

Benefits of the Wii Fit as an Exercise Program for Older Adults

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Purpose: To determine if Wii Fit is an effective older adult exercise program compared to a traditional exercise program (TRAD) with respect to functional fitness (FF) and balance. Wii Fit women (n=4) were matched on multiple variables to TRAD subjects (Ss)(n=4) and a control group (CON)(n=4). Interventions were 8 weeks and consisted of flexibility, strength, and balance training. Wii group followed the Wii program and TRAD participated in traditional classes. Pre and post measures included FF and balance. Results were evaluated using qualitative comparison. No baseline difference existed. With respect to FF, TRAD exhibited largest changes. With respect to balance, Wii exhibited similar large changes. Using Wii Fit appears to be as effective as TRAD for balance.

Introduction: There have been increasing concerns in recent years about falls in the older adult population. Blake, A.J, et al [1], found that 53% of falls by older adults resulted from tripping as a consequence of decreased muscle strength and balance. Therefore, exercise to increase balance and muscle-strength is warranted in prevention of falls in this population group.² The Wii Fit is an interactive gaming system that offers programs to increase strength, endurance, balance, and flexibility. The goal of this paper is to determine if the Wii Fit can improve functional fitness (muscle strength, cardio-respiratory endurance, flexibility) and balance in the older adult when compared to a traditional exercise class and control group. If successful, Wii Fit could benefit homebound populations, or individuals with no access to exercise facilities. Research is warranted to determine and quantify the physiological benefits of video game technology for the older adult, as there are currently no published studies. Results of the project could be useful in development of physical activity programs for older adults. It is hypothesized that the Wii Fit will improve functional fitness and balance in the older adult population as much as or more than the traditional exercise group.

Subjects: Four Females 65 years of age or older, who were community dwelling, active and able to get to a community center were recruited. Excluded from the study were those with pacemakers or seizure conditions, as these were contraindications of the Wii Fit. Also excluded were individuals whose physical or mental health would prevent them from performing the experimental protocols as determined by the EASY (Exercise And Screening for You).

Instruments: The instrument used for pre - and post- balance assessment was the Basic Balance Master by Neurocom. The Limits of Stability assessment was used to determine the maximum distance a person can lean in 4 directions without falling or reaching for assistance. Data collected included: End Point Excursion (EPE), Maximum Excursion (MXE), Movement Velocity (MVL), Directional Control (DCL) and Reaction Time (RTO). Functional fitness measures included the 30 second chair stand, 30 second arm curl, timed 8-foot up and go, and a 12 minute walk. General measures of height, weight, and body mass index (BMI) were also assessed.

Procedures: This was an 8-week intervention study, utilizing the Wii Fit gaming system and corresponding balance board. The Wii Fit was offered at a local senior center twice per week for 40 minutes and included flexibility (yoga), strength training and balance training with balance games, and cardio-respiratory training. All participants completed a Wii Fit familiarization session prior to starting interventions. Program progression involved increasing repetitions and sets of exercises and adding new or more difficult fitness components. Three sets of workouts (easy, moderate, difficult) were designed with the Wii Fit exercises. Participants progressed to more difficult exercises every two weeks based on ability and safety. Wii Fit uses an animated on-screen Wii Fit trainer, to provide one-on-one instructions to guide participants. Researchers also supervised to ensure safety and correct performance.

Data Analysis & Results: Four females (71 ± 8 years) participating in the Wii Fit group and were compared to 4 females (71 ± 8 years) participating in a traditional physical activity program, and 4 females serving as a control group (75 ± 1 year). Participants in the traditional and control group were drawn from larger programs allowing Wii Fit participants to be matched on the pre-measures of age, BMI, arm curl and chair stand. General physical

measures, functional fitness, balance, and a one-week daily activity assessment (steps) were completed prior to intervention and after eight weeks. Due to small sample size, quantitative analysis would yield little meaningful information and results were evaluated using qualitative comparison. Percent change was calculated and group change was compared (Table 1). With respect to functional fitness, Wii exhibited little change whereas, the traditional group exhibited large changes, especially on measures of strength. With respect to balance, Wii exhibited similar large changes compared to the traditional group and on some measures exceed the traditional group. The Wii group exhibited greatest balance improvement while leaning backward, showing superior improvements over the traditional group on endpoint excursion, maximum excursion and directional control.

Discussion: Results supported the hypothesis that the Wii group would improve on balance compared to traditional and control groups. In fact, the Wii group showed larger improvement on many balance measures compared to the traditional and control groups. Wii participants also improved similarly on the functional fitness measures of Up & Go and 12-min walk. However, the Wii group did not improve strength as measured by the arm curl and chair stand. This finding is not surprising as the Wii gaming system focuses more on balance and cardio activities. It should also be noted that many of the Wii strength exercises required using the body for resistance and were generally too difficult for the older adults to perform.

Limitations: This study did not include enough participants to allow for quantitative analysis. Due to participants being community dwelling, participation in every session was not guaranteed. Transportation and convenience for participants could have been a factor due to location. Following the progression schedule was difficult because of restrictions of games and activities on the Wii console. The study had 2 males originally, but one did not attend the posttest and the data of the other male was thrown out due to inability to match him to males in the traditional and control groups. Two subjects were in the same room at a time during Wii interventions, therefore, distractions and volume could have limited their performance. The generalization of this study is limited due to the small sample size and female sample.

Conclusion: This research study did not yield a significant difference between groups due to small sample size. The results do indicate that future research is warranted and that with a larger sample size significant differences may be expected. Results of this pilot study suggest the Wii Fit could be used as an effective tool for improving balance in healthy, older adults.

References:

- [1] A.J., Blake, K., Morgan, M.J., Bendall, H.B., Dallosso, S.B., Ebrahim, T.H., Arie, F.H., Fentem, , E.J, Bassey. "Falls by Elderly People at Home: Prevalence and Associated Factors" *Oxford J.* 1988 17 (6): 365-372.
- [2] PW, Overstall. "The Use of Balance Training in Elderly People with Falls." *Clinical Geron.* 2003 13 (2) 153-161.

Table 1: Percent Changes for Balance Measures

	Reaction Time %Δ			Mean Velocity %Δ			End Point Excursion %Δ			Max Excursion %Δ			Directional Control %Δ		
	Wii	TRAD	CON	Wii	TRAD	CON	Wii	TRAD	CON	Wii	TRAD	CON	Wii	TRAD	CON
Front	-24	-17	7	18	5	4	26	23	-7	25	14	3	9	8	4
Back	-16	-16	-4	32	36	2	17	17	-10	22	24	9	39	2	4
Right	-20	-23	9	58	24	4	3	-6	-19	2	0	-11	4	1	1
Left	-37	-20	-9	43	24	12	9	4	-10	7	12	-9	7	4	-1

Table 2: Percent Changes for Functional Fitness

	Wii %Δ	TRAD %Δ	CON %Δ
Arm Curl	5	48	6
Chair Stand	11	59	0
Up & Go	-11	-14	3
12 Min Walk	10	9	0