84 - GAME THERAPY AS THERAPEUTIC PRACTICE FOR DISABLED PERSONS

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doi: 10.16887/86.a1.84

1-INTRODUCTION

The World Health Organization (WHO) reports that more than a billion people worldwide live with some form of disability (WORLD HEALTH ORGANIZATION, 2012). It represents about 15% of the worldwide population, based on estimates 2010. In 1970 the WHO estimated a figure 10% of people with some type of disability. According to the Brazilian census of 2010, about 23% of the population has a disability, about 45 million Brazilians (BRAZILIAN INSTITUTE OF GEOGRAPHY AND STATISTICS, 2010). Deficiency can be classified into three groups: physical disabilities, sensory disabilities (e.g., hearing and visual) and intellectual disabilities. In each group of disability there are specificities that are defined by a set of interrelated factors, such as the structure of own disability, organic and subjective constitution of the person as well as their experiences and social and environmental conditions (DIAS, OLIVEIRA, 2013).

According to the literature, children with any disability have low muscle strength and that strength does not improve with maturation (Pitetti, FERNHALL, STUBBS, STADLER, 1997). It may be suggested that the reduced muscle strength in individuals with disability, in adulthood, tends to limit their performance in activities of daily living (Pitetti, YARMER, 2002). Muscle strength, especially in the lower limbs, for disabled individuals is critical to overall health, to improve professional productivity and to develop independence in activities of daily living (Rimmer, Yamaki, DAVIS LOWRY, WANG, VOGEL, 2010). The participation of persons with disabilities in physical activity programs has largely been encouraged. However, there are still challenges to consolidate educational and therapeutic strategies that take into account differences in a range of disabilities to effectively contribute on cognitive, psychosocial and motor development (RODRIGUES, LIMA, 2014).

Given the relevance of movement for the development of persons with disabilities, technology resources from the entertainment industry, such as video games, may be used as working tools by health and education professionals. The video games such as the Nintendo Wii and X-Box 360 are identified in a category known as non-immersive virtual reality (VR) (SCHIAVINATO, MACHADO, PIRES, BALDAN, 2011). VR is a technology that emerged from the need of human-computer interaction which emphasizes multi-sensory features with realistic environment simulation and three-dimensional navigation. The VR allows the interaction between the user and the simulated environment because its projection gives to the user the illusion to be inside of a virtual environment generated by a computer (HOFFMAN et al, 2007).

Individuals with disabilities can benefit from using video game as a therapy (i.e., game therapy) in addition to conventional or other form of therapy. The treatment based on game therapy can be customized, may provide extra motivation, gives online feedback, to improve the quality of life (ROCK, DEFAVARI, BRANDÃO, 2012). There is growing interest in the application of game therapy on persons with disabilities. More studies are needed not only to establish the effects on abilities and skills of persons with disabilities but also to consolidade therapeutic protocols for clinicians.

2-OBJECTIVE

The aim of this study was to conduct a systematic review of research on the use of video games for the therapeutic practice (gametherapy) in persons with disabilities.

3-METHODOLOGY

The present study uses a systematic literature review. To achieve the purpose of the study the following steps were done (Figure 1): framing the guiding question of research (i.e., problem); search of the literature related to the issue in electronic database, according to the selected key words; application of the inclusion and exclusion criteria; reading the articles; summarizing and interpreting findings of the selected articles for discussion and conclusion. The databases used were the publications found in the National Center for Biotechnology Information (PubMed) and Scientific Electronic Library Online (SciELO). The keywords used for the search were: virtual reality; disabled persons; wii. The key words were combined as follows: virtual reality and disabled persons; disabled persons and Wii; virtual reality and wii.

In the study of Junior et al (Junior Carvalho Silva, Bastos, 2011) which aimed to gather evidence about the different applications of virtual reality in rehabilitation, the review period done was from 2009 until 2011. For the present study the period considered was studies published from 2012 until 2015. Moreover, the present study considered for the analyses articles published in full text available online, application to game therapy as intervention and assessment of the effects of game therapy on persons with disabilities. Exclusion criteria were studies of literature review, monographs or theses or those studies that did not meet the scope of the study. According to the criteria previously established six articles were included in this study for further analyses.

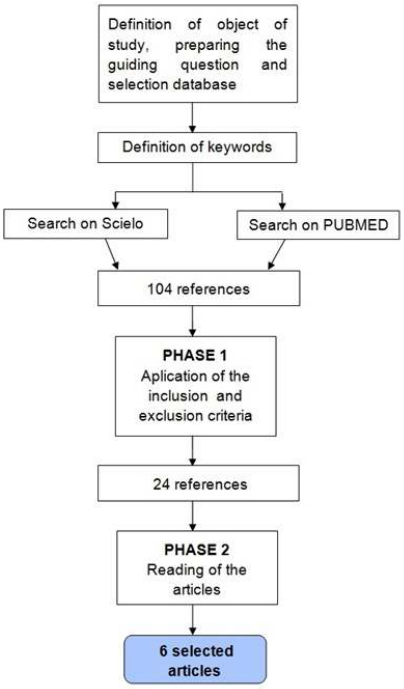

FIGURE 1 - Flowchart of search and selection of items used in the study.

4-RESULTS AND DISCUSSION

Five articles analyzed examined the effect of game therapy in persons with combined physical and intellectual disabilities (Zeigelboim, Souza, Mengelberg, Teive, Liberalesso, 2013; Kim, Park, Lee, 2015; Neil, Ens, Pelletier, jarus, Rand, 2013; Silva , IWave-Marchese, 2015; Choi, Han, Kim, Kim, Im, Lee Hyun, 2014). Only in one article the participants had physical disability (Loureiro, Ribas, Zotz, Chen, Ribas, 2012). The results will be discussed below, according to their therapeutic purpose.

4.1 GAME THERAPY AND MOTOR FUNCTION

Three studies (Choi, Han, Kim, Kim, Im, Lee Hyun, 2014; Loureiro, Ribas, Zotz, Chen, Ribas, 2012; Zeigelboim, Souza, Mengelberg, Teive, Liberalesso, 2013) showed positive results on improving motor function compared with conventional therapy. It is known that conventional treatment of persons with disabilities is based on the repetition of movements for acquiring or recovering motor functions. The game therapy allows the user to interact with the system and receive feedback on their performance in real time (Loureiro, Ribas, Zotz, Chen, Ribas, 2012; Zeigelboim, Souza, Mengelberg, Teive, Liberalesso, 2013) which is central to learning and acquisition of motor skills (Choi, Han, Kim, Kim, Im, Lee Hyun, 2014).

The results of three articles (Loureiro, Ribas, Zotz, Chen, Ribas, 2012; Zeigelboim, Souza, Mengelberg, Teive, Liberalesso, 2013; Zeigelboim, Souza, Mengelberg, Teive, Liberalesso, 2013) correlated the improvement of motor function in disabled patients with improvement in body balance. Is could be that the game therapy stimulates both the activation of the muscles in a voluntary fashion and the sensory system through the various positions and amplitudes of body segments. In addition, the game therapy provides feedback in real time (Loureiro, Ribas, Zotz, Chen, Ribas, 2012; Zeigelboim, Souza, Mengelberg, Teive, Liberalesso, 2013; Neil, Ens, Pelletier, Jarus, Rand, 2013) that may maximize the adjustment of the body balance.

4.2 GAMETHERAPY AND BODY BALANCE

Four studies (Neil, Ens, Pelletier, Jarus, Rand, 2013; Kim, Park, Lee, 2015; Zeigelboim, Souza, Mengelberg, Teive, Liberalesso, 2013; Silva, Iwave-Marchese, 2015) involving game therapy showed improvement on body balance. The use of game therapy may be beneficial for both on static and dynamic body balance. It may influence enhancing functional capacities of the user when used in combination with conventional treatment which may allow reduction in the use of mobility equipment and improvement of energy efficiency for ambulation (Silva, Iwave-Marchese, 2015).

The game therapy protocol must contain training that encourages body movements in sagittal, frontal, transverse and also multidirectional way to stimulate user proprioceptors. Furthermore, game therapy protocols are executed in vertical posture, thus favoring strategies to recover and / or maintain the body balance (Zeigelboim, Souza, Mengelberg, Teive, Liberalesso, 2013).

Zeigelboim, Souza, Mengelberg, Teive, Liberalesso (2013) point out that the body balance depends on the integrity of the visual system, vestibular and somatosensory. Sensory information from these systems are sent to the cerebellum that modulates the activation of axial and lower limbs muscles to maintain the body balance. The exercises based on game therapies stimulates to continuously maintain the body balance andstimulates the mechanisms of vestibular compensation, and thus promoting neuroplasticity. The balance may be adversely affected by muscle weakness, joint immobility, visual deficits, loss of proprioception or pain (Kim, Park, Lee, 2015).

4.3 GAMETHERAPY AND THE USE OF NINTENDO WII

All studies found in this review used the Nintendo Wii to examine the effects of game therapy for persons with

disabilities. Despite the unanimity in the choice of instrument for intervention, there are other video games that can be used for game therapy like Xbox and Play Station. Further studies with other video game systems needs to be carried out to set up intervention protocol based on scientific evidences for clinical settings.

The Nintendo Wii and its various products, such as Wii Fit, have interactive games that can help to improve motor skills, coordination skills, strength and reasoning, which drives the user to consciously interact with the virtual environment (Loureiro, Ribas, Zotz Chen, Ribas, 2012). It means that the user have a clear perception of the elements offered by the virtual environment. In addition, the Nintendo Wii is used in orthopedic and neurological rehabilitation, the platform that is included int the Wii Fit package brings benefits such as efficiency in maximus oxygen consumption, fitness, balance, posture, movement amplitude, and motivation (Silva, iWave-Marchese, 2015).

5-CONCLUSION

The use of game therapy makes participants to develop skills such as coordination, agility, displacement and weight bearing, postural adjustments, balance, trunk rotation and muscle strength of the lower limbs in a fun and interactive way. The game therapy can also contribute to improve motivation for the therapy and at the same time can lead to reduce apathy and absenteeism among patients. It is important to highlight that, for being a relatively new area of research, the consistency of the evidence is not substantial. However, it appears that game therapy might be used in complement with conventional therapy for persons with disabilities. .

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GAME THERAPY AS THERAPEUTIC PRACTICE FOR DISABLED PERSONS

ABSTRACT

The participation of people with disabilities in physical activity programs has been encouraged, however, there are difficulties to develop therapeutic strategies that can respect their differences. Some features can be used as health professionals working tools highlighting the video game. The aim of this study was to perform a systematic review on the use of video games as a therapeutic practice (gameterapy) for people with disabilities. The databases used were the National Center for Biotechnology Information (PubMed) and Scientific Electronic Library Online (SciELO). The keywords used for the search were: virtual reality; disabled persons; wii and their combinations. There were included in the search studies published between 2012-2015, full papers, with application of gameterapia as intervention in people with disabilities. From the above criteria, there were six articles included in this study for detailed analysis. In these studies the variables were: motor coordination, agility , displacement and weight bearing, postural adjustments, balance and muscle strength in the legs. From the results obtained it can be concluded that the use of gameterapia significantly improved development and physical capacity people with disabilities. Importantly, the search area is relatively new, so the consistency of the evidence is not so strong, with low scientific content studies with small number or case reports.

KEYWORDS: disabled persons; virtual reality; rehabilitation.

GAMETERAPIA THÉRAPEUTIQUES PRATIQUES POUR LES PERSONNES HANDICAPÉES
RÉSUMÉ

La participation des personnes handicapées dans les programmes d'activité physique a été de plus en plus encouragé, toutefois, il ya encore des difficultés à élaborer des stratégies thérapeutiques qui sont en mesure de respecter ses différences. Certaines fonctionnalités peuvent être utilisés comme des outils professionnels de la santé mettant en évidence le jeu vidéo. Le but de cette étude était de réaliser une revue systématique sur l'utilisation des jeux vidéo comme une pratique thérapeutique (gameterapia) pour les personnes handicapées. Les bases de données utilisées étaient le National Center for Biotechnology Information (PubMed) et Bibliothèque électronique scientifique en ligne (SciELO). Les mots clés utilisés pour la recherche étaient: la réalité virtuelle; les personnes handicapées; Wii et leurs combinaisons. Études publiées entre 2012 et 2015 ont été inclus, avec papiers complets, l'application de gameterapia comme une intervention chez les personnes handicapées. Six articles ont été inclus basés sur les critères cités à analyser. Dans ces études, les variables étaient: la coordination motrice, l'agilité, le déplacement et le poids roulement, des ajustements posturaux, l'équilibre et la force musculaire dans les jambes. D'après les résultats obtenus, nous pouvons conclure que l'utilisation de gameterapia causé aux participants de développer de manière significative les capacités physiques évalués. Surtout, étant un domaine relativement nouveau de la recherche, la consistance des preuves n'est pas solide. De nombreuses études ont un faible contenu scientifique dans leurs conceptions parce que les échantillons sont de petite taille ou sont des rapports de cas.

MOTS-CLÉS: les personnes handicapées; réalité virtuelle; la réhabilitation.

GAMETERAPIA CÓMO TERAPÉUTICA PRÁCTICAS PARA PERSONAS CON DISCAPACIDAD
RESUMEN

La participación de personas con deficiencia en programas de actividad física viene siendo estimulada, sin embargo, existen dificultades para elaborar estrategias terapéuticas que consigan respetar sus diferencias. Algunos recursos pueden ser utilizados como herramientas de trabajo de los profesionales de la salud destacándose el videojuego. El objetivo de este estudio fue realizar una revisión bibliográfica sistematizada sobre la utilización de videojuegos como práctica terapéutica (gameterapia) para personas con deficiencias. Los bancos de datos utilizados fueron el National Center for Biotechnology Information (PubMed) e Scientific Eletronic Library (SciELO). Las palabras clave utilizadas para la búsqueda fueron: virtual reality; disabled persons; wii y sus combinaciones. Fueron incluidos en la búsqueda estudios publicados entre 2012 a 2015, artículos completos, con aplicación de la gameterapia como intervención en personas con deficiencias. A partir de los criterios descritos arriba fueron incluidos en esta investigación seis artículos para análisis detallado. En estos estudios las variables evaluadas fueron: coordinación motora, agilidad, dislocamiento y descarga de peso, ajustes posturales, equilibrio y fuerza muscular de miembros inferiores. A partir de los resultados encontrados podemos concluir que la utilización de gameterapia mejoró significativamente el desarrollo y capacidades físicas de personas con deficiencia. Es importante resaltar que, el área de investigación es relativamente nueva, por tanto la consistencia de las evidencias todavía no son tan fuertes, habiendo estudios de bajo tenor científico, con las muestras pequeñas o relatos de caso.

PALABRAS CLAVE: personas con deficiencias; realidad virtual; rehabilitación.

GAMETERAPIA COMO PRÁTICA TERAPEUTICA PARA PESSOAS COM DEFICIÊNCIAS
RESUMO

A participação de pessoas com deficiência em programas de atividade física vem sendo estimulada, no entanto, existem dificuldades para elaborar estratégias terapêuticas que consigam respeitar suas diferenças. Alguns recursos podem ser utilizados como ferramentas de trabalho dos profissionais da saúde destacando-se o vídeo game. O objetivo desse estudo foi realizar uma revisão bibliográfica sistematizada sobre da utilização de vídeo games como pratica terapêutica (gameterapia) para pessoas com deficiências. Os bancos de dados utilizados foram o National Center for Biotechnology Information (PubMed) e Scientific Eletronic Library Online (SciELO). As palavras-chave utilizadas para a busca foram: virtual reality; disabled persons; wii e suas combinações. Foram incluídos na busca estudos publicados entre 2012 a 2015, artigos completos, com aplicação da gameterapia como intervenção em pessoas com deficiências. A partir dos critérios descritos acima foram incluídos nesta pesquisa seis artigos para análise detalhada. Nestes estudos as variáveis avaliadas foram: a coordenação motora, agilidade, deslocamento e descarga de peso, ajustes posturais, equilíbrio e força muscular de membros inferiores. A partir dos resultados encontrados podemos concluir que a utilização de gameterapia melhorou significativamente o desenvolvimento e capacidades físicas de pessoas com deficiência. É importante ressaltar que, a área de pesquisa é relativamente nova, portanto a consistência das evidências ainda não são tão forte, havendo estudos de baixo teor científico, com amostras pequenas ou relatos de caso

PALAVRAS-CHAVE: pessoas com deficiências; realidade virtual; reabilitação.