4Active Intervention for Promoting Physical Activity and Cognitive Flexibility among Older Adults

Abstract

Background/Pupose: Physical activity (PA) is essential to delaying cognitive decline and preventing cognitive impairment in older adults. We used the Social Ecological Model as the framework for designing an interpersonal-level and individual-level multicomponent PA intervention, 4Active, to increase PA participation and cognitive function in older adults living in retirement communities. The purpose of this study was to examine the effectiveness of the 4Active intervention to promote physical activity and cognitive function in older adults.

Methods/Design: Fifty-eight eligible older adults with a mean age of 83.83 years (76.3% females) living in two retirement communities voluntarily participated in this study. Forty subjects participated in the two-level 4Active intervention for 12 weeks. At the interpersonal-level of the 4Active intervention, the participants attended 36, 45-minute multicomponent exercise sessions taught by well-trained, on-site exercise instructors. At the individual-level, each participant wore a Fitbit (Model Inspire) activity tracker daily, 5 days per week for 12 weeks, to self-monitor daily PA behaviors. Eighteen subjects in the control group were asked to do their usual activities. One week before and after the intervention, trained research staffs administered the computerized tablet NIH Toolbox_Dimensional Change Card Sort Task (DCCS) and the International Physical Activity Questionnaire to each participant individually. Data analysis by means of descriptive statistics, independent sample t-tests, and ANCOVA repeated measures with controlling for age.

Results: ANCOVA with repeated measures indicated that the intervention group had overall higher levels of the total PA and the moderate PA than the control group ($F = 8.71$, $p = 0.005$, $\eta^2 =0.141$; $F = 8.85$, $p = 0.004$, $\eta^2=0.143$). In addition, the intervention group showed pronounced increases in light PA (walking) over time, while the control group decreased light PA from baseline to the post-test ($F = 6.91$, $p = 0.011$, $\eta^2 =0.115$). Regarding the results of cognitive flexibility, the ANCOVA with repeated measures revealed that intervention group had overall higher levels of cognitive function compared to the control group ($F = 7.88$, $p = 0.007$, $\eta^2 =0.129$). Both groups showed significant increases in cognitive flexibility over time ($F = 6.68$, $p = 0.013$, $\eta^2 =0.112$), but the intervention group had a smaller change in cognitive flexibility over time compared to the control group ($F = 6.75$, $p = 0.012$, $\eta^2 =0.113$).

Conclusion: The study indicated that engaging in technology-enhanced multicomponent exercises is an effective approach to contributing to physically active and cognitively competent aging.