

Statement of
Dr. Paul S. Legg, M.D.
Before the
Special Committee on Aging
United States Senate

Chairman Scott, Ranking Member Gillibrand, and Honorable Members of the Committee,

Thank you for this opportunity to offer testimony to the Senate Special Committee on Aging. The opinions expressed herein are my own and do not reflect the view or position of my employer.

My name is Dr. Paul Legg. I am a practicing orthopaedic surgeon in Charleston, West Virginia, having spent 27 years in private group practice and the past two years as a hospital-employed surgeon for Vandalia Health. I am board certified by the American Board of Orthopaedic Surgery with a certificate of additional qualification in sports medicine. I am also the orthopaedic surgeon for the University of Charleston, an NCAA Division II school with approximately 620 athletes.

Sports medicine encompasses the prevention and care of musculoskeletal injuries and medical conditions encountered in sports. Lessons from the field, operating room, and research are applicable to maintain the physical function and performance in competitive athletes at any age. The health outcomes of seniors improve by keeping them healthy, active, and injury-free as they age. Surgical techniques designed to return competitive athletes to the field of play can also benefit seniors with similar injuries. For example, small incision or percutaneous repair of Achilles tendons is such a technique. Using this percutaneous technique in patients decreases operative time, wound complications, scarring, and infection.¹ Patients also return earlier to pre-injury activity. However, surgical techniques are only a small part of sports medicine's influence on senior health. The manner in which our athletes train and prepare offer many more lessons on improving the health outcomes of seniors.

According to the 2022 report by the National Health Statistics, only 13.9 percent of adults aged 65 and older met the Federal activity guidelines.² The environmental factors related to low physical activity rates include automobiles, television, computers, mobile devices, remote

¹ Hsu AR, Jones CP, Cohen BE, and others. Clinical Outcomes and Complications of Percutaneous Achilles Repair System Versus Open Technique for Acute Achilles Tendon Ruptures [Internet]. *Foot Ankle Int.* 2015 Nov;36(11):1279-86. Available from: <https://pubmed.ncbi.nlm.nih.gov/26055259/>. doi: <https://doi.org/10.1177/1071100715589632>.

² Elgaddai N, Kramarow E. Characteristics of Older Adults Who Met Federal Physical Activity Guidelines for Americans: United States, 2022 [Internet]. U.S. Centers for Disease Control and Prevention; 2022 Nov 25 [cited 2025 June]. Available from: <https://www.cdc.gov/nchs/data/nhsr/nhsr215.pdf>. Aerobic physical activity guidelines for adults recommend at least 150 to 300 minutes a week of moderate-intensity aerobic activity or 75 to 150 minutes of vigorous activity a week.

controls, elevators, suburban roads with no sidewalks, sedentary jobs, and eating out/fast food. Since very few people get adequate exercise at work or throughout their days, exercise needs to be added as a purposeful activity. Fitness is partly genetic and is measured by how far you go on an exercise test. Physical activity is behavioral and requires motivation and commitment. Increasing your physical activity will increase your fitness.

Poor physical activity and nutrition top the list of most common health issues encountered by seniors.³ Dr. Jerome Fleg tested healthy patients over 20 years and found that we get less fit as we get older and fitness sharply declines after age 75.⁴ In 1975, Dr. Robert Bruce demonstrated that physical fitness as measured by VO₂ max decreases as we age, even in healthy individuals.⁵ VO₂ max is a measure of your body's maximal rate of oxygen consumption. When we're exercising—or just sitting down—our body takes in air from the lungs, distributes it throughout the body via the heart and blood vessels, and then pulls oxygen from that blood into our muscles, tissues, and cells. In the cells, mitochondria use oxygen to produce energy in the form of adenosine triphosphate (ATP). VO₂ max declines with age. This occurs in part due to decreased cardiac output and decline in mitochondrial number and quality. These changes mean that either less oxygen is taken up by the muscle or the oxygen that is taken up isn't utilized to the same extent, which can limit our aerobic energy production and exercise capacity. While VO₂ max declines with age, we can prevent some decline in patients. Continuing to exercise can boost mitochondrial capacity, preserve cardiac function, and may even prevent some of the age-related declines in heart rate and strength with age.

Seniors need aerobic fitness, but they also need strength training. Loss of strength and loss of muscle mass (sarcopenia) begins roughly at age 40. Muscle mass declines five percent per decade starting at age 40. Strength-trained men and women start with higher peak strength and lose strength at a slower rate. Muscle mass increases only with intensive and prolonged resistance training. The established benefits of regular strength (resistance) exercise include increased strength and endurance, increased/maintained muscle mass, increased resting metabolic rate, and preventing disability.

Both research and clinical experience indicate that resistance training is safe for healthy older adults, frail older adults, and individuals with disease. Muscle disuse is a preventable and reversible factor. Resistance exercise training has been consistently shown as a feasible and

³ McNaughton SA, Crawford D, Ball K, and others. Understanding Determinants of Nutrition, Physical Activity and Quality of Life Among Older Adults: The Wellbeing, Eating and Exercise for a Long Life (WELL) Study [Internet]. Health Qual Life Outcomes; 2012 Sep 12;10:109. Available from:

<https://pmc.ncbi.nlm.nih.gov/articles/PMC3479030/>. doi: <https://doi.org/10.1186/1477-7525-10-109>.

⁴ Fleg JL, Morrell CH, Bos AG, and others. Accelerated Longitudinal Decline of Aerobic Capacity in Healthy Older Adults. *Circulation* [Internet]. 2005 Aug;112(5):674-82. Available from:

<https://pubmed.ncbi.nlm.nih.gov/16043637/>. doi: <https://doi.org/10.1161/circulationaha.105.545459>.

⁵ See Quinn E. The Bruce Protocol Treadmill Test [Internet]. VerywellFit; 2024 July [cited 2025 June]. Available from: <https://www.verywellfit.com/the-bruce-treadmill-test-protocol-3120269>.

effective means of counteracting muscle weakness and physical frailty; improving physical performance; increasing muscle, fiber, area; improving muscle quality; improving bone density; improving metabolic health and insulin sensitivity; improving psychological well-being; and reducing risk for falls and fractures and older adults.

What behaviors can we encourage in senior adults to help start and maintain an exercise program? The first step is making a commitment to increase physical activity. Established protected time to exercise and forgo other activities that may encroach on this scheduled time. Develop a habit. Set small and realizable goals for exercise as you begin but also think about and establish long-term goals for overall fitness. Barriers to exercise must also be addressed, which include lack of understanding, lack of awareness, lack of funds, and lack of a plan.

What can we learn from sports medicine and athletes? Athletes train and prepare for competition. Their training includes aerobic exercise and strength training. Their exercise is planned and purposeful. We need to view exercise like personal hygiene—regular and routine practices that improve overall health.

Sports medicine has also introduced specific training techniques that improve fitness. These techniques were designed to improve performance of competitive athletes. Yet, these principles can be used by all ages, including senior adults. The Norwegian 4x4 protocol is a high intensity interval training method that involves four minutes of near maximum intensity exercise followed by three minutes of light activity repeated four times. A study in 2020 demonstrated a lower all-cause mortality trend with 4x4 interval training, compared with controls and moderate intensity continuous training.⁶ Fartlek is another type of interval training that is based on even shorter intervals of increased activity with intermittent light activity or rest. Fartlek, which is Swedish for “speed play,” tends to be less structured than other interval techniques. These high intensity interval training techniques can be used with a variety of exercises including walking, running, cycling, elliptical, and rowing.⁷

Health outcomes in seniors can be improved with lessons learned from sports medicine and sports science. Surgical techniques and rehab protocols help return seniors to pre-injury function and activity. Planned and purposeful exercise and strength training used in preparation for competitive athletic events provide a structure for exercise and senior adults. Advanced training techniques can move senior adults beyond just physical activity and into increasing levels of fitness.

⁶ Acala JJ, Roche-Willis D, Astorino TA. Characterizing the Heart Rate Response to the 4x4 Interval Exercise Protocol. *Int J Environ Res Public Health* [Internet]. 2020 Jul 15;17(14):5103. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC7399937/>. doi: <https://doi.org/10.3390/ijerph17145103>.

⁷ See Zickl D, Latter, P. What Is a Fartlek Run and How Can It Help You Get Faster? [Internet]. *Runner's World*; 2020 Dec 8 [cited 2025 June]. Available from: <https://www.runnersworld.com/training/a34824872/fartlek-run/>.