

שם: טל גפני גל

שם העבודה:

Physical Activity, Sedentary Behavior, and Brain Health

מנחה: ד"ר גלית וינשטיין

Abstract

Background:

Evidence indicates that physical activity (PA) has beneficial effects on brain health, whereas excessive sitting may increase cardiovascular risk, including the development of metabolic syndrome (MetS), and therefore may be associated with cognitive decline. Yet, the independent association of sitting time with cognitive outcomes has rarely been examined. In addition, it remains unclear how changes in PA habits over the lifespan are related to cognitive decline and dementia risk. Moreover, the activity mechanisms explaining the link between PA and cognition have insufficiently been explored. One important suggested mechanism explaining this link between PA and cognition is autonomic imbalance, since it is associated both with increased cognitive decline and with physical inactivity. Hence the current study has a three-fold contribution to the literature: (1) The focus on sedentary behavior and cognition has rarely been examined and is important since sitting is pervasive in western society and its implications on brain health warrant scientific exploration; (2) Whereas the relationship between PA and cognition have sufficiently been examined, the effects of changes of PA on dementia incidence have not; and (3) Research pertaining to the underlying physiological mechanism explaining the relationship between PA and brain health is in its infancy, and the current focus on autonomic balance will significantly contribute to the literature in the field.

Aims:

The primary aims are twofold: (1) To examine the relationship between PA, sedentary behavior, and brain health; and (2) To explore whether autonomic balance mediates the relationship between PA and brain health.

Methods:

Data from two large, well-established cohort studies -the Coronary Artery Risk Development in Young Adults (CARDIA) and the Cooper Center Longitudinal Study (CCLS) will be utilized. In both cohorts, PA is assessed via questionnaires and cognitive function overall and its specific domains are evaluated using validated tests. In the CCLS, information on incident dementia are linked with Medicare insurance data. We employ both cross-sectional and longitudinal study designs to examine the data. Multivariable models will be used to examine the relationship of PA and sedentary behavior with cognitive function, risk of dementia (CCLS), and cognitive decline (CARDIA). Formal

mediation analysis will be employed to examine the role of autonomic balance as a mediator in the relationship between PA and cognitive decline (CARDIA).

Importance and innovation:

Despite a strong biological plausibility, autonomic balance has never been explored as a potential mediator in the relationship between PA and cognitive outcomes. If such a mechanism does exist, it may offer a simple and affordable new way to detect individuals with higher risk for cognitive decline and dementia. Moreover, it may act as a marker for the effectiveness of PA as a primary prevention measure for dementia. Hence, the study aims to illuminate new pathways in which PA affects cognition and dementia risk and will serve as a stepping-stone for developing innovative programs to mitigate brain aging. Finally, the longitudinal examination of both younger and older adults will elucidate the health benefits of PA in the various stages of the aging process.