Neurophysiological Aspects of Vision-based Speed of Processing Cognitive Training in Older Adults with Mild Cognitive Impairment

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Principal Investigators

LIN, FENG VANKEE

Institution

UNIVERSITY OF ROCHESTER

Contact information of lead PI
Country

USA

Title of project or programme

Neurophysiological Aspects of Vision-based Speed of Processing Cognitive Training in Older Adults with Mild Cognitive Impairment

Source of funding information

NIH (NIA)

Total sum awarded (Euro)

€ 1,842,377.98

Start date of award

05/09/2015

Total duration of award in years

5

The project/programme is most relevant to:

Alzheimer's disease & other dementias

Keywords

cognitive training, mild cognitive impairment, processing speed, neurophysiology, Vision

Research Abstract

? DESCRIPTION (provided by applicant): Mild Cognitive Impairment (MCI), especially amnestic type, is considered a symptomatic pre-Alzheimer's disease (AD) phase, and is prevalent in the aging population. Vision-based speed of processing (VSOP) cognitive training is one of the most widely applied behavioral interventions in community-dwelling older Americans free of AD, holding potential to slow cognitive decline. Its particular relevance to MCI is supported by converging evidence from our preliminary studies, including a recently completed pilot intervention study. However, we know little about the mechanisms underlying the benefits of VSOP training, limiting our ability to further exploit VSOP or other forms of cognitive training. I particular, we do not know if and how the effects of VSOP training on cognitive performance are mediated by neuroplasticity-related brain changes. Since recent evidence suggests that neuroplasticity is inducible throughout adult life, even in MCI, it is possible that VSOP training promotes neuroplasticity and slows neurodegeneration. In this early stage and new investigator application, we will focus on assessing whether and how VSOP training, relative to mental leisure activities (MLA), alters cognitive and neural functions in older adults with MCI, up to 6 months after training. The study will enroll and randomize 84 participants with amnestic MCI to VSOP training or MLA control groups. Three specific research aims are to (1) determine whether VSOP training improves processing speed and attention that are associated with changes of brain structural and functional connectivity; (2) test a novel neurophysiological pathway of VSOP training effect on brain structure and function; (3) examine the effect of VSOP training on untrained cognitive and functional domains and the role of neurophysiological changes underlying possible transfer effects. By examining multiple neural and novel physiological mechanisms linking a promising VSOP training intervention to improvements in cognitive performance, this application seeks to challenge and shift current research on cognitive training that merely examines training effects on cognitive outcomes. Discovery of neural, and physiological-related mechanisms in VSOP training will have important implications beyond this particular intervention. Findings from recent behavioral studies (e.g., cognitive intervention, physical exercise, nutrition, and bio-feedback intervention) suggest that for cognitive decline to be mitigated in individuals at risk for AD, it will be necessary for interventions to target the neural and peripheral physiological pathways that are susceptible to AD neuropathology. Confirmation of the study hypotheses could support immediate translation to clinical practices by demonstrating the efficacy, sustainability, and generalizability of cognitve training.

Lay Summary

PUBLIC HEALTH RELEVANCE: This project seeks to identify neural changes that occur in adults with mild cognitive impairment (MCI) after engagement in computerized cognitive training. In addition, this project aims to identify physiological factors that may bolster effectsof the training on cognitive function. Individuals with MCI are at high risk for Alzheimer's disease (AD). Understanding how cognitive training protects cognitive function in MCI can contribute to development of effective interventions to slow progression to AD in individuals at risk, thereby reducing the significant morbidity and health care costs associated with AD.

Further information available at:

Types:

Investments > €500k

Member States:

United States of America

Diseases:
Alzheimer's disease & other dementias

Years:
2016

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N/A

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