from understanding our instructions

Study design

Design

Study type: Interventional

Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	01-04-2010
Enrollment:	15
Type:	Actual

Ethics review

Approved WMO

Date:	18-03-2010
Application type:	First submission
Review commission:	METC Universitair Medisch Centrum Groningen (Groningen)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL30969.042.09