

## Senior Cybercycling With a Virtual Team: Behavioral and Physiological Outcomes

### ABSTRACT

**PURPOSE:** We examined the effects of videogame-enhanced recumbent exercise cycling on behavioral and physiological measures in older adults. **METHODS:** Seventy-four participants (mean±SD: age, yrs = 78.6±9; Weight, kg = 73.6±15; Height, cm = 161.2 ±8.1; Percent Body fat = 41.1±7.3; Lean mass, kg = 41.3±6.6) enrolled from 9 different independent living facilities in the first and second year of this study. Participants were randomly assigned to either a control (CO; n=38) in which they rode cybercycle viewing only biofeedback information (HR, kcal, etc.), or were assigned to progress through four 3-week conditions riding the cybercycle (CC; n=26): biofeedback only, 3-D terrain rides (option to race past performances), option to race others, and riding as part of a league. Baseline and 3 month changes were analyzed for the following variables; body weight, fat mass, abdominal obesity (ROI analysis with iDXA); plasma insulin, leptin, adiponectin, IGF-1 (ELISA), and glucose (glucose oxidase), resting metabolic rate (indirect calorimetry, ParvoMedics, UT), physical activity expenditure (actical), muscle strength and function (Cybex Dynamometer) and dietary intake. **RESULTS:** Body weight decreased at 3 month (P<0.05) in CC but remained unchanged in CO (CC; 74.0±13.4 vs. 73.2±13.5 kgs; CO; 73.0 ± 15.9 vs. 73.0±16.2 kgs). Total body fat mass (CO; 28.5 ± 11.8 vs. 27.7 ±11.3 kgs; CC; 31.5 ± 8.5 vs. 30.4±8.6 kgs), Abdominal adiposity (CO; 3412.7 ± 1911.2 vs. 3342.9 ± 2176.8 gs; CC; 4122.8 ± 1644.0 vs. 3942.2 ± 1561.2 gs) and plasma leptin (CO; 14,400±29,800 vs. 10,100±21600 pg/ml; CC; 23,200±30,300 vs. 20,700±28,800 pg/ml) decreased in both groups at 3 month (p<0.05). Lean mass increased at 3 month (p<0.05) for CO only (CO; 42.2 ± 6.8 vs. 42.8 ± 7.2 kgs). Resting energy expenditure increased significantly (P<0.05) at 3 months (CO; 1340±271 vs. 1442±290 vs. kcals/d; CC; 1129±176 vs. 1327±147 kcals/d). Muscle strength and function increased in the total work extension and flexion for CO only (CO; Flex: 359.8 ± 255.7 vs. 524.9 ± 288.0 N·m; Exten: 416.3 ± 265.8 vs. 605.4 ± 298.0 N·m). CC observed a significant positive correlation in: leptin vs. total fat mass; leptin vs. abdominal fat mass; leptin vs. IGF-1; adiponectin vs. total body fat mass percent change in leptin concentration with mean percent change in total fat mass, abdominal fat mass, IGF-1 and self-reported physical activity questionnaire. CO observed a significant positive correlation in leptin vs. resting energy expenditure. **CONCLUSION:** Both exercise interventions showed favorable effects in decreasing total body fat mass, abdominal obesity, plasma leptin levels and increasing resting energy expenditure following the 3 month supervised intervention in both groups. The CC group showed a greater magnitude in changes in these variables, as well as the favorable effects in total body weight. The greater magnitude of body composition changes may suggest for interactive exercise video games to be effective method of improving physiological health in an elderly population. However, further analysis on exercise adherence would be necessary to support our physiological improvements in both groups.