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Promoting Movement as Medicine for the Mind

REVIEW

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Health benefits related to physical activity participation have been suggested since 65 BCE, with Marcus Tullius Cicero (1) attributed as stating "It is exercise alone that supports the spirits, and keeps the mind in vigor". A more modern concept however is "movement as medicine." The field of physical therapy, which is built upon this concept, was only fully realized as a discipline in North America in the early twentieth century as the polio epidemic began to strike North America (2) and soldiers returned from World War I with chronic injuries (3). Later still, a mere 63 years ago, was the first publication of a research study proposing a link between physical activity and health (4). Following these initial events in practice and research, the therapeutic and health benefits of movement as medicine are now backed by a strong body of research (5). From heart disease (6-8), to diabetes mellitus (9,10), to stroke (11), and certain types of cancer (12,13), exercise is considered a key component of chronic disease prevention. Recent research also supports physical activity as a method to maintain cognitive health and reduce risk of dementia. For example, a meta-synthesis of published research to date outlines seven risk factors for dementia. This study suggests a 25% decrease in physical inactivity could reduce the prevalence of dementia by 1,000,000 cases globally (14).

Participating in physical activity from a young age into older adulthood yields the most preventive benefits for brain health. In one study, 9344 older women were asked about their physical activity levels during their teenage years, age 30, age 50, and at their present age. Researchers then analyzed their lifetime physical activity patterns in relation to each individual's current level of cognitive function (15). Older women who were more physically active at earlier ages were less likely to be cognitively impaired at their present age compared to women rated as "inactive". Greater levels of self-reported physical activity during the teenage years were most strongly associated with cognitive performance in later life. Hope is not lost for late-starters however, as even women who only became active in later life were less likely to be cognitively impaired compared

to those who remained "inactive" throughout the life span (15). In another study, it was found that moderate-intensity physical activity levels at both midlife and in old age were associated with a reduced likelihood of developing Mild Cognitive Impairment (16), a stage of cognitive decline beyond normal age-related changes that may progress to dementia. In a different longitudinal study, investigators found that middle-aged adults who reported being active at least twice per week were 52% less likely to have developed dementia at a 20-year follow-up (17). According to this evidence, it's never too late to start reaping the benefits of exercise for brain health. It's best to start early, but if you didn't, start now.

While providing promising findings, we need to consider these studies critically. They used retrospective, self-reported assessments of physical activity, which may not be as accurate as objective, real-time assessments. The findings of these studies are also correlational, and thus do not prove a causal relationship between lifetime physical activity and dementia prevention. Results of these studies allow for cautious optimism that physical activity at any age can help maintain cognitive health later in life. Longitudinal intervention studies using objective measures of physical activity are needed to test this hypothesis without the limitations identified in currently published research.

Now that we know engaging in physical activity throughout the life span is linked to brain health in older age, how can we practice movement as medicine? What kind of exercise is best, and which frequencies, intensities, and durations are optimal to maximize the benefits indicated by research? Published physical activity guidelines, while not specific to brain health, provide some suggestions. Guidelines for youth (5-17 years old) in the new Canadian 24-Hour Movement Guidelines (18) encourage at least 60 minutes per day of moderate-to-vigorous intensity physical activity, including both aerobic and strengthening exercises. Guidelines for adults (18-64 years old) stipulate at least 150 minutes weekly of moderate-to-vigorous aerobic physical activity in bouts of at least 10 minutes, with additional strengthening exercises twice weekly (19). Physical activity guidelines for adults aged 65 years old and over are identical to this, with the added recommendation of balance exercises for falls prevention (19).

Yet across all age groups, Canadians are struggling to meet these guidelines. Data published by Statistics Canada in 2014 (20) indicated only 53.7% of Canadians reported engaging in any leisure-time physical activity. Reported physical activity was highest in youth aged 12-19 years old at 70.4%, but steadily decreased throughout adulthood to 47.7% in the 65 and older age group (20). This data gives no indication whether reported physical activity met minimum levels recommended by national guidelines (18,19).

Is it possible that Canadians aren't meeting physical activity guidelines because they don't know what they are? A review (21) of research on awareness and understanding of the 2011 Canadian Physical Activity Guidelines (19) indicated this might be a factor, with less than 10% of respondents from a large national sample aware of the physical activity guidelines. Notably, one survey highlighted in this paper reported 37.7% of adults had heard of the Canadian Physical Activity, but only 7.6% of respondents were able to elaborate upon what it recommended (21).

In the context of promoting brain health, there may also be a lack of awareness about the benefits of exercise for different brain disorders, particularly dementia. A study that surveyed undergraduate students' awareness of the association between physical activity and chronic disease prevention found awareness of physical activity's health benefits was highest for prevention of cardiovascular disease (97.4%). Comparatively, only 58.0% of students were aware of the association between physical activity and reduced risk of Alzheimer's disease. Awareness was lower still for Parkinson's disease risk reduction (45.0%). If more youth were aware of the benefits of physical activity for maintaining cognitive health, would they be more motivated to exercise? Awareness may be an important factor, as only 22.1% and 20.0% of students indicated they were motivated to exercise to prevent Alzheimer's and Parkinson's diseases (respectively), compared to 68.8% for cardiovascular disease (22).

Equipped with research findings supporting the benefits of physical activity for brain health, we have an opportunity to take action in stemming the "rising tide" of dementia (23) anticipated to hit aging populations around the world. Communicating the importance of engaging in lifelong physical activity, as part of a strategy to reduce dementia risk later in life, requires a life span approach. For youth and middle-aged adults, this means increasing awareness that they have the power to maintain a healthy brain by starting to care for their brains now. For older adults with more immediate concerns about developing dementia, there are many potential strategies to encourage physical activity for maintaining brain health. At a policy level, an older adult fitness tax credit would financially incentivize this group to be more active, and reduce the cost-barrier to access (24). At the level of frontline clinicians, exercise prescription (25) for persons at risk for cognitive decline is an opportunity to reinforce the idea of "movement as medicine". On a community level, recreational programs geared towards older adults are an opportunity to educate them about physical activity's brain health benefits. Knowledge mobilizers in the field of rehabilitation science, which holds the concept of "movement as medicine" at its core, are in a prime position to champion these initiatives to promote brain health across the life span.

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