

COGNITION

Exercise Plus Virtual Reality Improves Cognition

Looking for a fun way to give your older patients a cognitive *and* physical workout? Get them into gaming—as in “exergaming.” In a study of older adults, those who used a “cybercycle” had better cognitive function than did traditional exercisers, say researchers from Union College, Schenectady, New York; Skidmore College, Saratoga Springs, New York; Columbia University, New York, New York; Albany Medical Center, Albany, New York; and the University of Illinois, Urbana-Champaign.

In the study, 79 participants rode identical recumbent stationary bikes. However, in one group, 38 “cybercyclists” rode bikes equipped with virtual reality displays featuring tours and competitors. The participants gradually increased exercise frequency to 45 minutes per session 5 times a week. The minimum threshold for “completers” was 25 rides during the intervention period; completers rode an average of 3 rides per week. Sixty-three adults, aged 58 to 99 years, completed the study.

Cognitive testing was done at baseline, 1 month later, and 3 months later. The primary cognitive outcome was status of executive function.

Cybercyclists showed significantly more improvement in executive function. Although both groups put in the same amount of effort, cybercycling produced a medium effect that was over and above traditional exercise, with average improvements in performance of 1/2 standard deviation. Further, fewer cybercyclists progressed to mild cognitive impairment (MCI);

they had a 23% reduction in risk of clinical progression to MCI compared with traditional exercisers (9 controls vs 3 cybercyclists).

Contrary to expectations, effort and fitness did not seem to be factors behind differential cognitive benefits found in the cybercycle group. The researchers say the most “potent” factors of the cybercycle might be the virtual reality imagery and interactive decision making. One 86-year-

One 86-year-old participant said she felt healthier, which she attributed to competing with “that fellow ahead of me!”

old participant said she felt healthier, which she attributed to competing with “that fellow ahead of me!” The researchers suggest that the interactivity provides a different kind of cognitive stimulation. Navigating a 3-D landscape, anticipating turns, and competing with others required additional focus, expanded divided attention, and enhanced decision making, all activities that depend in part on executive function, they point out.

A synergistic effect from combining cognitive and physical exercise may also exist. Research has shown that combining mental stimulation and physical exercise, such as in learning and practicing Tai Chi or dancing, challenges more than 1 part of the brain. Moreover, the researchers found that, compared with the traditional exercisers, cybercyclists

had a significantly greater increase in brain-derived neurotrophic factor, a biomarker indicating possible neuroplasticity, which can have cognitive benefits.

Source: Anderson-Hanley C, Arciero PJ, Brickman AM, et al. *Am J Prev Med.* 2012;42(2):109-119. doi:10.1016/j.amepre.2011.10.016.

ENDOCRINOLOGY

Metabolic Syndrome Starts Early

According to findings from the Prediction of Metabolic Syndrome in Adolescence (PREMA) study, a 10-year investigation of 2,361 children in Athens, Greece, metabolic syndrome (MetS) isn’t an “adult” problem—it has roots as far back as infancy for some people.

At baseline, children aged 6 to 8 years underwent anthropometric, blood pressure (BP), fasting plasma glucose, and lipid measurements. In addition, the children’s natal and parental histories were recorded. In the first phase of the study, the researchers used those data to construct a risk score for MetS in adolescence. Parents were given lifestyle recommendations for their children. Seven years later, all adolescents aged 13 to 15 years who had attended the first session were invited to participate in a survey evaluating the prevalence of MetS. Phase 2 of the study was a cross-sectional investigation testing the predictive accuracy of the risk score by applying it to a new, independent population of adolescents aged 12 to 15 years.

Of the 1,270 children in the first part of the study, 105 (8%) developed MetS, “corroborating the alarming increase in the rate of MetS at the age of 12 to 18 years,” which is now about

10% in the United States and Western Europe—an increase mirroring that in adults over the past decade. Birth weight and birth head circumference below the 10th percentile and having at least 1 overweight or obese parent were independently associated with a diagnosis of MetS in adolescence. In the second cohort of 1,091 children assessed in the validation phase of the study, those 3 factors predicted MetS with a sensitivity of 91% and a specificity of 98%.

The researchers cite earlier research showing that birth weight is inversely associated with coronary artery disease, stroke, high BP, insulin resistance, MetS, and type 2 diabetes. Small head circumference has also been linked to high adult BP, impaired glucose tolerance, and heart disease. Moreover, parents' body mass index (BMI) has been shown to be a more powerful independent predictor of their children's BMI than are nutrition habits and sedentary behavior; in the current study, children with overweight parents had triple the risk of MetS.

The period between childhood and adolescence may be the most critical, the researchers say. Although 36% of the children who developed MetS were already overweight or obese at ages 6 to 8, the prevalence of overweight or obesity increased in the interval between ages 6 to 8 and 13 to 15. By the time of the second follow-up phase, 90% of the MetS group were overweight or obese, compared with 25% of the non-MetS group.

Source: Efstathiou SP, Skeva II, Zorbala E, Georgiou E, Moutokalakakis TD. *Circulation*. 2012;125:902-910. doi: 10.1160/CIRCULATIONAHA.034546.

PULMONOLOGY

Enteral Feeding in Acute Lung Injury

What's the best timing, formulation, and amount of enteral nutrition for

patients with acute lung injury (ALI)? Recent studies have suggested that both strategic underfeeding and “full feeding” can have benefits such as shortening the duration of mechanical ventilation, reducing infections, and improving survival.

Those conflicting findings prompted researchers for the EDEN Randomized Trial to compare the effects of trophic enteral feeding with full enteral feeding for the first 6 days of mechanical ventilation. They hypothesized that initial trophic feeding would increase the number of ventilator-free days (VFDs) by reducing the number of instances of gastrointestinal (GI) intolerance.

The researchers recruited patients and physicians from 44 hospitals in the National Heart, Lung, and Blood Institute Acute Respiratory Distress Syndrome Clinical Trials Network. One thousand patients were enrolled within 48 hours of developing ALI requiring mechanical ventilation and were randomized to receive either trophic or full enteral feeding for the first 6 days. After that, those who were still on mechanical ventilation were managed according to the full-feeding protocol. The full-feeding group received more enteral calories for the first 6 days, about 1,300 kcal/d, compared with 400 kcal/d. Noting that there's no standard definition of “trophic feeding” or “permissive underfeeding,” the researchers say they chose to provide about one-quarter of estimated total caloric needs, based on studies in animals and low-birth-weight infants. Their decision meant that there was less separation between the groups than if one group had received no enteral feeding at all.

The main outcome of the study was VFDs to study day 28. Secondary endpoints included frequency of GI adverse effects, 60-day mortality before hospital discharge with unassisted breathing, ICU- and organ-failure-free days, and new infections.

The researchers found no statistically significant differences between the 2 groups. Contrary to other reports, hypocaloric feeding did not significantly reduce mortality, infections, or lengths of stay. Both groups had about 15 VFDs, and 60-day mortality was 22% to 23%. What's more, the researchers say, hypocaloric feedings didn't improve any outcomes in any subgroup, including obese, critically ill patients. Mean plasma glucose values and average hourly insulin administration were both higher in the full-feeding group over the first 6 days, but did not exceed the recommended limits of 150 mg/dL.

The full-feeding patients reached goal feeding rates sooner: 90% within 1.3 days, compared with 90% of the trophic-feeding patients in 6.7 days. However, despite receiving more prokinetic agents, the full-feeding group experienced more vomiting (2.2% vs 1.7% of patient feeding days) and constipation (3.1% vs 2.1% of feeding days). Regurgitation, constipation, vomiting, and aspiration were uncommon in both groups, the researchers say, which calls into question the routine use of postpyloric tubes. In this study, more than 85% of patients were initially fed via a gastric rather than a postpyloric tube despite near-universal use of sedatives and narcotics and the fact that about 40% of the patients were in shock. The researchers note that initial feeding in the stomach can help avoid delays in enteral access. ●

Source: National Heart, Lung, and Blood Institute Acute Respiratory Distress Syndrome Clinical Trials Network. *JAMA*. 2012;307(8):795-803. doi:10.1001/jama.2012.137.

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