

BACKGROUND

- Hispanics/Latinos in the U.S. experience disproportionate risk for Alzheimer’s disease and related dementias (ADRD), partly driven by cardiovascular disease (CVD) risk.
- Digital phenotyping may provide scalable, passive markers of neurocognitive and CVD risk in this population.
- The Technology and Brain Health in older Hispanics/Latinx (SALUD-Tech) study examines associations between smartphone and wrist-worn wearable digital behavior metrics and ADRD- and CVD-related outcomes among middle-aged and older Hispanics.
- AIMS:** To examine life-space mobility as a potential digital signature of ADRD risk in in a large sample of Hispanic adults with varying levels of ADRD risk, including mild cognitive impairment (MCI) and CVD risk status.

METHODS

Participants: 240 adults aged 50 - 70 from the San Diego regional area

Cognitive status: 123 (51.3%) met criteria for MCI via traditional neuropsychological testing and 159 met criteria for elevated cardiovascular disease (CVD) risk.

Digital data protocol: 30-day protocol collecting (1) GPS coordinates via smartphone; (2) Activity & sleep data via Fitbits; (3) Screenshot data via screenshots; & (4) keypress data via KeyWise AI. Only GPS data is presented here.

ADRD risk groups were defined by:

MCI status: Impairment in ≥1 cognitive domain (>1SD below reference data on ≥2 tests per domain).

CVD Risk: Presence of ≥2 cardiovascular risk factors (diabetes, hypercholesterolemia, hypertension, smoking, obesity).

Table 1. Demographic characteristics

	MCI-	MCI+	p-value	CVD-	CVD+	p-value
Age	59.6 (5.7)	59.7 (5.6)	0.99	58.9 (5.5)	60.0 (5.8)	0.15
Sex (female)	90 (76.9%)	87 (70.7%)	0.35	63 (77.8%)	114 (71.7%)	0.39
Years of education	11.3 (4.2)	11.9 (4.1)	0.28	13.3 (4.1)	10.8 (4.0)	0.01
Testing language, Spanish	92 (79%)	92 (75%)	0.58	55 (67.9%)	129 (81.1%)	0.03
Years in U.S.	30.6 (14.4)	33.02 (15.0)	0.23	30.1 (16.7)	32.8 (13.5)	0.23
Acculturation score	3.7 (1.6)	3.5 (1.8)	0.24	3.8 (1.7)	3.5 (1.7)	0.18
Global Cognition	51.3 (3.9)	45.8 (3.8)	0.01	48.9 (4.9)	48.3 (4.6)	0.37
Cardiovascular Risk Factors						
Obesity (BMI ≥30)	58 (49.6%)	55 (44.7%)	0.53	12 (14.8%)	101 (63.5%)	0.01
Diabetes	46 (39.3%)	54 (43.9%)	0.56	4 (4.9%)	96 (60.4%)	0.01
Hypertension	65 (55.6%)	70 (56.9%)	0.94	13 (16.0%)	122 (76.7%)	0.01
Dyslipidemia	66 (56.4%)	80 (65.0%)	0.22	21 (25.9%)	125 (78.6%)	0.01
Current smoker	5 (4.3%)	11 (8.9%)	0.23	1 (1.2%)	15 (9.4%)	0.03
GPS Data						
Days of monitoring	29.5 (11.33)	29.7 (11.6)	0.87	30.3 (10.8)	29.3 (11.8)	0.52
Avg daily distance	37.0 (24.2)	35.3 (28.2)	0.26	42.1 (28.1)	33.1 (24.8)	0.01
Avg life-space	4.5 (7.0)	3.1 (3.1)	0.05	4.1 (7.5)	3.6 (4.0)	0.99
Δ Daily distance	35.0 (26.0)	33.9 (27.2)	0.45	40.0 (30.3)	31.5 (24.0)	0.02
Δ Life-space	4.4 (13.0)	2.5 (2.9)	0.22	4.2 (15.0)	3.0 (4.0)	0.53

RESULTS

Figure 1. GPS mobility by MCI status

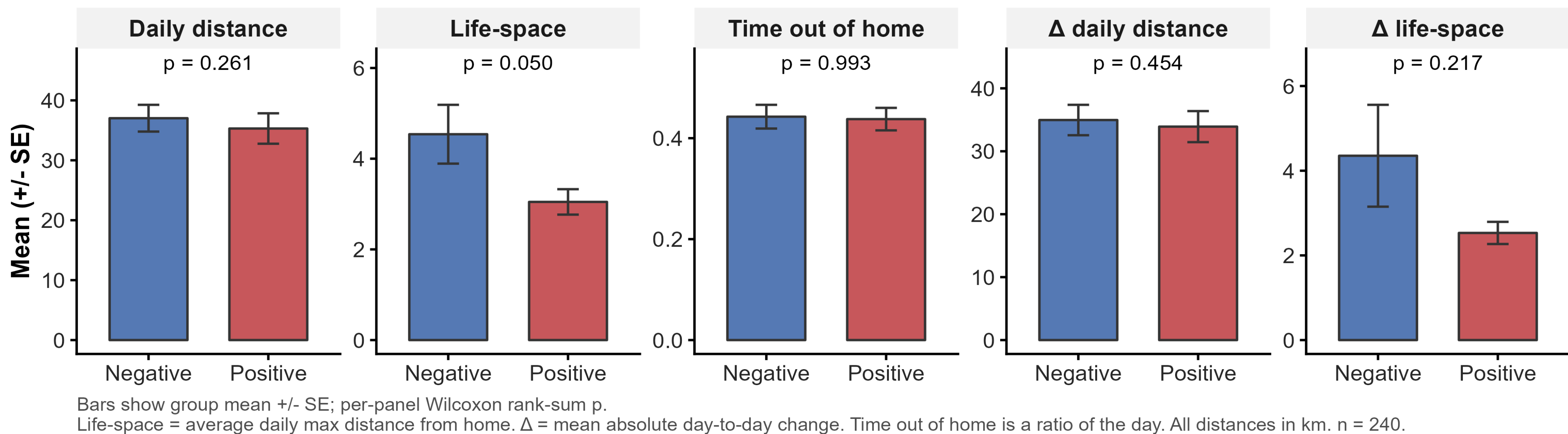


Figure 2. GPS mobility by CVD status

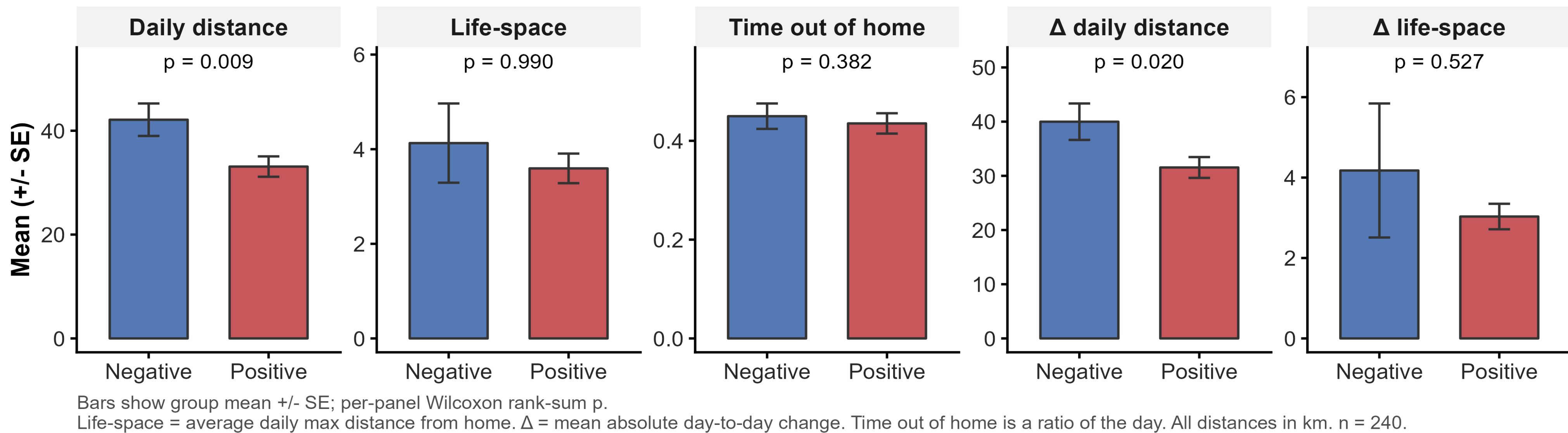


Figure 3. CVD risk factor decomposition

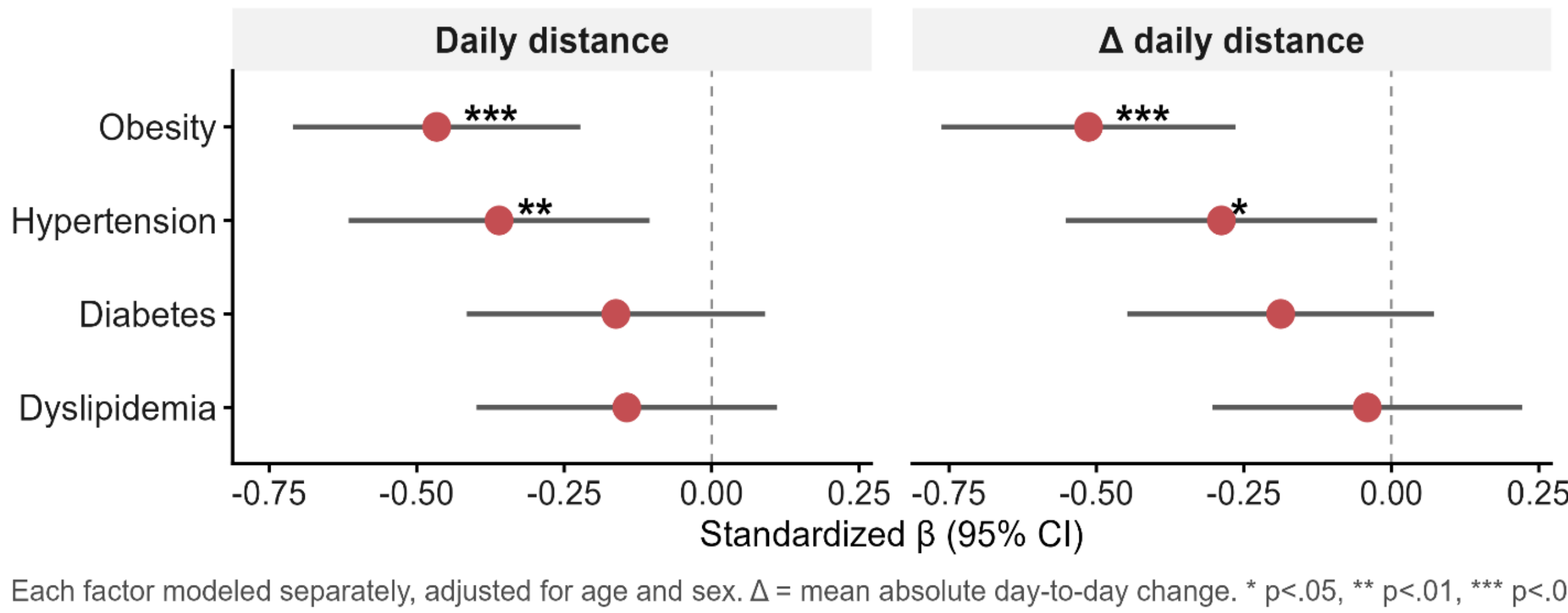
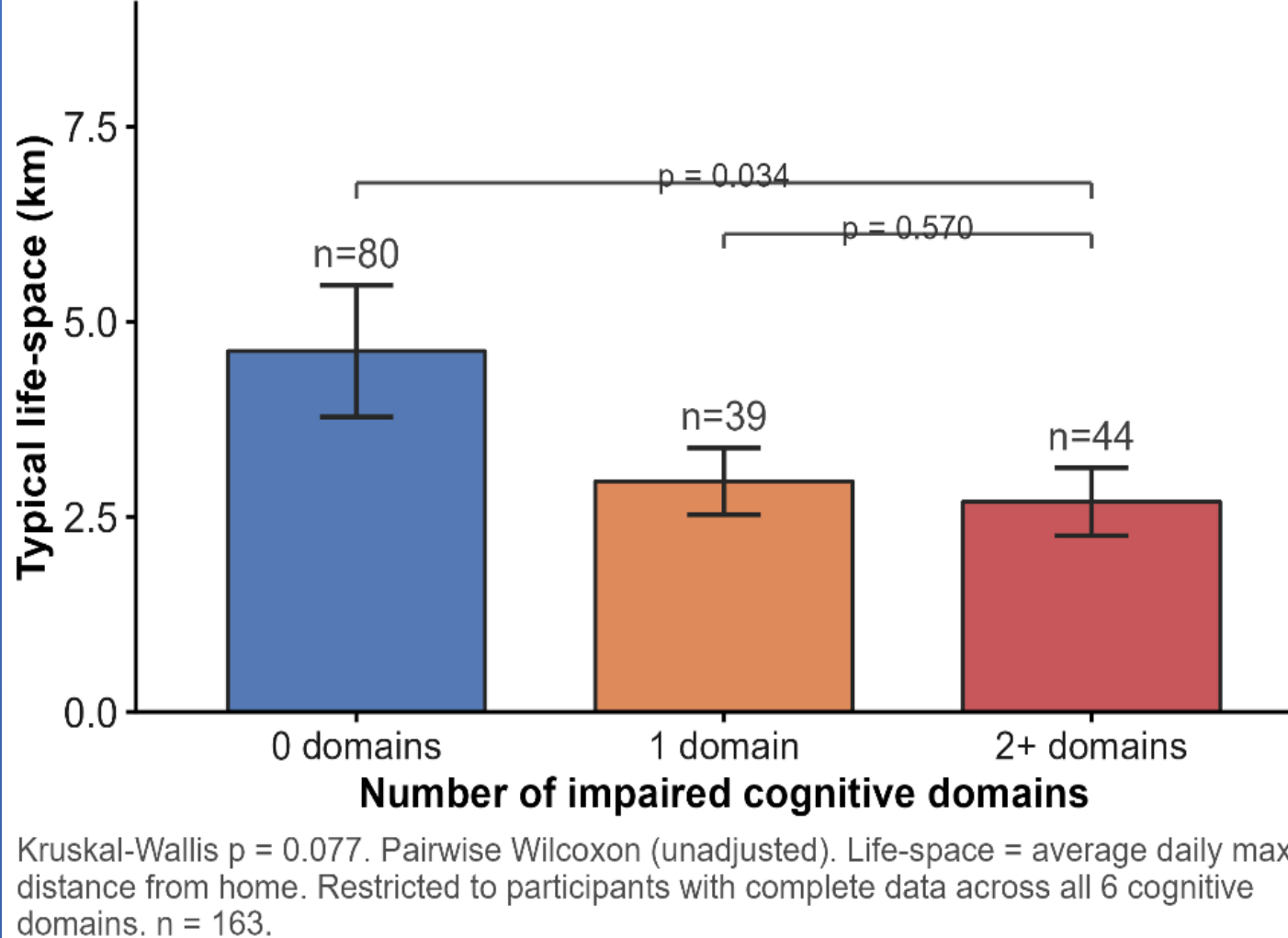


Figure 4. MCI domain burden and life-space



CONCLUSIONS

- GPS-derived mobility metrics may capture meaningful behavioral signatures of ADRD and CVD risk among middle-aged and older Hispanic/Latino adults.
- Reduced life-space was associated with MCI status and appeared to decrease with greater cognitive domain burden, suggesting that mobility range may reflect early functional changes linked to cognitive risk.
- Elevated CVD risk was associated with lower average daily distance and lower day-to-day distance variability, indicating a more restricted mobility pattern among adults with greater vascular risk. Among individual CVD risk factors, obesity showed the strongest and most consistent association with reduced mobility.
- Passive smartphone-based GPS measures may offer a scalable, low-burden approach for identifying mobility-related indicators of cognitive and vascular risk in Hispanic/Latino populations.
- Our ongoing work is examining whether a combination of passive smartphone- & wearable metrics