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Supplement: Social Environment and Cognitive Health in Urban and Rural Areas | **Research Article**

Rationale and study design for the Social Environment and Cognitive Health in Urban and Rural Areas study

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Abstract

Objectives: **The Social Environment and Cognitive Health in Urban and Rural Areas study was designed to examine cognitive health disparities in later life. It gathers data on access to social resources, engagement in cognitively stimulating interactions, and exposure to activity spaces.**

Methods: **We enrolled 510 participants from 41 Indiana counties during baseline data collection in Fall 2023. All participants completed a computer-assisted personal interview survey that collected data on their cognitive, mental, and physical health, personal networks, sociodemographic attributes, occupational history, lifestyle activities, and social support. 273 participants completed a follow-up module in which they used a smartphone to record ecological momentary assessments (EMAs) that were administered 4 times per day for 7 days.**

Results: **The mean age was 69.9 years. Most participants were women (64.5%), White (90.2%), and retired (54.5%). The average participant named 5.38 network members. Participants were at home (70.7%) and alone (60.2%) for the majority of their EMAs. Approximately one third of the sample scored below a recommended cutoff for mild cognitive impairment on the Montreal Cognitive Assessment.**

Discussion: **We conclude by outlining a research agenda that (a) characterizes the social networks, interactions, and place-based activities of participants across geographic contexts, and (b) assesses the potential pathways between a combination of networks, interactions, and activities and cognitive function.**

Keywords: Social interactions, Social networks, Ecological momentary assessments

Increasing longevity has led to a rise in prevalence of cognitive impairment in the United States (Alzheimer's Association, 2024). Yet rates of cognitive impairment are disproportionately higher in rural populations than urban populations (Russ et al., 2012; Weden et al., 2018). A prominent explanation for these geographic disparities is that rural communities limit opportunities for cognitive stimulation via education and occupational pathways (Herd et al., 2021; Lorenzo-López et al., 2017; Weden et al., 2018). Although education and employment are important, recent research argues for a broader focus on the social environment by including the activities in which individuals partake, the places these activities occur, the people with whom they share social ties, and their everyday social interactions (Cagney et al., 2013, 2020; Ferraro & Han, 2025; Letellier et al., 2019; Perry et al., 2022a; Roth, 2020; Zhaoyang et al., 2021). Indeed, several meta-analyses indicate that various aspects of the social environment (e.g., number of friends, participation in social activities, and community characteristics) are linked with cognitive decline (Clarke et al., 2015; Kelly et al., 2017; Piolatto et al., 2022).

The Social Environment and Cognitive Health in Urban and Rural Areas (SECHURA) study was designed to prospectively examine multiple environmental factors that can be used to identify social mechanisms underlying rural-urban cognitive health disparities. The aims of the study are to (a) characterize the social networks, social interactions, and place-based activities of participants across geographic contexts, and (b) assess the pathways between a combination of networks, interactions, and

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activities and participants' cognitive function. This paper describes the design, baseline summary statistics, and strengths and limitations of the SECHURA study.

Study design and procedure

Participants were recruited from a preexisting sample that was collected for the Person to Person Health Interview Study (P2P). The P2P is a state representative omnibus health and wellness study fielded from 2018 to 2021 that used a probability sampling frame to recruit and collect data from 2,685 participants (aged 18 and over) who resided in 41 Indiana counties. Further details on the P2P sample can be found elsewhere (Green & Pescosolido, 2024; Perry, 2021; Railey & Greene, 2024; Railey et al., 2023; Roth et al., 2022).

In Fall 2023, we began recruiting all P2P participants who (a) were 55 years or older, (b) were still residing in Indiana, and (c) agreed to be contacted for follow-up studies. Figure 1 presents a flowchart of participant eligibility status, recruitment procedures, and final participant disposition. Ultimately, 510 of the 868 recruited participants consented to the SECHURA study and completed a CAPI (computer-assisted personal interview) survey between November 2023 and March 2024. Based on the values presented in Figure 1, this corresponds to an AAPOR Response Rate 3 of 61% (American Association for Public Opinion Research, 2023). The mean duration of the CAPI surveys was 79 min ($SD = 30.73$).

After completing the CAPI survey, the field interviewers introduced participants to a follow-up module that requested participants to complete a week's worth of ecological momentary assessments (EMAs). This latter approach leverages smartphone technology that allows participants to respond to questions about their behaviors and perceptions as they are experienced in real-time in their natural environments (Roth, 2024). The EMA module took place as follows:

1) All participants were shown a short instructional video explaining the nature of the EMA module of the study.
2) Two hundred and seventy-three participants consented to the EMA module and installed the LifeData app onto their smartphone. Participants who did not own a smartphone ($n = 80$) were offered a loaner phone to reduce selection bias.
3) For the following seven days after the CAPI survey, the LifeData app began randomly notifying the participants four times per day to respond to an EMA. Each notification was spaced at least 2 hr apart and only came between 8:00 a.m. and 8:00 p.m.
4) Participants were instructed to complete an EMA, which consisted of 8–14 questions, every time they heard a notification.

Internet access was only required during the installation phase of the LifeData app. The SECHURA field interviewers inquired about internet connectivity before scheduling the in-home visit. This allowed them to install the app on a loaner smartphone before visiting the homes of participants without internet access. After installing the app, all data that participants recorded throughout the EMA module were temporarily stored in the smartphone's internal memory. The data were automatically uploaded to LifeData's secure online platform as soon as the smartphone reconnected to the internet.

It is worth noting that there were some notable differences between SECHURA participants who enrolled in the EMA module

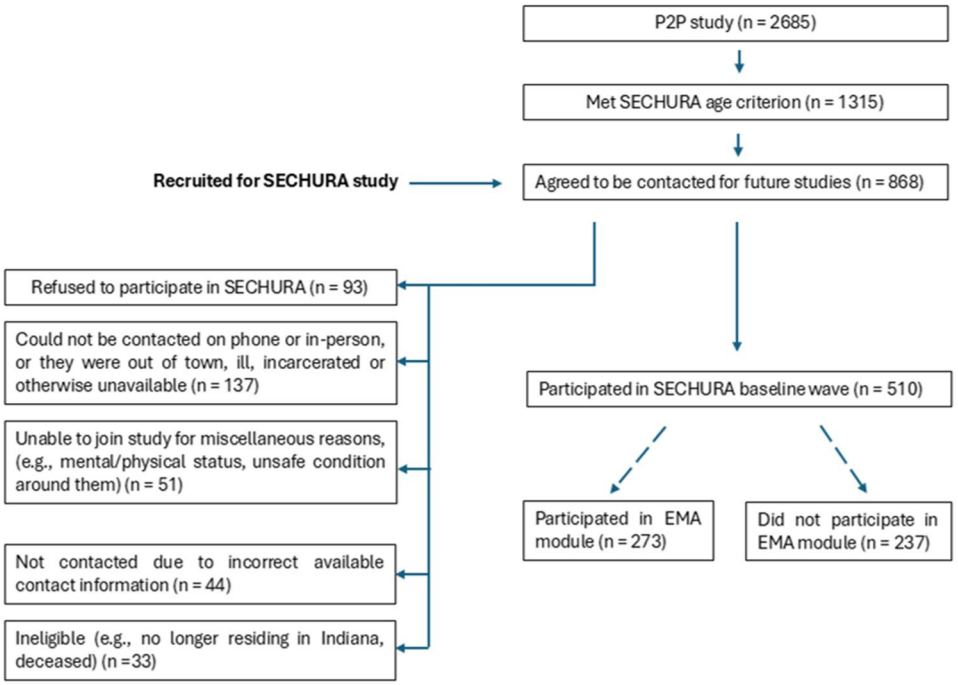


Figure 1 Flow diagram of SECHURA participant recruitment. EMA = ecological momentary assessment; P2P = Person to Person Health Interview Study; SECHURA = Social Environment and Cognitive Health in Urban and Rural Areas. The participants who enrolled in the EMA module (bottom right of the figure; $n = 273$) include those who installed the LifeData app and completed at least one EMA.

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and those who did not. Overall, participants who enrolled were significantly younger, exhibited higher cognitive function, and were more likely to own a smartphone than those who did not enroll in the module. Further details on EMA enrollment and compliance in the SECHURA study are documented elsewhere (Roth et al., 2026).

CAPI survey

The CAPI survey asked participants questions related to the following six domains: (a) personal networks; (b) sociodemographic attributes; (c) cognitive, mental, and physical health; (d) occupational history; (e) lifestyle activities; and (f) perceived social support.

Personal networks

A central theme of the SECHURA study is to understand the social environments in which participants are embedded. Personal networks (i.e., webs of social relationships surrounding focal individuals) constitute a fundamental aspect of the social environment (Perry et al., 2024). We placed the personal network module at the beginning of the CAPI survey to minimize the recall fatigue that occurs when the network module is placed at the end of a survey (Pustejovsky & Spillane, 2009).

Participants were presented with five name-generating prompts that were intended to elicit the names of people who played a specific role in their lives. These name generators asked participants to list (a) "people with whom they discussed important matters," (b) "people with whom they discussed their health" (i.e., health discussants), (c) "people who tried to get them to do something about their health" (i.e., health regulators), (d) people with whom they spent their free time, and (e) people who caused them problems. There was no limit on the number of names that participants could name for each generator. Participants could name the same person across generators. The name generating protocol is adapted from the PhenX Social Network Battery (PhenX Toolkit, 1991).

After populating the personal network, participants were presented with a series of name interpreting prompts. These name interpreters asked participants to report the gender, race/ethnicity, and age of each network member. Participants were also asked how they were connected to each network member (e.g., spouse, romantic partner, child, friend, co-worker), the different types of support provided by each network member (e.g., listens, advises, and lends money), and the strength of their relationship on a scale from 1 to 10.

Finally, participants were asked a series of questions about how well each network member knew the other members. This procedure is especially time-consuming since the number of these questions increases exponentially with the number of network members a participant names. Therefore, we asked only about the relationships among ten randomly selected network members to save time. This method has been shown to produce reliable results with respect to constructing measures of network structure (e.g., density) (Peng et al., 2023). The vast majority (93%) of the SECHURA sample listed 10 network members or less. Therefore, our randomization procedure only applied to 34 participants (7% of the sample). The network module took an average of 17.24 min ($SD = 8.78$) to complete. As expected, participants who named more network members took longer to complete the module ($r = 0.65$).

Sociodemographic attributes

SECHURA gathered data on the following sociodemographic attributes: date of birth, gender (man, woman), and race/ethnicity (White, Black/African American, Hispanic, Asian, American Indian/Alaska Native, Native Hawaiian/Pacific Islander, or Other), marital status (married, divorced/separated, widowed, or never married), employment status (working full time, working part time, temporarily laid off/sick leave/maternity leave, unemployed and looking for work, unemployed and not looking for work, retired, disabled, homemaker, or other), education (less than high school, high school, technical certificate, some college, college degree, or greater), and annual household income including from employment, retirement, pensions, Social Security, and other sources (less than $10,000, $10,000–$24,999, $25,000–$49,999, $50,000–$99,999, $100,000–$149,999, $150,000, or more).

Cognitive, mental, and physical health

Participants next completed a series of assessments and questions designed to measure their cognitive, mental, and physical health. First, participants completed four cognitive assessments: the Montreal Cognitive Assessment (MoCA), the Rey Auditory Verbal Learning Test (AVLT), the Cognitive Change Index (CCI), and the Functional Activities Questionnaire (FAQ). The MoCA is a clinically designed assessment that measures global cognitive function by testing attention, memory, visuospatial ability, abstraction, delayed recall, and orientation to time and place (Nasreddine et al., 2005). MoCA scores range from 0 to 30.

The AVLT is one of the most widely used memory assessments in clinical research and practice (Schmidt, 1996). A list of 15 words (List A) is read aloud for five consecutive trials, and each trial is followed by a free-recall test (Trials 1–5). After the fifth trial, an interference list of 15 different words (List B) is presented, followed by a free-recall test of that list. A free recall of List A (Trial 6) is tested immediately after List B is presented. Finally, a delayed recall of List A is measured 30 min after the immediate recall (Trial 7).

The CCI assesses subjective perceptions of cognitive decline. We use the CCI-5 to evaluate self-reports of memory, executive functioning, language, and attention over the past five years. Participants were instructed to rate each item on a 5-point Likert scale (1 = no change or normal ability, 2 = minimal change or slight/occasional problem, 3 = some change or mild problem, 4 = clearly noticeable change or moderate problem, 5 = much worse or severe problem). Higher scores indicate greater perceived cognitive decline (Rattanabannakit et al., 2016).

The FAQ asks participants to report their degree of difficulty with the following 10 daily activities that require cognitive effort: (a) writing checks, paying bills, or balancing a checkbook; (b) assembling tax records, business affairs, or other papers; (c) shopping alone for clothes, household necessities, or groceries; (d) playing a game of skill such as bridge or chess, working on a hobby; (e) heating water, making a cup of coffee, turning on the stove; (f) preparing a balanced meal; (g) keeping track of current events; (h) paying attention to and understanding a TV program, book, or magazine; (i) remembering appointments, family occasions, holidays, medications; and (j) traveling out of the

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neighborhood, driving, or arranging to take public transportation (Mayo, 2016). Response options included "not applicable (i.e., never did)," "no assistance needed," "have difficulty but can do by myself," "requires some assistance," and "completely dependent."

Mental health was assessed using the 15-item Geriatric Depression Scale (GDS-15) and the three-item short scale adaptation of the UCLA Loneliness Scale. The GDS-15 includes the following 15 questions regarding participants' feelings within the past week: (a) are you basically satisfied with your life? (b) have you dropped many of your activities and interests? (c) do you feel that your life is empty? (d) do you often get bored? (e) are you in good spirits most of the time? (f) are you afraid that something bad is going to happen to you? (g) do you feel happy most of the time? (h) do you often feel helpless? (i) do you prefer to stay home, rather than going out and doing new things? (j) do you feel you have more problems with memory than most? (k) do you think it is wonderful to be alive now? (l) do you feel pretty worthless the way you are now? (m) do you feel full of energy? (n) do you feel your situation is hopeless? and (o) do you think most people are better off than you are? (Yesavage & Sheikh, 1986). GDS scores range from 0 to 15.

The adapted UCLA loneliness scale asked participants (a) "how often do you feel that you lack companionship?," (b) "how often do you feel left out?," and (c) "how often do you feel isolated from others?" These three items, which have been previously validated (Hughes et al., 2004), have a Cronbach's alpha of 0.80 in the SECHURA sample.

Physical health was assessed by asking participants about their activities of daily living (ADLs) as well as their comorbidities. Participants were first asked how much difficulty ("no difficulty," "some difficulty," "much difficulty") they had with the following nine activities: (a) walking one block; (b) walking across a room; (c) dressing (including putting on shoes and socks); (d) bathing or showering; (e) eating (e.g., cutting up food?); (f) getting in or out of bed; (g) using the toilet (including getting up and down); (h) driving a car during the day; and (i) driving a car during the night. These items, which combined to create the ADL scale (Huisingh-Scheetz et al., 2014), have a Cronbach's alpha of 0.83 in the SECHURA sample.

Finally, participants were asked if they had ever been told by a doctor that they had any of the following medical conditions: (a) arthritis; (b) stomach ulcers or peptic ulcer disease; (c) emphysema, chronic bronchitis or chronic obstructive lung disease; (d) asthma; (e) stroke, cerebrovascular accident blood clot or bleeding in the brain or transient ischemic attack; (f) high blood pressure or hypertension; (g) diabetes or high blood sugar; (h) Alzheimer's disease or related dementia; (i) cirrhosis or serious liver damage; (j) HIV/AIDS; (k) leukemia or polycythemia vera; (l) lymphoma; (m) skin cancer, including melanoma, basal cell carcinoma, squamous cell carcinoma; (n) cancer other than skin cancer, leukemia, or lymphoma; (o) poor kidney function; thyroid problems; or (p) enlarged prostate gland (men only).

Occupational history

The next domain asked participants about occupational history. This follows prior research which suggests that the complexity of the jobs that people hold throughout their lives is associated with cognitive function in older adulthood (Andel et al., 2005; Coleman et al., 2023). Participants were first asked about their longest-held job. This could be their current job or a past job. They were asked to provide a job title, an open-ended description of the type of work it entailed, the most important activities in that job, the year they started, and the year they ended. These questions were skipped if the participant had never held a job. This was followed by the same set of questions as it pertained to their second-longest held job. Finally, participants were asked to provide the total number of jobs they worked in their lifetime.

Lifestyle activities

Participants were next asked a series of questions about their routine activities related to their social life, work life, and private life. They were asked how often and for how long they read magazines/newspapers, do crossword puzzles, play card games, do jigsaw puzzles, write, attend lectures/visit museums, practice memory/thinking techniques, sew/knit/crafts, watch TV, listen to the radio, use a computer/tablet/smartphone, play a musical instrument, visit family and friends, and receive visitors in their home. They were next asked about the number of social groups and organizations that they routinely participate in.

Perceived social support

The final domain of the CAPI survey asked participants about their perceptions of social support from family and friends using the multidimensional scale of perceived support (Zimet et al., 1988). Participants were prompted to respond to the following eight items: (a) my family really tries to help me out; (b) I get the emotional help and support I need from my family; (c) my friends really try to help me out; (d) I can count on my friends when things go wrong; (e) I can talk about my problems with my family; (f) I have friends with whom I can share my joys and sorrows; (g) my family is willing to help me make decisions; and (h) I can talk about my problems with my friends. Participants were instructed to respond to these items using a 5-point Likert scale ("Strongly agree," "Agree," "Neutral," "Disagree," "Strongly disagree"). These items have a Cronbach's alpha of 0.87 in the SECHURA sample.

Ecological momentary assessments

The 273 participants who agreed to the EMA module completed a total of 5,586 EMAs. This equates to an average of 20.48 EMAs per participant ($SD = 6.59$) for a 73% compliance rate. See Figure S1 for the distribution of EMAs completed by participants and Figure S2 for the time-ordered trend in compliance rates. Each EMA asked the same series of questions during each session, with the exception of the first EMA of each day, which also asked participants to estimate the number of people they interacted with the prior day. GPS coordinates were gathered for each EMA response. Participants had 20 min to respond to each notification before it expired, with three additional reminder notifications being sent in 5-min intervals. EMAs were considered complete if participants answered all the questions that appeared during the session. The mean time that it took participants to complete an EMA was 1 min and 18 s. A majority of participants (84.0%) completed their EMAs in less than 2 min.

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Each EMA session started by asking participants where they were when they first heard the notification ("my home," "someone else's home," "workplace," "restaurant/bar/café," "store," "place of worship," "library," "park," "somewhere else outdoors," "healthcare facility," "other"). This was followed by asking what they were doing when they first heard the notification ("eating/drinking," "socializing," "relaxing," "working," "shopping," "household chores," "volunteering," "transporting [e.g., car, bus, bike]," "medical care," "other"). Participants were then asked to respond to the following three prompts: (a) "I was being exposed to new information or recommendations when I heard the notification"; (b) "I was being challenged to consider a new perspective when I heard the notification"; and (c) "I was using a lot of cognitive effort when I heard the notification." Each item was accompanied by a 10-point slider scale, with 1 representing the low end (e.g., "no new perspective") and 10 representing the high end (e.g., "completely new perspective"). These three items were intended to measure exposure to stimulating social situations, which are theorized to promote cognitive resilience (Perry et al., 2022a). The Cronbach's alpha for these three items is 0.89 in the SECHURA sample.

Participants were next asked if they were interacting with anyone (face-to-face or via telecommunication) when they heard the notification. This is an important distinction because if they were asked to report who they were with when completing the EMA (as opposed to when they heard the notification), this would likely bias the results to show more participants reporting being alone rather than with someone. If participants reported that they were alone when they heard the notification, the EMA session ended. If they were interacting with someone, there were five follow-up questions. Figure S3 plots the time-ordered trends of the proportion of EMA during which the participants reported being alone. As shown in this figure, there was no clear evidence that participants were any more likely to report being alone in the later stages of their EMA study period compared to the earlier stages.

First, participants who were interacting with someone during their EMA were asked to approximate the number of people they were interacting with. Second, they were asked to list all the types of people they were interacting with ("Spouse/romantic partner," "Parent [include step- or in-law]," "Sibling [include step- or in-law]," "Child [include step- or in-law]," "Grandchild/great-grandchild," "Other relative," "Friend," "Co-worker, colleague, employer, employee," "Neighbor," "Fellow church group member," "Fellow group member [sports, social, leisure club, etc.]," "Fellow volunteer," "Professionals [healthcare provider, lawyer, accountant, etc.]," "Acquaintance," "Stranger [someone you are meeting for the first time]," "Other"). Third, they were asked the mode of communication for that specific interaction ("face-to-face," "telecommunication," "both"). Fourth, participants were asked to estimate the number of people who were nearby during their interaction but whom they were neither talking to nor interacting with.

Finally, participants who were with someone during their EMA were presented with the following three prompts: (a) "My mood was good because of this social interaction"; (b) "I felt stressed because of this social interaction"; and (c) "I felt a close, personal connection during this social interaction." These prompts were intended to capture the psychological impact of social interactions, which are theorized to buffer against cognitive decline (Perry et al., 2022b). Participants were again presented with a 10-point slider to answer each item, with 1 indicating low and 10 indicating high. The Cronbach's alpha for these three items was 0.68 in the SECHURA sample.

Results

Table 1 presents the summary statistics for the sociodemographic attributes of the SECHURA sample. The mean age is 69.9 years ($SD = 9.3$). The majority of participants were women (64.5%), White (90.2%), and retired (54.5%). A plurality of

Table 1 Sociodemographic attributes ($n = 510$).

Variables	*M* (*SD*)/%
Age	69.9 (9.3)
Gender	
Women	64.5
Men	35.5
Race/ethnicity	
White	90.2
Black	7.25
Hispanic	1.37
Asian	0.39
Other	0.78
Education	
<High school	6.08
High school	23.9
Some college	21.8
Technical certificate/associate degree	16.3
College degree+	32.2
Marital status	
Married	43.9
Divorced	28.2
Widowed	21.6
Never married	6.27
Employment status	
Working full time	19.8
Working part time	8.63
Laid off/sick leave/maternity leave	0.20
Unemployed (seeking work)	1.57
Unemployed (not seeking work)	1.37
Retired	54.5
Disabled	10.8
Homemaker	1.76
Other	1.37
Income[a]	
<$10,000	2.94
$10,000–$24,999	23.3
$25,000–$49,999	29.4
$50,000–$99,999	26.5
$100,000–$149,999	6.86
$150,000+	6.27
Did not report	4.71

[a]There were 24 participants (4.71%) who did not report their income. No other variables presented in this table had missing values.

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participants (43.9%) were married, 28.2% were divorced, and 21.6% were widowed. The median household income was $25,000–$49,999, with 29.4% of the sample falling into this category.

Figure 2 presents a map of the 41 Indiana counties where SECHURA participants resided during the baseline wave. There was an average of 12.4 participants per county (*SD* = 13.4). Figure 2 is color-coded according to the Indiana County Classification, which separates the state's counties into three categories—urban (red), rural (tan), and rural/mixed (peach)—based on population size, population density, size of the county's largest municipality, and a subjective indicator of how Indiana residents viewed their home county (Ayres et al., 2012). The majority of participants resided in either urban (51.4%) or rural (40.2%) counties, as per SECHURA's focus on these two geographic contexts.

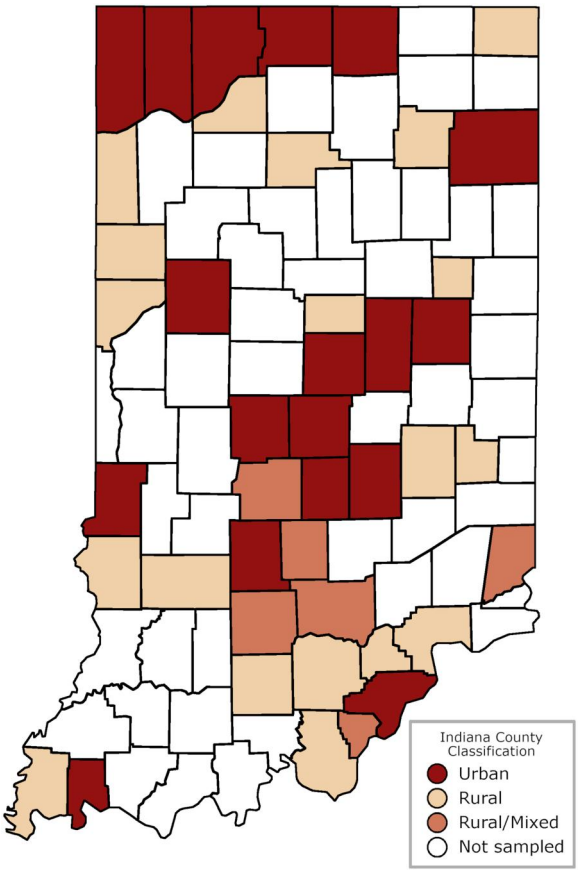


Figure 2 Geographic variation in the SECHURA cohort. SECHURA = Social Environment and Cognitive Health in Urban and Rural Areas. Counties are color-coded according to the Indiana County Classification (Ayres et al., 2012).

The mean MoCA score was 23.7 (*SD* = 4.44). This statistic closely mirrors the mean MoCA value from the National Social Life, Health, and Aging Project (mean = 24.0) that was reported in the most recent wave of data (Zhong & Wroblewski, 2025). Approximately one third (34.1%) of our sample scored below 23, which is a recommended cutoff for mild cognitive impairment (Carson et al., 2018). The mean score was 7.30 (*SD* = 2.37) for the AVLT immediate recall and 6.73 (*SD* = 3.94) for the AVLT delayed recall. These values represent the correct number of words that participants recalled from the list of 15 words. The mean loneliness score (1.52) and GDS-15 score (2.94) were relatively low. These variables were both positively skewed, indicating that most participants reported low levels of loneliness and few depressive symptoms. The mean ADL score was 0.26 (*SD* = 0.33). The average participant reported 2.89 comorbidities (*SD* = 1.91); only 6.3% reported zero comorbidities. See Table S1 for further information on the health statistics.

The average participant named 5.38 network members (*SD* = 2.93). Only two participants did not name a single network member, whereas the majority (60.8%) named between three and six network members. The mean network density, which can only be calculated for networks that have at least 2 members, was 0.76 (*SD* = 0.26). In other words, 76% of all possible connections between members were present in the average participant's personal network. The mean diversity was 3.10 (*SD* = 1.22), which means that the average participant was connected to three different types of network members (e.g., spouse, friend, and co-worker). See Table S2 for further information on the network statistics.

Figure 3 shows an example of three personal networks that approximate the SECHURA participants at the 25th, 50th, and 75th percentiles for size, density, and diversity. Network A shows a participant who is connected to three network members (one spouse and two children) who all know each other. These network statistics (size = 3, density = 1.0, diversity = 2) reflect those at the 25th percentile for the SECHURA sample. Network B shows a participant who is connected to five network members

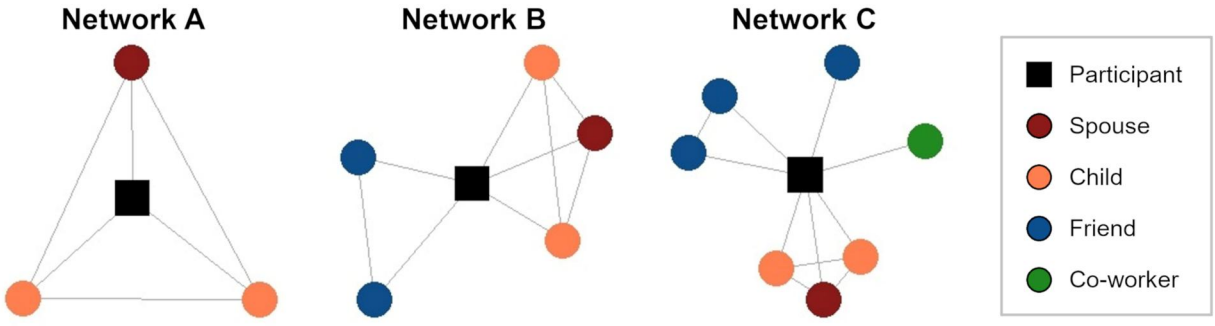


Figure 3 Example of three personal networks from the SECHURA sample. SECHURA = Social Environment and Cognitive Health in Urban and Rural Areas. Networks A, B, and C approximate the network attributes at the 25th, 50th, and 75th percentiles of the sample, respectively.

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(one spouse, two children, two friends), most of whom know each other. These statistics (size = 5, density = 0.80, diversity = 3) reflect those at the 50th percentile of the SECHURA sample. Network C shows a participant who is connected to seven members (one spouse, two children, three friends, and one co-worker), only some of whom know each other. These statistics (size = 7, density = 0.60, diversity = 4) reflect those at the 75th percentile of the SECHURA sample.

The majority of participants engaged in the following activities either daily or weekly: reading newspapers, writing, watching TV, listening to the radio, using a computer or smartphone, visiting family/friends. A minority of participants frequently played crossword puzzles, card games, or jigsaw puzzles, attended lectures or went to museums, sewed or knitted, or played a musical instrument. Meanwhile, the mean score on the perceived social support scale was 4.16 (out of 5.0) ($SD = 0.64$). In other words, the SECHURA sample perceived high levels of support from their family and friends. Table S3 presents summary statistics for the lifestyle activities.

Table 2 summarizes the distribution of key EMA variables. The average participant completed 20.48 EMAs ($SD = 6.59$). The most commonly reported activity was relaxing (27.9%), followed by paid work (14.6%), other (14.1%), and eating/drinking (13.8%). The majority of EMAs occurred at home (70.7%). The workplace was the next most common location (9.54%), followed by other (5.15%), someone else's home (4.46%), and the store (3.15%). Participants were alone for the majority of EMAs (60.2%). They were with their spouse for 15.1% of the EMAs, with children for 7.03%, and with friends for 6.57%. Approximately one tenth of EMAs (9.35%) occurred in the presence of multiple types of social partners (e.g., spouse and children; friends and neighbors).

Table 2 Ecological momentary assessments (EMAs; $N = 5,586$).

Variables	%
Activities	100.0
Eating/drinking	13.8
Socializing	9.13
Relaxing	27.9
Working	14.6
Shopping	3.90
Household chores	11.4
Volunteering	0.55
Transporting	3.40
Medical care	1.18
Other	14.12
Place	100.0
My home	70.7
Someone else's home	4.49
Workplace	9.54
Restaurant/bar/cafe	2.18
Store	3.15
Place of worship	0.75
Library	0.18
Park	0.18
Somewhere else outdoors	2.31
Healthcare facility	1.41
Other	5.15
Social interactions[a]	113.5
Alone	60.2
Spouse/partner	15.1
Parent	1.70
Sibling	3.26
Child	7.03
Grandchild	3.90
Other relative	2.93
Friend	6.57
Co-worker	5.03
Neighbor	0.52
Church member	0.81
Group member	0.48
Volunteer	0.21
Professional	1.56
Acquaintance	0.54
Stranger	1.29
Other	2.40

[a]Percentages for social interactions sum to more than 100% because participants could report multiple partner types during a single EMA.

Discussion

The SECHURA study offers three innovations that will contribute to research on the social determinants of cognitive function in later life. First, it consists of a state representative sample of older adults residing in urban and rural areas to study geographic disparities in cognitive health. Few studies use probability samples of rural and urban residents to explore such disparities. Although existing urban-centric studies lend valuable insights into the social mechanisms of cognitive impairment, it is unclear whether previously identified mechanisms operate to a similar degree in rural areas. Second, many of the variables used in this sample overlap, either partially or completely, with those used in preexisting large-scale surveys of older adults (e.g., National Social Life, Health, and Aging Project; Health and Retirement Study; Midlife in the United States; and Wisconsin Longitudinal Study). Table S5 offers a side-by-side comparison of the main variables used in SECHURA and how they may be harmonized with variables from other studies. Third, the SECHURA study adopts a multi-level approach to studying the social environment, considering where participants live, whom they are connected to, and their daily interactions, activities, and mobility patterns. Collectively, these data will allow us to identify specific aspects of the social environment that relate to cognitive function among older adults in rural and urban areas.

There are, however, several methodological limitations to the study. First, there is a possibility that participants may have experienced difficulty with the network module (e.g., misinterpreting the prompts or forgetting to name specific people) (Bernard et al., 1984; Brewer, 2000). Although this concern may become especially pertinent when dealing with an older population, we saw no clear evidence of it in the SECHURA sample. Moreover, it has been documented elsewhere that older adults with mild cognitive impairment are neither more nor less likely than cognitively normal older adults to systematically omit members

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from their networks (Roth et al., 2021). Second, all participants were asked to respond to four EMAs for seven days, but approximately half did not participate in this module. This may have introduced response bias as there is prior evidence that SECHURA participants who were older, scored lower on the MoCA, and did not own a smartphone were less likely to enroll in the EMA module (Roth et al., 2026). Third, the intention of the EMA module was to provide a detailed view of their daily lives. However, EMAs are often not fully representative of daily life because participants may be systematically unresponsive to notifications that come when they are engaged in certain activities (e.g., socializing and physical activity) (McLean et al., 2017; Peng et al., 2026; Rintala et al., 2020). It is also possible that one week was not long enough to capture the "normal" routines of participants. We limited the EMA module to one week to avoid overburdening participants. Yet there was still some evidence of non-compliance during the EMA module, despite our attempt to alleviate participant burden. There is currently no standard approach to addressing missingness in EMA studies (Stone et al., 2023).

Overall, the SECHURA study offers a promising venue for gerontological research. It will enable interested researchers to leverage these data to study cognitive health disparities as well as other dimensions of health and social life that are likely to occur in older adulthood. Data will be made available upon request at a future date. Prospective users are advised to check the SECHURA website for updates (www.sechurastudy.org). We close by reminding the reader that SECHURA is a prospective cohort study that is scheduled to collect a new wave approximately two years after baseline. The longitudinal nature of this study will allow for exploration into the dynamic pathways leading to cognitive decline in older adulthood.

Supplementary material

Supplementary material is available at *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* online.

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Conflicts of interest

A. R. Roth is the organizer of the supplement in which this article is published but was not involved in the manuscript's review process or decision to accept it for publication. Other authors have no conflicts to declare.

Data availability

This study was not preregistered. SECHURA data will be made available upon request at a future date.

Ethics approval

The SECHURA study was approved by the Institutional Review Board at Indiana University (IRB-IUB-16000) and exempted by the Institutional Review Board at Oklahoma State University (IRB-22-351).

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