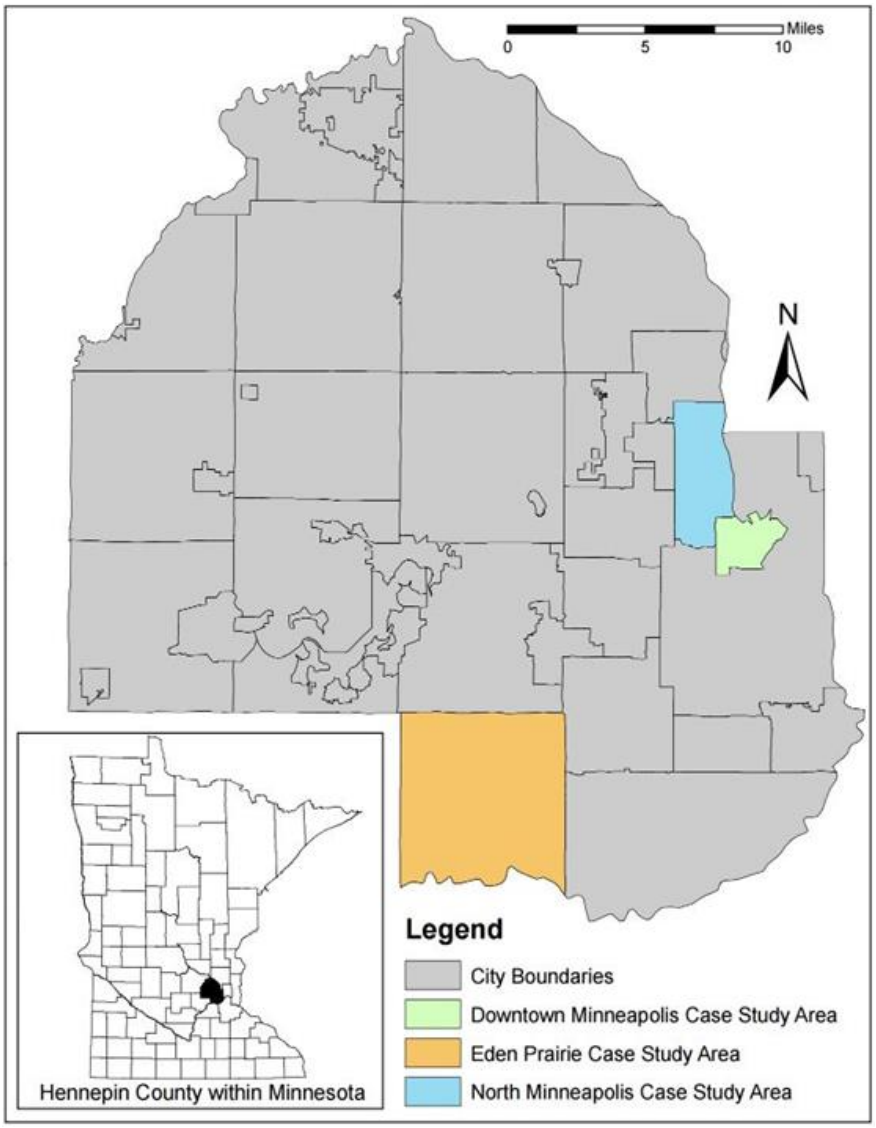
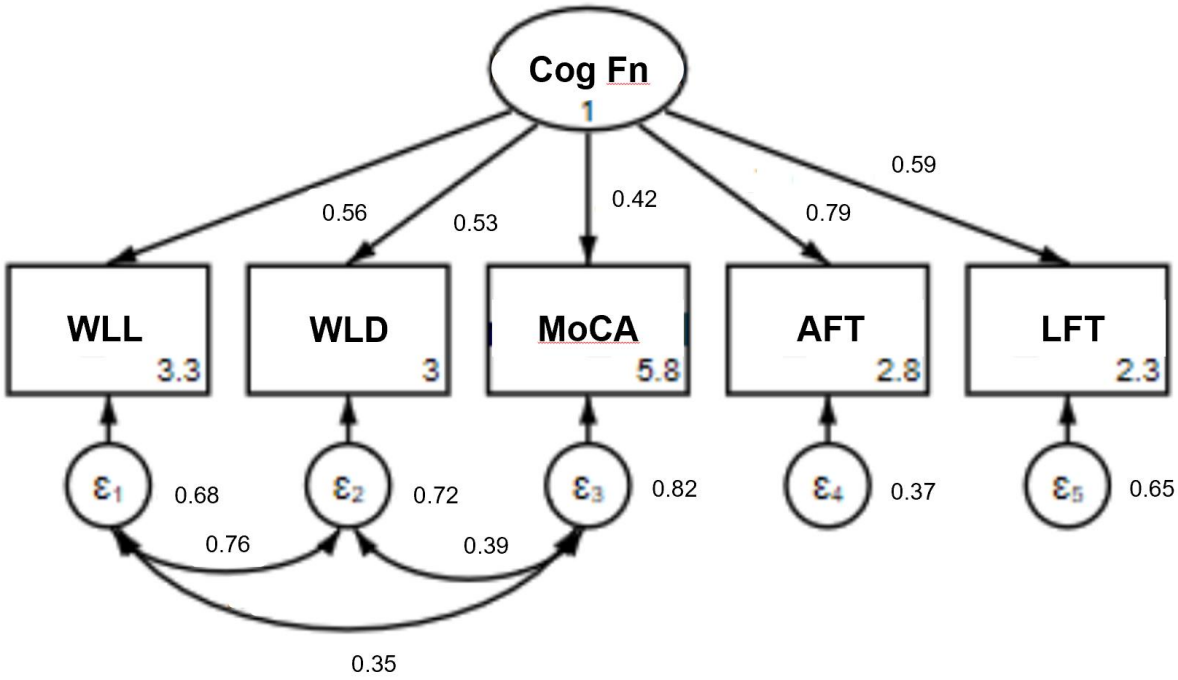
Supplementary Material

Supplementary Figure 1. Case study areas in the Minneapolis metropolitan area, Hennepin County, MN.



Note: The purposive design of the case studies selected for socio-demographic and geographic characteristics. Eden Prairie is a low-density, car-oriented suburban area. It is the wealthiest of the three case study areas. North Minneapolis is a medium-density, urban residential area inhabited primarily by Black residents. It has higher levels of unemployment and socioeconomic disadvantage. Downtown Minneapolis is a high-density, pedestrian-oriented city center. It is socioeconomically polarized between more affluent condo- and apartment-dwelling individuals and lower-income populations residing in subsidized housing and homeless shelters.[58]

Supplementary Figure 2. Global cognitive function factor score.



Note. Cog Fn=Cognitive Function, WLL=Word List Learning cognitive test, WLD=Word List Delayed cognitive test, MoCA=Montreal Cognitive Assessment, AFT=Animal Fluency Test, LFT=Letter Fluency Test. Factor loadings ranged from 0.43 (MoCA) to 0.79 (AFT), and model fit improved when allowing for correlated error among the memory items (WLL, WLD, MoCA) (Root Mean Square Error of Approximation=0.013; Comparative Fit Index=0.999).

Supplementary Table 1. Summary of Semi-Structured Interview Topics and Questions

Interview sections	Semi-structured question topics
Personal Information	i. Background: age, gender, birthplace/time in the US, self-identified race/ethnicity, language, education, marital status, past employment, driving ability ii. Living situation: Housing tenure, length of residence, living arrangement
Physical & Built Environment	i. The local neighborhood: daily routines, perceived boundaries, level of satisfaction, (un)met needs ii. Availability and accessibility of services, mobility iii. Perceived safety and comfort in the home and neighborhood, fall history iv. Planning for the future; perceptions of "aging in place" - expectations, desires, (dis)advantages, barriers; suggestions for neighborhood improvement/investment
Neighborhood and Social Connections	i. Family, friend, and neighbor social interactions and connections ii. Sense of isolation and vulnerability iii. Perceived inclusion/ exclusion with family/ friends and in the community, experiences of ageism
Health and Quality of Life	i. Quality of life, sense of happiness, sources of sadness and/or anxiety ii. Perceptions of aging and getting older iii. Self-perceived health, any concerns, limitations iv. Sense of independence

Supplementary Analysis. Cognitive decline and active aging infrastructure.

To supplement the main analysis, we examined the association between active aging infrastructure and *cognitive decline.* While the primary analysis investigated whether access to active aging infrastructure explained differences in cognitive function *between* respondents, this supplemental analysis examined whether the *rate* at which an individual's cognitive function declined over the course of the survey was, at all, dependent on immediate access to active aging resources. Following the logic of the main text, we hypothesized that older adults living in areas with greater availability of activity-promoting neighborhood resources would decline more slowly than individuals who resided in spaces that lacked said infrastructure.

For this analysis, we again fit a series of Gaussian multilevel generalized additive models to the REGARDS sample. In a first model (*Model 1*), we regressed cognitive function on the controls and random terms described in the main text; a smooth term for each active aging infrastructure resource; and a smooth term for years of follow up from baseline test. In subsequent models, we updated the specification of Model 1 by fitting an interaction among time and each separate physical activity resource: *Model 2* allowed for rate of decline to vary among respondents living in areas with different business densities; *Model 3* fit an interaction among years from baseline test and neighborhood park count; and *Model 4* allowed for rate of cognitive decline, over the course of the study, to vary by recreation amenity kernel density. To allow for flexibility in our 2-dimensional terms, we modeled each interaction using a tensor product smooth.

To discern between models, we used Akaike Information Criterion (AIC).[59] If an individual's rate of cognitive decline was generally conditional on their immediate access to active ageing infrastructure, than a model that fits an interaction among time and active ageing resources should fit the data better than one that excluded said interactions. More precisely, if active ageing infrastructure was associated with cognitive decline among REGARDS participants, than we expect for the AICs of Models 2, 3 and 4 to be smaller than the AIC of Model 1.

Table S2 (below) displays the AICs of each model described above:

Supplementary Table 2: Akaike Information Criterion for alternative models of cognitive decline.

Specification	AIC	$AIC_{Model\ 1} - AIC_{Model\ x}$
Model 1	286,803.8	0.000
Model 2	286,809.2	-5.341
Model 3	286,814.9	-11.021
Model 4	286,804.5	-0.648

Note: Model 1 represents a specification where rate of cognitive decline is independent of access to neighborhood active aging infrastructure. *Model 2, Model 3* and *Model 4* represent specifications where rate of cognitive decline is dependent on neighborhood business density; park count; and recreation center kernel density, respectively. The last column of the table gives the difference in AIC scores between Model 1 and subsequent model fits.

For each physical activity resource, the AIC of a model that *excluded* an interaction among cognitive decline and physical activity infrastructure fit the data better than a model that included said interaction. Thus, according to these data and models, we do not find support for our hypothesis that physical activity infrastructure is associated with cognitive decline.