

Passive monitoring technologies can capture meaningful activity patterns linked to cognitive health.

Background

Physical, cognitive, and social activity engagement are modifiable factors that may reduce dementia risk. Yet their assessment typically relies on self-report measures prone to recall bias.

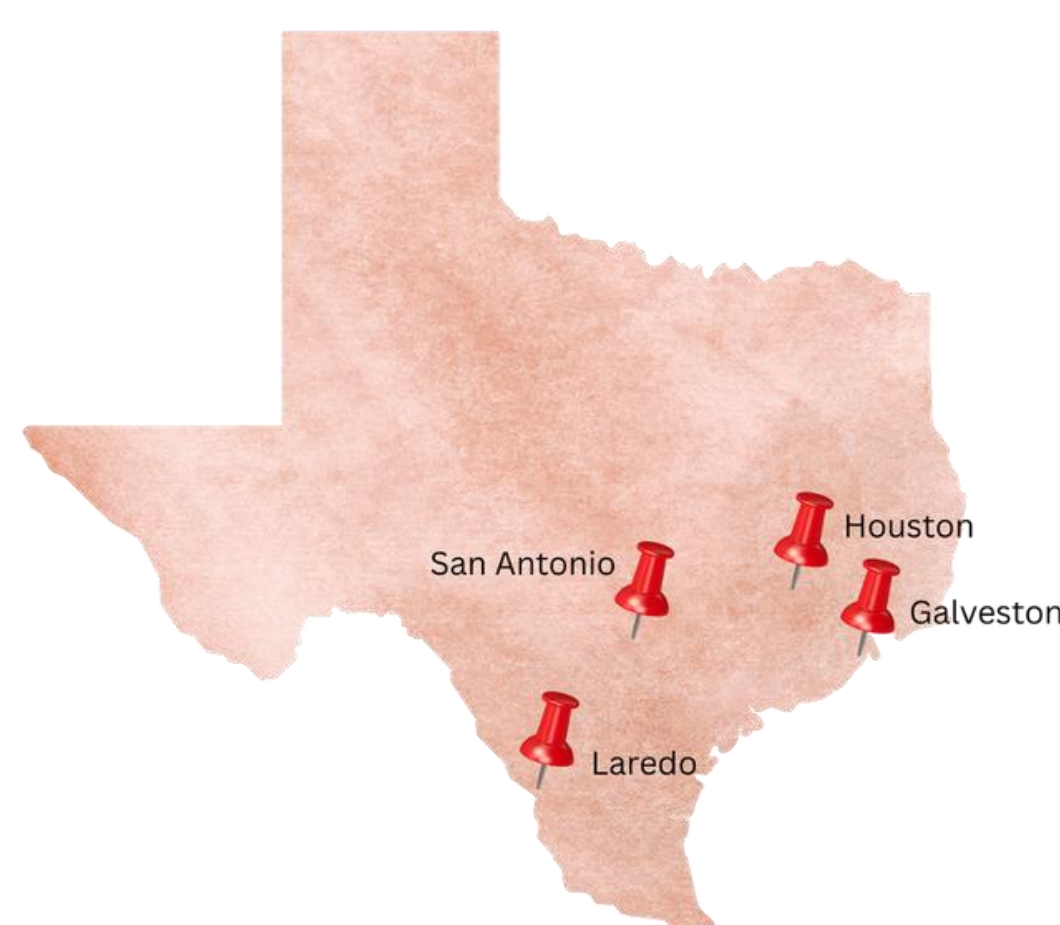
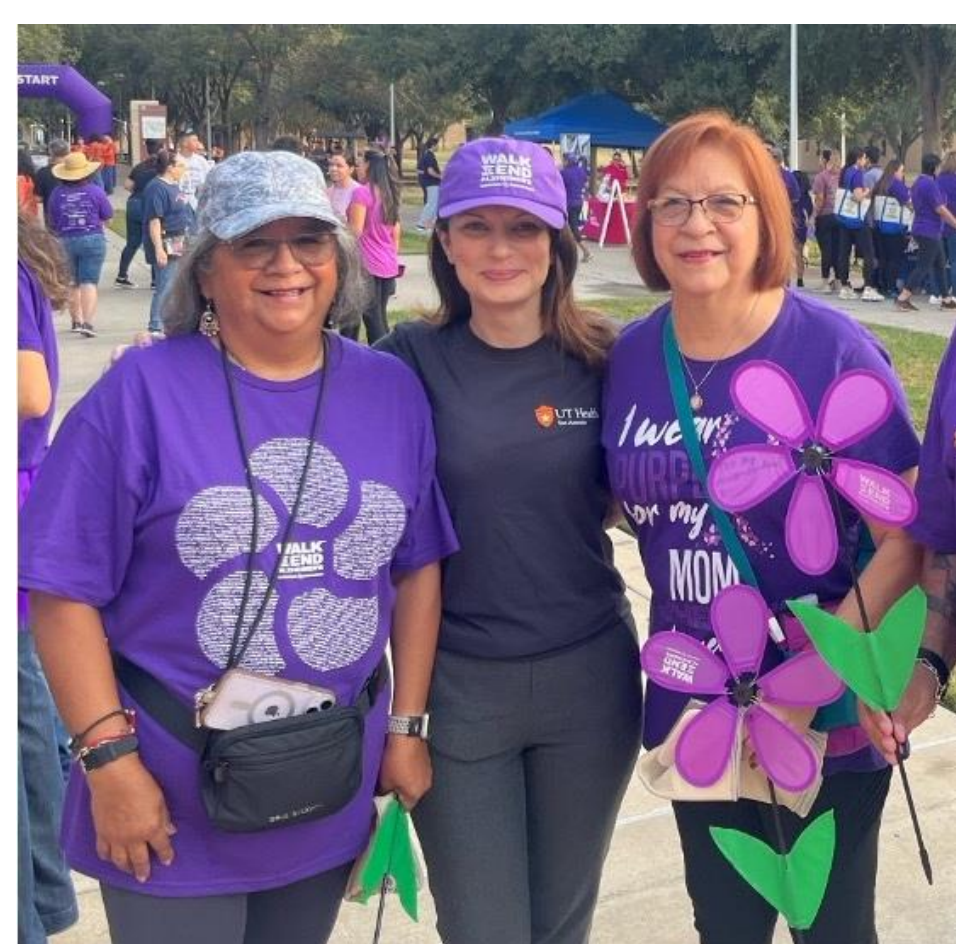
The **COMPADRE-CART** study uses passive home monitoring technology to objectively capture real-world activity patterns in Hispanic/Latinx older adults, a population at elevated risk for Alzheimer's disease and related dementias (ADRD), yet underrepresented in research.

Objectives

Determine whether objectively measured room transitions (in-home mobility) and daily step counts (physical activity) are associated with cognitive performance across domains of global cognition, episodic memory, and semantic fluency.

Population

Hispanic/Latinx older adults aged 62 and older at elevated risk for Alzheimer's disease in South Texas.



Characteristic	n = 92*
Age, years, median (min–max)	70.0 (61.0–81.0)
Education, years, mean (SD)	14.7 ± 2.7
Sex, n (%)	
Male	30 (32.6%)
Female	62 (67.4%)
Primary Language, n (%)	
English	75 (81.5%)
Spanish	17 (18.5%)
MoCA total score, median (min–max)	24.0 (13.0–30.0)
Single-resident home, n (%)**	26 (28.3%)

Note. MoCA = Montreal Cognitive Assessment; SD = standard deviation. Age and MoCA are reported as median (min–max). Education is mean (SD). Categorical variables are n (%). *Sample with available wearable data. **Sample with completed quality-controlled sensor data.

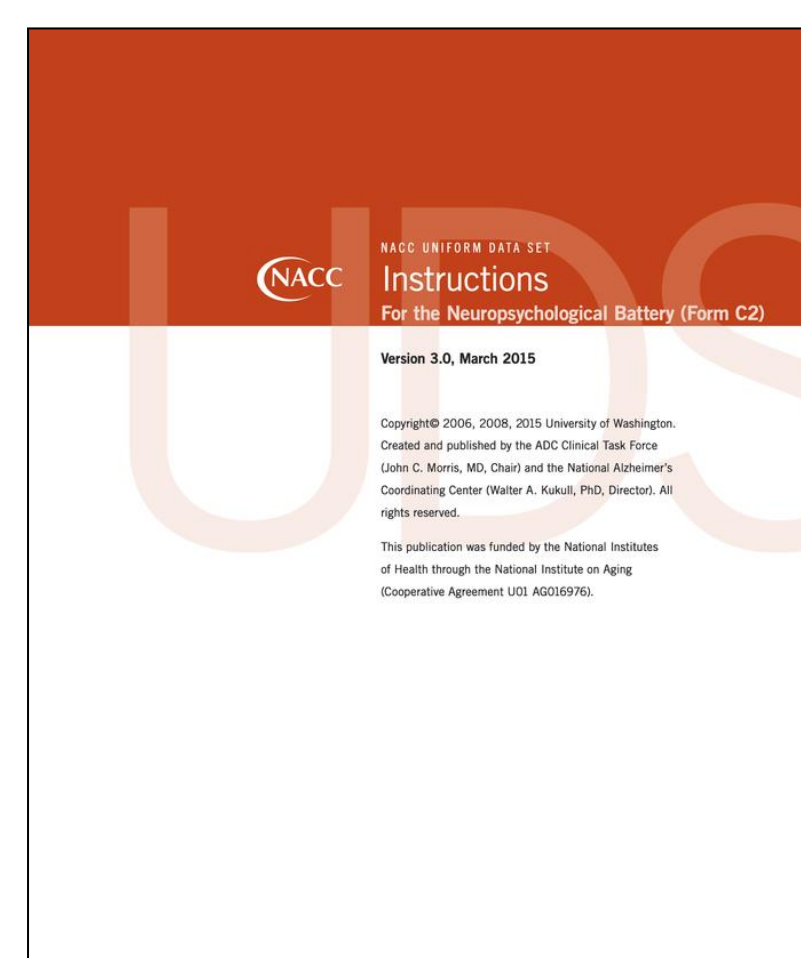
Passive Monitoring



Wireless motion sensors (NYCE) objectively track room transitions and time out of home.

Wearable technology captures real-world physical activity through daily step counts.

Cognitive Assessment



- **Global Cognition:** Montreal Cognitive Assessment (MoCA)
- **Episodic Memory:** Craft Story Immediate and Delayed Recall
- **Semantic Fluency:** Animal Naming

Statistical Analysis

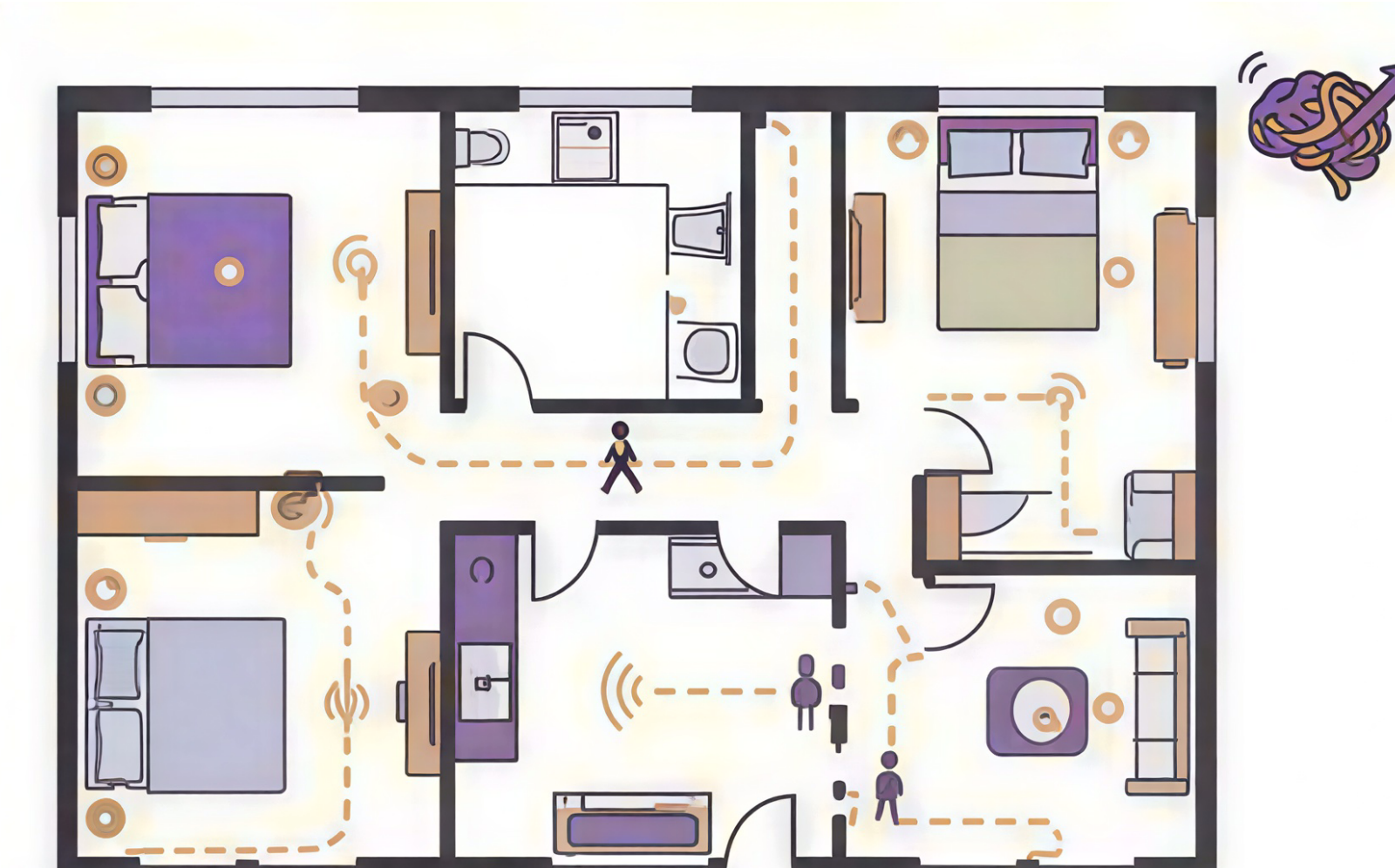
Multivariable linear regression models examined associations between each predictor and z-scored cognitive outcomes, adjusting for age, education, sex, and language of test administration (English/Spanish). In-home mobility analyses were restricted to single-person households (n=26).

Acknowledgments

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Key Findings



In 26 participants, **frequent room transitions** correlate with **better global cognition** ($\beta=0.75$, $p=0.010$) and **episodic memory performance** (immediate recall: $\beta=0.43$, $p=0.004$; delayed recall: $\beta=0.37$, $p=0.016$)



Higher daily steps was associated with **better** performance in **semantic fluency** ($\beta=0.21$, $p=0.028$; $n=92$). **Time outside** was associated with **better semantic fluency** ($\beta=0.39$, $p=0.033$) but **worse episodic memory** (immediate $\beta=-0.41$, $p=0.025$; delayed recall: $\beta=-0.48$, $p=0.006$; $n=26$).

Limitations

Limitations include the cross-sectional design, current small sample for in-home mobility analyses ($n=26$), and potential self-selection bias inherent to single-person household restriction.

Conclusion & Future Direction

Different activity dimensions map onto different cognitive domains, *mobility within the home onto memory, steps onto fluency*, pointing toward passive monitoring as a tool for domain-specific cognitive surveillance.

Longitudinal analyses will assess whether these patterns predict conversion to MCI or dementia in this cohort.