

Energy Expenditure in Adults With Spinal Cord Injury

Physical activity levels decrease across the life span for persons with spinal cord injury due to declining ability for volitional muscle activity. A potential strategy to increase physical activity is neuromuscular electrical stimulation. This study sought to examine the use of low stimulation frequency and intensity electrical activation of the quadriceps and hamstrings on energy expenditure in adults with spinal cord injury. Participants had energy expenditure measured while completing a resting baseline period followed by bouts of electrical stimulation at 1-Hz and 3-Hz frequencies. Each bout progressed from a stimulation intensity of 50–100 mA. Energy expenditure significantly increased from rest under both conditions. The authors concluded that the lowest stimulation frequency (1 Hz) and highest stimulation intensity (100 mA) had the greatest increase in energy expenditure. However, both body mass index and visceral adipose tissue were negatively correlated with energy expenditure response to electrical stimulation due to impeding the stimulus that reached muscle fibers. These findings suggest that low-force muscle stimulus may be a safe and effective long-term approach to increase daily activity in adults with spinal cord injury.

Woelfel, J.R., Kimball, A.L., Yen, C.-L., & Shields, R.K. (2017). Low-force muscle activity regulates energy expenditure after spinal cord injury. *Medicine & Science in Sports & Exercise*, 49(5), 870–878. doi:10.1249/MSS.0000000000001187

The Fitness–Cognition Relationship in Multiple Sclerosis

In multiple sclerosis (MS), cognitive impairment that occurs with progressive central nervous system damage is thought to be a by-product of processing speed. A potential treatment to address cognitive processing speed in this population may be exercise training, but previous studies have been limited by samples of noncognitively impaired persons with MS. This study sought to examine the differences between groups of persons with MS, with and without processing speed impairments (PSI), on the association of cardiorespiratory fitness and processing speed. A total of 64 adults with MS, including 14 identified with low cognitive processing speed (PSI) and 50 with normal processing speed (without PSI), participated in the study. Cardiorespiratory fitness was measured with an incremental cycle ergometer test, and processing speed was measured with a modified flanker test. Lower cardiorespiratory fitness was significantly associated with slower processing speed in the PSI group. However, there was no significant association in the group without PSI. The authors conclude that this preliminary evidence supports the use of aerobic exercise training as a behavioral approach in persons with MS to prevent declines in cognitive performance.

Sandroff, B.M., Motl, R.W., & Deluca, J. (2017). The influence of cognitive impairment on the fitness-cognition relationship in multiple sclerosis. *Medicine & Science in Sports & Exercise*, 49(5), 1184–1189. doi:[10.1249/MSS.0000000000001215](https://doi.org/10.1249/MSS.0000000000001215)

Perceived Exertion in Adults With Spinal Cord Injury

A challenge in prescribing exercise for persons with spinal cord injury is that common physiological markers of exercise are impaired due to the injury. Ratings of perceived exertion (RPE) are, thus, considered more appropriate measures of exercise intensity in this population. However, there may be clinically relevant differences between individuals with paraplegia and tetraplegia in the differentiation between peripheral and central RPE. A total of 36 recreationally active adults with spinal cord injury, including 13 with paraplegia and 23 with tetraplegia, completed a maximal graded arm cycling test and minute-by-minute reports of central RPE and peripheral RPE. There was a nonlinear increase in both central and peripheral RPE compared with a linear increase in cardiorespiratory output during arm cycling. It appears that peripheral RPE increases faster than central RPE for persons with tetraplegia, but this difference may be due to multiple participants not reaching ventilatory threshold. The authors conclude that differentiated RPE responses may have implications for prescribing aerobic exercise in persons with spinal cord injury. This publication should be of interest to practitioners involved with exercise testing and prescription.

Au, J.S., Totosy De Zepetnek, J.O., & Macdonald, M.J. (2017). Modeling perceived exertion during graded arm cycling exercise in spinal cord injury. *Medicine & Science in Sports & Exercise*, 49(6), 1190–1196. doi:[10.1249/MSS.0000000000001203](https://doi.org/10.1249/MSS.0000000000001203)

Horse Riding and Fitness Success in ADHD Children

A 12-week intervention of a simulated developmental horse-riding program combined with physical fitness training was explored to improve motor proficiency and physical fitness for children with attention-deficit/hyperactivity disorder (ADHD). Approximately 1,080 min (1 session, 90 min/week) of simulated developmental horse-riding program and group fitness sessions resulted in significantly improved motor proficiency skills and aerobic endurance in the group of children with ADHD that received training ($n = 12$). A control group of children with ADHD that did not receive training ($n = 12$) did not improve fitness levels, but did improve motor proficiency with small effect sizes; however, the intervention group boasted large effect sizes for all motor measures. Consistent with previous research, there were deficits in motor proficiency and physical fitness when comparing children with ADHD to typically developing peers, which was confirmed with this study. This novel type of intervention may provide ways to improve these health factors in children with ADHD. The simulated developmental horse-riding program targeted motor skills, perceptual skills, and balance as well as fitness, which may have contributed to overall success in an innovative way.