Research Bites, September 2019, by Mary Yoke, PhD, FACSM, MA, MM

Do Younger and Older Adults Get Similar Results with Individualized Training?

Have you ever wondered about differences in training responses between age groups? For example, do older adults improve fitness to the same degree as younger adults? The answer to this question was explored by researchers at Western State Colorado University; their research findings were subsequently published in the *Journal of Exercise Physiology* in 2018 (1).

The authors analyzed data on 18 sedentary men and women: ten of these participants were between the ages of 18-35; the other eight participants were between the ages of 50-70. All finished an 8-week training program divided into two phases: four weeks at a lower intensity, followed by four weeks at a higher intensity. The training program was developed according to the American Council on Exercise (ACE) Integrated Fitness Training (IFT) model (2). The lower intensity phase was defined as training at a heartrate below Ventilatory Threshold 1 (VT1), whereas the higher intensity phase was defined as training above VT1, but less than Ventilatory Threshold 2 (VT2).

According to the ACE model, when a person is active below VT1, they can talk comfortably (this is Zone 1—low to moderate intensity). When a person is between VT1 and VT2, they are not sure if they can talk comfortably (Zone 2—moderate to vigorous intensity). When they have passed VT2 (also known as the onset of blood lactate), they definitely cannot talk comfortably while exercising (Zone 3—vigorous to very vigorous intensity).

Prior to and after the 8-week training program, participants had their resting blood pressure, resting heart rate, fasting blood lipid profile, fasting blood glucose, waist circumference, weight, body composition, VO_2 max, sit-and-reach, stork-stand balance, and 5RM bench press and leg press assessed.

During the training program, participants exercised 3-4 days per week for 45-60 minutes during Phase 1 (first 4 weeks), and for 5 days per week for 60-75 minutes during Phase 2 (last 4 weeks).

So what were the findings? The younger group showed significant increases in all fitness measures over the 8 weeks. The older group also showed significant increases in all fitness measures except the 5RM leg press and the sit-and-reach test (there was an improvement trend in both the 5RM leg press and the sit-and-reach test scores, although the change was not statistically significant). The older group had significant reductions in systolic blood pressure.

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Results from an independent t-test showed there were no significant differences between the younger and older groups in terms of changes from baseline to the end of the study. In other words, both groups received similar amounts of benefits across the program, and the health-related components of fitness improved to the same relative extent, no matter the age group. This is particularly good news in light of the fact that the U.S. population has ever-increasing numbers of people over age 65. Starting in 2030, when all baby boomers will be older than 65, older Americans will make up 21 percent of the population, up from 15 percent today (3). Learning that inactive older adults can measurably adapt to fitness training, to a comparable degree as younger adults, can help all of us be more proactive when designing, promoting, and implementing physical activity programs.

The Presence of a Spotter Can Significantly Help Improve Amount of Weight Lifted and Number of Reps!

Researchers Sheridan et al (4) were curious whether the visual presence of a spotter made a difference in terms of how much weight could be lifted, and how many reps could be performed, during the bench press exercise.

To evaluate the spotters' effect, 12 experienced male participants (average age: 21.3), all of whom had been resistance training for at least 12 months, were recruited. Participants were not told the actual purpose of the study, in order to minimize any potential for conscious bias toward one condition or the other. The experimental design involved two bench press conditions at a Smith machine: 1) a spotter trial, in which two spotters were visible at either side of the Smith machine bar during the lifts and during the rest periods, and 2) a deception trial, in which the spotters were not visible either during the lifts or during the rest periods. The researchers placed an opaque material around the Smith machine frame, which provided a shield for the spotters during the deception trial; the opaque shield remained in place for both conditions. After a warm-up, the bench press lifting protocol involved three unassisted sets of reps to failure at 60% 1RM, with two-minute rest periods between sets. Participants did not receive any verbal encouragement, and all received the same instructions during both trials: "Maintain your visual focus on the bar throughout each set; Think about the movement of the bar; Lift to failure". Measurements included blood lactate concentration before and after each trial, RPE and local

RPE of the chest and arms; participants were also asked to estimate their confidence regarding matching the previous numbers of reps (using a confidence scale from 1-10).

So what were the results? Participants were able to lift significantly more weight and complete significantly more repetitions when the spotters were visible. In addition, blood lactate responses were significantly higher in the spotter condition, *objectively* indicating greater effort. RPE, however, was higher when spotters weren't visible, particularly in the first two sets, indicating a greater *subjective* perception of effort. Self-efficacy was significantly higher in the spotter condition. The authors write that the results were due to the close proximity of a small number of people visible during the sets, and that exercisers were less likely to lift as much weight and/or feel as confident when exercising by themselves, even though they were experienced. Spotters may even promote more self-efficacy and enhanced training by emphasizing their beliefs in the exerciser's ability to complete the moves and improve their performance.

These findings underscore the importance of training with friends or utilizing the services of a personal trainer. Particularly when performing a bench press (we might assume these results hold true for other exercises), not only is safety enhanced, but an exerciser gains confidence and does measurably more work, potentially leading to more satisfaction and greater fitness gains.

Are There Associations Between Living in a Green Neighborhood, Physical Activity, and the Incidence of Obesity?

In a large cross-sectional epidemiological study by Villeneuve et al (5), data from 50,884 women (ages 35-74) who participated in the Sister Study from 2003-2009 were analyzed. The purpose of this study was to examine possible associations between residentially-based measures of greenness and both obesity and physical activity.

What is meant by residential (e.g. neighborhood) greenness? Residential measures of greenness were determined using the US National Land Cover database. Researchers created four metrics for greenness as follows: 1) Green1: includes predominantly forest, shrubland, and herbaceous land covers, 2) Green2: includes classes within Green1 as well as developed open spaces, such as lawns and some roads 3) DHI: developed high-intensity land cover, including apartment complexes and commercial and industrial development 4) IMP: impervious surfaces

accounting for 80%-100% of total land cover, including roads, sidewalks, parking lots, brick, stone, and rooftops.

Physical activity for the past 12 months was self-reported by the study participants, and the number of MET-hours per week was determined. BMI values (height and weight were measured by trained examiners) were collected from the original data set, along with multiple other measures such as age, ethnicity, income, and smoking status. The association between greenness, obesity, and physical activity was analyzed via logistic regression.

It was found that the more green the neighborhood, the less likely residents were to be obese—an inverse association. Residents were also more likely to be active, with greater numbers of MET-hours of activity per week. In terms of demographics, Whites tended to live in greener areas relative to Blacks or Hispanics. Married couples were more likely to live in greener areas when compared to those of a different marital status. Geographically, the strongest associations were found in western states. The relationship between residential greenness and lower risk of obesity held true across all age groups. Regarding income, the strongest correlations between greenness and obesity were found among those of lower income; individuals with financial challenges are least likely to be able to move where they please, and are more likely to be obese.

The authors conclude that increasing residential greenness may be an important factor in helping people become more active, reduce sedentary behavior, and lower the risk of obesity.

References:

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