

Multiple Sclerosis Research Update

News from the Center for Neuropsychology & Neuroscience Research at Kessler Foundation

In This Issue – Exercise and Multiple Sclerosis

The current issue of the *Multiple Sclerosis Research Update* newsletter focuses on the benefits of exercise training in persons with multiple sclerosis (MS).

MS is associated with a number of physical and mental health consequences such as physiological deconditioning, mobility issues, balance impairment, cognitive problems, fatigue, and depressive symptoms, among others. Disease-modifying drug therapies as first-line MS treatments are highly effective for arresting disease activity and preventing relapses. However, these treatments are not designed to restore functions that have been lost due to MS.

By comparison, exercise training as a form of rehabilitation has been identified as the single, most-promising approach for restoring function in persons with MS. Researchers at Kessler Foundation have been investigating the effects of exercise-related approaches for restoring function and improving brain health and



quality of life in persons with MS over the past 14 years. In this issue we report on findings from two exercise training studies on cognitive functioning: a home-based intervention aimed at increasing walking behavior and improving processing speed difficulties in MS, and the other, an in-person intervention aimed at improving memory problems and brain health in MS. 🧠

Meet the Researcher



Brian M. Sandroff, PhD, is a senior research scientist in the Center for Neuropsychology and Neuroscience

Research and the director of the Exercise Neurorehabilitation Laboratory at Kessler Foundation. He is also a research associate professor of Physical Medicine and Rehabilitation at Rutgers New Jersey Medical School. Dr. Sandroff's research focuses on developing and testing exercise interventions for improving cognition, mobility, and brain health in persons with MS. He is an internationally recognized leader in this area. Dr. Sandroff has also been involved in major

research on the determinants, correlates, and measurement of physical activity and trials aimed at improving lifestyle physical activity in MS. Collectively, Dr. Sandroff has amassed a considerable record of accomplished and productive research projects over the past 14 years. He has published over 170 peer-reviewed papers in high-impact journals and has obtained over \$10 million in grant funding. 🧠



The Center for Neuropsychology and Neuroscience Research has been conducting Multiple Sclerosis (MS) research for nearly 30 years. Impairments in higher level cognitive processing, such as learning and memory, are common symptoms of MS, and negatively impact aspects of everyday life. Scan the QR code or go to <https://KesslerFoundation.org/research/multiple-sclerosis-research> to learn more about our research.

Research Highlights

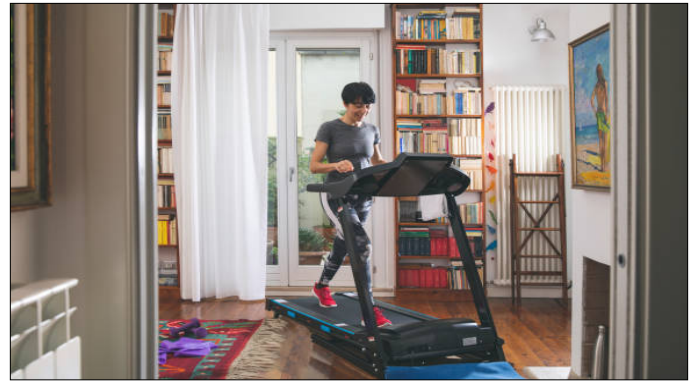
Remote Walking Exercise Positively Affects Cognitive Processing Speed Impairment in Persons with MS

Cognitive processing speed impairment (CPSI) is the most common and debilitating cognitive problem associated with MS. CPSI occurs in approximately 67 percent of patients, is associated with poor physical and mental health, and is not effectively managed with pharmacological intervention approaches.

Over the past 14 years, Kessler Foundation researchers have collected systematic data for developing an optimal aerobic exercise training intervention for treating CPSI in MS. Data suggest that supervised treadmill walking exercise improves cognitive processing speed among individuals with MS. However, researchers have also learned firsthand that exercise training taking place in laboratory-based settings presents major barriers (i.e., time and travel constraints). Consequently, the laboratory-based treadmill walking approach was transformed recently into a remotely delivered and supported intervention to enhance its accessibility.

In December 2022, researchers completed a randomized controlled trial (RCT) evaluating the feasibility and initial scientific effects of a 16-week, remotely delivered and supported intervention. The trial compared aerobic walking exercise training with stretching-and-toning activities on cognitive processing speed in 19 cognitively impaired persons with MS.

Both conditions involved delivery of informational newsletters and one-on-one, online video chats with a behavior coach. Participants across both conditions tracked their activity using highly accurate, wearable motion sensors. For participants randomly assigned into the aerobic walking exercise condition, adherence and compliance were also measured since



it was the first trial to involve remote walking exercise in this MS population.

The study was cost-effective, accessible, acceptable, and safe. Adherence rates across both conditions exceeded 80 percent, indicating that participants were able to perform the interventions as prescribed in a home-based setting. Notably, the participants in the aerobic walking exercise condition (3 days/week) averaged 15 minutes and 1,400 steps per session in the first week of the program and averaged 36 minutes and 3,200 steps per session in the final week of the program.

Importantly, there was an overall moderate effect for change in cognitive processing speed between the conditions. Specifically, the aerobic walking exercise training condition resulted in a 10 percent, clinically meaningful improvement compared with a 2 percent improvement for the stretching-and-toning condition. Collectively, the overall pattern of results supports the design of a large RCT on this approach for treating CPSI among individuals with MS. 🧠

Remotely delivered and supported aerobic walking exercise training condition resulted in a 10 percent, clinically meaningful improvement for participants with MS.

– Brian Sandroff, PhD



To learn more about this research visit: bit.ly/3LrDKx2

Research Highlights, cont.

The Effects of Walking Exercise on Learning and Memory Impairment in MS




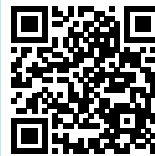
Memory problems, including difficulty with learning new information, are a common and debilitating consequence of MS. Moreover, memory issues in MS, like cognitive processing speed impairment (CPSI), have not been effectively managed with pharmacological intervention approaches. On the other hand, aerobic exercise training has been identified as a promising approach for improving learning and memory in MS. This is based, in part, on the large volume of evidence in older adults from the general population along with some early-stage evidence in persons with MS.

Researchers recently completed an RCT that examined the efficacy of treadmill walking exercise training compared with stretching-and-toning activities for improving learning and memory as well as MRI outcomes of the hippocampus (a brain structure that has been tied to memory).

The trial, which ended prematurely due to the COVID-19 pandemic, included 11 participants with impairments in learning and memory. Participants were randomly assigned into either 12 weeks of supervised, treadmill walking exercise training or 12 weeks of supervised stretching-and-toning activities. Participants underwent learning, memory, and hippocampal MRI tests before and after the 12-week study period.

Investigators found a moderate-to-large effect on measures of verbal learning and memory. Participants who completed the treadmill walking exercises demonstrated improvements compared with individuals who completed the stretching-and-toning condition. Hippocampal volume was preserved in the treadmill walking exercise condition compared with hippocampal atrophy in the stretching-and-toning condition. This effect was large in magnitude.

This study provided important proof-of-concept data for further examining treadmill walking exercise as a neuroplasticity-inducing approach for treating learning and memory impairment and preserving hippocampal volume in persons with MS. 



To learn more about this research visit: bit.ly/3oLxYxs

Clinician's Corner



To date, there is an abundance of evidence stemming from over 250 papers supporting the safety and multi-systemic benefits of exercise training in persons with MS. However, only 20 percent of

patients engage in sufficient amounts of physical activity for health benefits, based on published guidelines for MS.

Given such a discrepancy, our researchers have focused on the patient-provider interaction as a critical factor for exercise promotion in comprehensive MS care. They hypothesize that the neurologist represents the linchpin of exercise behavior

change. This notion is based on an 8-year line of research (involving both patients and providers as participants), which resulted in practice models that can be used by providers and patients across the MS disability spectrum.

Practice models represent powerful resources for implementing exercise promotion as part of the neurologist's clinical arsenal. The goal is to reduce the gap between the wealth of knowledge of exercise benefits in MS and high rates of physical inactivity.

Our researchers have further presented challenges and potential solutions to facilitate the promotion of exercise behavior within comprehensive MS care settings.

To learn more about this research and clinical guidance, visit bit.ly/3L5XBAR.

The time is now to encourage patients to keep moving!

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Editorial

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Clinical Tool Spotlight

The “Canadian Physical Activity Guidelines for Adults with MS” are recommendations available publicly that represent the minimal exercise stimulus necessary for inducing general health benefits for adults with MS. These guidelines apply to individuals with MS in the U.S., too! The 10-year-old guidelines were the product of a comprehensive review of the literature on exercise benefits in MS. The guidelines also address aerobic and strength exercise behaviors and provide examples for patients on exercise frequencies, intensities, durations, and types that can be performed to achieve the level of exercise for inducing health benefits.

To increase the applicability of the guidelines to all adults with MS, [the guidelines were updated recently](#) by the National MS Society. They now also include recommendations regarding lifestyle physical activity as well as more detailed information about engaging in exercise based on the level of ambulatory disability. To learn more about this research visit: bit.ly/3LeMHJY

SCAN ME

Now Recruiting

Do you have a patient who is interested in participating in research? Researchers at Kessler Foundation are actively recruiting for the following studies:

- **The UP Project.** This study consists of a 12-week virtual, group intervention aimed at reducing depression and anxiety to improve overall quality of life among individuals with MS. Individuals experiencing significant depression and/or anxiety and who have access to the internet are eligible to participate. Individuals should not be involved with any concurrent formal group or individual psychotherapy.
- **Eye-movements and Processing Speed in Multiple Sclerosis.** This is a one-visit study that takes approximately 3 hours to complete. Please refer any individuals with MS between the ages of 30-65 who have never had eye surgery (LASIK, Cataract, laser therapy, etc.) and have no significant psychiatric disorder. The first step is a visual screening that takes around 15 minutes to complete. The evaluation includes one hour of tests using an eye tracker and 2 hours of paper and pencil tests.
- **Memory Rehabilitation in Multiple Sclerosis.** Please refer any individuals between the ages of 18-69 with MS. The first step is a telephone screening by one of our data collectors, which takes approximately 30 minutes.
- **Reinventing Yourself with Multiple Sclerosis.** This study consists of a 6-week virtual, group intervention that employs cognitive behavioral and positive psychology principles to improve self-efficacy and assist individuals in living well with MS. Please refer any individuals with a definitive diagnosis of MS and no other neurological conditions. Individuals should not be involved with any concurrent formal clinical group, psychotherapy, or experiencing any significant depression.
- **Supervised Exercise and Cognition in Multiple Sclerosis.** This study consists of a 12-week exercise intervention (3 days/week). Eligible individuals should be between the ages of 18-65, right-handed, able to walk without an assistive device (EDSS 0 - 4.0), have no significant psychiatric disorder, on a stable disease-modifying therapy for at least six months, relapse-free for 30 days, demonstrate some impairment in processing speed, and have low contraindications for exercise and MRI
- **Home-Based Walking Exercise for Improving Cognition and Brain Health in MS.** This study consists of a home-based, 12-month walking exercise intervention. Since the exercise takes place at home, only 3 visits to Kessler Foundation are required over the 12 months. Each participant gets a personalized exercise coach (via Zoom), as well as a Fitbit for tracking progress (which they may keep). Eligible individuals should be between the ages of 18-65, right-handed, able to walk without an assistive device (EDSS 0 - 4.0), relapse-free for 30 days, demonstrate some impairment in cognitive processing speed, and have low contraindications for exercise and MRI.

Ask potential participants to contact Nancy Moore at nbmoore@kesslerfoundation.org for more information.