Cognitive Health & Environment

Flash Session

CACHE | Center for Aging, Health & Environment

Environment and Cognitive Aging

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CACHE Aging-Climate-Health Workshop

Where My Research Began

Title: Neighborhood Environments and Cognitive Decline Among Middle-Aged and Older Adults in China, National Institute of Aging (R03 AG065637-01), 2020-2023

Research Questions: How natural, built, and social neighborhood environments affect cognitive performance over time in middle-aged and older adults?

Data: The China Health and Retirement Longitudinal Study (CHARLS, 2011-2018)

Results: Positive neighborhood characteristics—such as access to green spaces, well-designed built environments, and strong social cohesion—are linked to improved cognitive outcomes and reduced cognitive decline over time.

Next steps: Disentangle specific environmental component and Incorporate biomarkers or neuroimaging to understand biological mechanisms.

My Current Research

Title: Environmental Risk Factors and Cognitive Health: Role of Biomarker Pathways

Research Questions: What is the role of biomarkers (e.g., blood lipids, PFAS, and epigenetic clocks) in the association between exposure to environmental risks factors and cognitive domain?

Data: The Multi-Ethnic Study of Atherosclerosis (MESA, 2000-2018); The Health Retirement Study (HRS) and Harmonized Cognitive Assessment Protocol (HRS-HCAP)

•**Results**:
- ✓ Rather than a mediator in the air pollution-cognition relationship, LDL-C modifies NO2/NOx effects on global cognition (CASI scores) and brain structure (MRI). LDL-C is a suppressor and lessened the negative impact of NO2/NOx exposure on global cognition and the white matter in the MESA cohort.
- ✓ Volunteering (1–100 h/year) mitigates aging's impact (PhenoAge, GrimAge) on global cognition in the HRS-HCAP cohort.
- ✓ Blood PFAS concentration suppressed the negative impact of recent exposure to PFAS on processing speed and global cognition in firefighters.

Next steps: Climate-related stressors on cognitive domains through cardiovascular and epigenetic mechanisms.

Partnering with CACHE for Progress

Title: Extreme Temperature and Cognitive Function: Cardiovascular and Epigenetic Pathways

Research Questions: How the exposure to extreme temperatures (i.e., heat, coldness, and transitions between both) is associated with cognitive domain through blood lipids and epigenetic clocks?

Data: The PRISM Climate and Weather data from the National Neighborhood Data Archive (NaNDA) and the HRS cognition and venous blood data.

Leveraging CACHE

✓ **Exclusive Data Access and Efficient Data Handling**

Utilize the center's expertise for streamlined data acquisition and analysis.

✓ **Expanded Opportunities**

Tap into the center's network or future collaborations and broader reach.