A critical appraisal of "Effects of an Interactive Computer Game Exercise Regimen on Balance Impairment in Frail Community-Dwelling Older Adults: A Randomized Controlled Trial"

By

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Abstract

Fulfilling a requirement for a Doctor of Physical Therapy Evidence Based Practice course, as well as answering a clinical question regarding the use of interactive video gaming for older adults with balance issues, the following paper is a critical appraisal of the article "Effects of an Interactive Computer Game Exercise Regimen on Balance Impairment in Frail Community-Dwelling Older Adults: A Randomized Controlled Trial." A thorough examination of the strengths and weaknesses of the article's introduction, methods, results, and discussion was conducted and recorded in this paper. An analysis of the intervention of interactive video games for balance therapy and its clinical relevance, benefits, and risks is also discussed. The results from this study display that there are benefits when combining the use of interactive video games with graded, dynamic balance exercises on different surfaces. Critically analyzing studies such as this one is important in determining the safety, effectiveness, and clinical relevance for new physical therapy interventions.

Key words

Interactive Video Gaming, balance, critical appraisal, older adults

Introduction

One of the most prominent issues in the older populations today is balance problems and the related risk of falling. Therefore, much of the physical therapy that elderly patients undergo is focused on balance, which can be monotonous for patients, causing them to lose motivation and interest in their therapy exercises. The use of interactive video games could be a potential solution to this problem, if it is able to have positive benefits in terms of improved balance. Critically appraising research done on this intervention is important for physical therapist and consumers of the research to determine the validity and credibility of the study. The above information lead to the following clinical question: Is interactive gaming more effective in balance training for a 75-year-old lady who has had multiple falls when compared to tradition balance training?

Methods

When searching for articles regarding the clinical question, Ramcat, U search, and PubMed were the data bases used. The search words used to narrow down the articles presented were “interactive gaming,” “balance training,” and “geriatrics.” There were two limitations put on the search, including a time restraint of 2010-2017 and limiting the articles to only those that have been peer reviewed. The time line was used because of the many changes that have occurred in technology over the last two decades, and I wanted to look at more modern interactive games. The search was limited to peer reviewed articles in order to have the articles that have undergone review by professionals in the related fields given. The population was narrowed down to geriatric patients because this is a population that has the most problems with falls and balance. There are many different types of technology and interactive video games, but

the search was not narrowed to a specific brand or game. On U search, there were 6 total hits and there were 3 total hits on PubMed.

The article selected for appraisal comes from the journal *Physical Therapy*, which has an impact factor of 2.526. This study was conducted in Winnipeg, Manitoba, Canada, and the article was published in 2011. The authors for this study include Tony Szturm, from the Department of Physical Therapy at the University of Manitoba, Aimee L. Betker and Zahra Moussavi, both from the Department of Electrical and Computer Engineering, Ankur Desai, a physical therapist in Toronto, Ontario, Canada, and Valerie Goodman, a physical therapist in Winniepeg, Manitoba, Canada. I decided on this article over the other articles found because it studies, specifically, the effects of an interactive video game compared to traditional therapeutic exercises to treat an elderly population with balance issues. This article also appeared thorough in background information.

Results

Summary of the study

There are many different factors that have to be considered when making a therapy program for an elderly individual with balance issues, but one problem with many protocols used, is that patients become bored with the monotony of them. Interactive video games give many advantages to balance training including a fun environment and biofeedback. This study examines the use of an interactive video game program to treat patients with balance issues. Thirty older adults were randomly assigned into an experiment group and control group. The control group participated in a typical rehabilitation program while the experimental group participated in dynamic balance exercises coupled with computer games. The outcome measures

recorded for both groups before and after the exercise programs included Berg Balance Scale (BBS), timed "Up and Go" test (TUG), spatial-temporal gait parameters, Activities-specific Balance Confidence Scale (ABC), and a modified version of the Clinical Test of Sensory Interaction and Balance. The experimental group exhibited significantly greater improvements in scores from before the study to after the study for the BBS, the LOB counts, and ABC when compared with the control groups changes from beginning to end. The researchers concluded that graded, dynamic balance protocols for patients with balance issues along with video game tasks, can have a positive effect on the patients' balance.

Appraisal of the study introduction

The introduction is comprehensive and provides the reader with information on why balance issues can have a negative impact on the elderly population, why past rehabilitation regimens are not effective in some cases, and why interactive video games could be a possible therapeutic solution to the problem. There is an adequate amount of references used and a comprehensive background on the topic is given for the reader to understand why the research is relevant. The authors used 34 references to form a sound rationale for this study from several well-known and credible journals such as Neuroscience, Journal of Physiology, and Physical Therapy. Overall, the introduction is clear and well written.

Some of the references used in the introduction are from articles more than 10 years older than when this study was conducted, so some of information could possibly be outdated. Another weakness in the introduction of this article is that the authors don't mention many dependent variables or outcome measures used when looking at balance. This information would be useful to the reader in order to

understand the outcome measures used in this study better. There was also not much mention of common interactive video games that are used for any other issues other than balance deficits.

Appraisal of the study methods

All subjects for this study were community-dwelling and ambulatory older adults who were receiving balance training at a hospital and were between the ages 65 and 85. There was not any significant differences between the control and experimental groups in terms of age, use of assistive devices, Mini-Mental State Examination scores, gender ratio, or average gait speed. The group assignments were placed and sealed in envelopes concealing assignments from the participants and researchers, but, because of the nature of this study, both the subjects and researchers had to know what group they were assigned to. Adding strength to the credibility of this study, the assessors were blinded to the group assignments. Both groups were treated the same throughout the study with the exception of the intervention. The protocol for the experimental group was explained thoroughly and future researchers could reproduce the experimental group's protocol.

There were a few weaknesses found in the methods. Three subjects did not finish all the sessions which could cause some skewing of the data. Also, the protocol for the control group could have been explained in more detail to allow for better understanding. The outcome measures were not described in detail, but each outcome measure talked about is given a reference where the reader can go to look for more details on the outcome measure. The reliability for each outcome measure is also not mentioned in the article. Lastly, there weren't specific instructions on how to collect some of the date and perform some of the tests which could be a limitation and hinder someone from being able to replicate this study.

Appraisal of the study results

The results section is well written, organized, and easy to read. The results for each outcome measure were presented in an order that made sense and, for the most part, was consistent with the order that the outcome measures were discussed in the methods. Each outcome measure and the overall research question is addressed, and the results of the between group and within group statistics were given in order to address each outcome measure. The single hypothesis that was given in the methods is addressed several times throughout the results section. Figures and table were used appropriately and are useful in interpreting each outcome measure's data. The results that were statistically significant were given, and based on my current knowledge, these results are clinically meaningful and relevant to the clinical question.

There were not many weaknesses found in the results section of this paper. The graphs could have color added to them to be more aesthetically pleasing, but some people prefer a black and white graph.

Appraisal of the study discussion

The authors explained what each set of data and outcome measure means and what they indicate about the study. The authors also gave possible reasons for changes in data or lack of changes that were not expected, and were able to tie the data they collected and the findings of this study to studies that have already been conducted as well as other existing literature. The references used for this study are from credible journals, and a thorough conclusion of the findings that reflect the results of this study was given. There is a section in this article that discusses the clinical significance of the findings from the study to physical therapy patients.

One of the weaknesses for this article is the use of references that are ten years older than this study. Although the information used from these references could still be relevant, it is also important to

use the most current information possible when the topic of technology is involved. There are two limitations for this study given by the authors. The fact that they gave limitation is a strength, but the limitations themselves could be considered weaknesses. These include a small sample size and a lack of baseline equivalence of the subjects.

Discussion

This study is relevant to physical therapist because of the positive effects that it could possibly have on elderly patients. Interactive video games coupled with balance exercises could help keep patients motivated during therapy, and might leave lasting positive effects and behavior with the patients. This study can answer my clinical question because it is comparing the use of interactive video games to traditional balance therapy, and it is looking at an elderly population specifically.

From the information received in this article, it can be concluded that the intervention of interactive video games should be used in the clinic. Coupling the use of interactive video games with other balance therapy has many potential benefits. Motivation for therapy can be hard to come by in the clinic, but using a fun intervention can help keep patients motivated in their recovery process. It is also helpful in giving feedback of the patient's performance to the therapist and in giving patients knowledge of their own performance. Lastly, this intervention is becoming increasingly affordable, allowing it's use in clinics to be more realistic. Potential risks for this intervention include safety issues. Because the patients will be mentally invested in the video game, they will be less in tune with their surroundings, which could lead to potential falls. Another potential risk for this intervention could be the possibility of patients not being able to have success at the games being played, causing frustration and potentially having a negative

impact on the patient's improvements. However, the benefits far outweigh the possible risks of using interactive video games in the clinic. To improve the argument in favor of using this intervention a study of the exact psychological effects in patients who use this intervention, as well as the preference of patients to use this intervention over traditional therapeutic programs in the future.

This study was well conducted and supported, showing validity and giving me confidence to use this intervention with my future patients. The protocol was organized and showed how the intervention compares to the common protocols for balance issues in the elderly. Furthermore, the results from this study display that there are benefits when combining the use of interactive video games with graded, dynamic balance exercises on different surfaces. This intervention is also relatively safe to use in the clinic. However, research is needed to determine whether patients will be at more risk for falling in the clinic when they are physically and mentally engaged in such tasks.

After searching out and examining the strengths and weaknesses that are found throughout this article, this critical analysis was able to determine the quality and effectiveness of not only the study's protocol, results and discussion of the results, but also the intervention being tested as well. The authors of the article being appraised were successful both in carrying out the study as well as being able to communicate the reasoning for this study, the protocol and intervention being used, the results, and some rationale for the results.