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Which One Works Better? Testing Outcomes of Using a Somatosensory Game Intervention and a Chair-Based Exercise Program on Elderly

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Abstract: The purpose of the study is to understand the outcomes of using a somatosensory game intervention and a chair-based exercise program on elderly. Forty older adults aged more then 65 were recruited from Yung Shin nursing home and divided into two groups, a somatosensory video game and chair-based exercise group. All participants were required to complete 30-minute somatosensory video game or 30-minute sedentary activity interventions three times a week of 8 weeks. Pre- and post- tests were administrated before and after the interventions and utilized to assess the benefits and outcomes. Soda Pop test for eye hand coordination and grasping ruler test are two measurement tools were used to measure their reaction time. The results identified that the "Fruit Ninja" game intervention did not successfully created positive impacts on their reaction through a 30-mintue sessions three times a week for 8 weeks. However, 8-week chair-based exercise program did have significant impact on their reaction time. In terms of eye hand coordination, both somatosensory game and chair-based exercise programs were effective to enhance their performance.

Keywords: Reaction, eye hand coordination, somatic learning, video game, chair-based exercise

1. Introduction

Aging society is a commonly concerned issue in Taiwan. With the development of medical and technology, recent Taiwan Health Bureau's Statistics shows that Taiwan's elderly population increases dramatically (Ministry of Interior Accounting Office, 2012). According to the Taiwan national statistics, the elderly population above 65 years old has reached 2,600,152 and took up 11.15% of the total population (Ministry of Interior Accounting Office, 2012). Taiwan has become one of the fastest aging countries in the world. Due to the fast-growing aging population, chronic diseases come along with the aging trend. Elderly people, who suffered from chronic diseases, losing their independence and needing long-term care. The rapid growth of older adults makes the increasing demand and requirement for long term care and have become urgent and significant issues for policy makers and related professionals.

Aging is inevitable and regularly causes muscle loss, atrophy, and chronic diseases affecting their activities and physical functions for daily living of the elderly. However, past studies pointed out that physical functions and cardiorespiratory endurance still could be maintained or improved through various physical activity programs (McMurdo and Burnett, 2009). Somatosensory games and traditional sports are identified as effective interventions to promote functional fitness. Brumels and his colleagues (2008) found that both traditional sport training programs and somatosensory games are able to improve clients' balance measurements significantly and identified that somatosensory games have better outcomes in enjoyment and engagement. In addition, the somatosensory game can improve attention, cognitive function, hand-eye coordination, reaction, balance improvement and fall

prevention (Belchior, Marsiske, Sisco, Yam, Bavelier and Mann, 2013; Chiang, Tsai and Chen, 2012; Grosjean et al, 2010). To sum, elderly still have opportunities to maintain their independency and be safer and happier to enjoy their life through appropriate aerobic training, muscular strength training, flexibility stretching activities by using somatosensory games or functional physical fitness courses on balance, coordination and agility. Therefore, the purpose of the study is to understand the outcomes of using a somatosensory game intervention and a chair-based exercise program on elderly.

2. Method

Forty older adults aged more then 65 were recruited from Yung Shin nursing home and divided into two groups, a somatosensory video game and chair-based exercise group. All participants were required to complete 30-minute somatosensory video game or 30-minute sedentary activity interventions three times a week of 8 weeks. Pre- and post- tests were administrated before and after the interventions and utilized to assess the benefits and outcomes.

Elderly in the somatosensory games group played the "Fruit Ninja" game developed by Xbox 360 Kinect. Single mode was selected and began from the beginner level every intervention. On the other hand, participants in the chair-based exercise group, were arranged to play the body extension relaxes and tension belt training, ...etc.

Soda Pop test and grasping ruler test are two measurement tools were used to measure their reaction time. Examinees have to do those movements twice and the total spending time will be recorded. Grasping ruler test, each examinee will do this test twice and the better score will be recorded. SPSS 18.0 was used for statistical analysis that included descriptive statistics and non-parametric methods, such as Mann-Whitney *U* test and Wilcoxon matched-pairs signed-rank test.

3. Findings

3.1 Demographic Background of the Participants

There is no significant difference in their age, the mini-mental state examination (MMSE), activities of daily living (ADLs) and instrumental activities of daily living (IADLs) between these two groups. Scores in MMSE of both groups were lower than 24 and stands for those participants had mild cognitive impairment. Both groups had scores in ADLs between 61~80 and had mild disabilities. However, participants in two groups have scores lower than 15 in IADL and had very poor performance in their instrumental activities of daily living.

3.2 Outcomes of Reaction Time and Eye-hand coordination

After 8-week somatosensory game intervention, "Fruit Ninja", participants did not have significant progress in reaction time ($p > .05$). However, participants in chair-based exercise group did have significant improvement in reaction time ($p > .05$). Both groups had significant progress in the performance of eye-hand coordination ($p > .05$).

4. Discussion

In this study, we found those chair-based exercise can significantly improved reaction time on elder who are partial independent with 8-week intervention. According to Snowden et al. (2011) and the colleagues, they had similar findings and identified that multicomponent chair-based exercises could improve reaction time and other cognitive functions, In addition, we also found that both somatosensory game and chair-based exercise can significantly improve their performance in eye-hand coordination for older adults. These results echoed the research findings by Achtman, Green

and Bavelier (2008) and Marques et al. (2011). They also found that somatosensory game can decreases in manual dexterity, hand-eye coordination and general cognitive abilities and multicomponent exercises training can improve their agility, such as eye-hand coordination and eye-foot coordination.

5. Conclusion

This study identified that the "Fruit Ninja" game intervention did not successfully create positive impacts on their reaction through a 30-mintue sessions three times a week for 8 weeks. However, 8-week chair-based exercise program did have significant impact on their reaction time. In terms of eye hand coordination, both somatosensory game and chair-based exercise programs were effective to enhance their performance.

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