# Exposure of Neighborhood Racial and Social Composition in Activity Space

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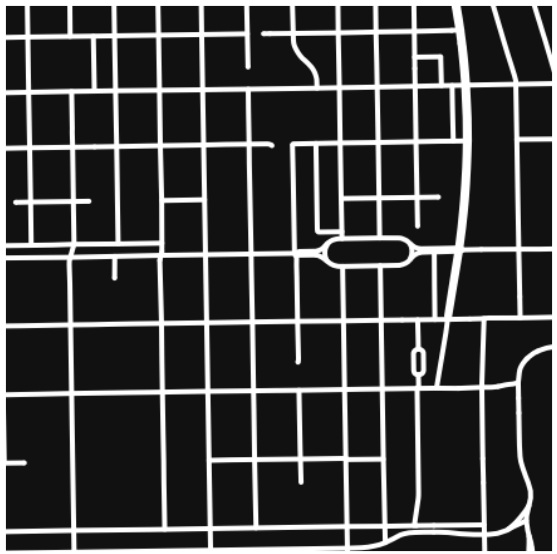
# Overview

1. Introduction
   - Beyond the residential context
   - Isolation vs. Compelled mobility
2. New Measures & Results
   - Measures
   - CHART
   - CMAP
3. Conclusion & Discussion



# Segregation/Exposure beyond the residential context

The literature is predominantly focused on segregation in the **static** residential space (Massey & Denton, 1988). But people experience segregation during routine activities (**dynamic**) that cross the border of their own neighborhood.

These are largely due to data limitations in the past. With activity space data, we can do more!

# Competing hypotheses

Classic *geographic isolation approach:* consistency of segregation across residential locations and activity spaces (Wilson 2012; Wang et al., 2018).

- People tends to be geographically isolated in their residential environment, spatially contiguous contexts, and places that are compositionally similar (homophily)

*Compelled mobility approach:* people are drawn out of their home environment to typically Whiter and more resourced locations to seek resources, even for those residing in Black-segregated neighborhoods (Small & McDermott, 2006; Browning et al., 2022).

# Segregation in Residential & Activity space

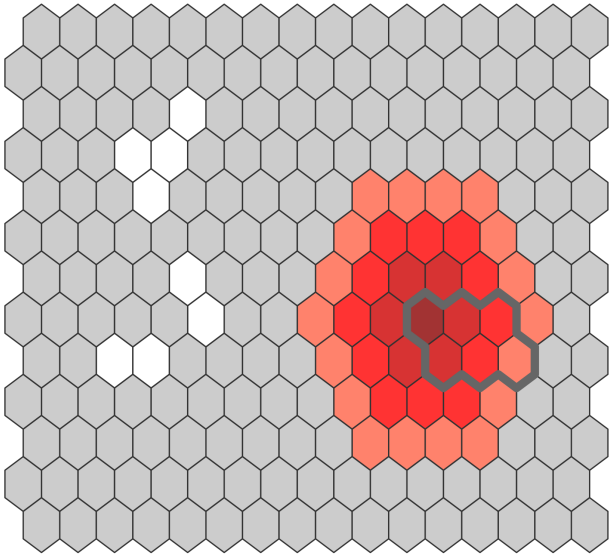
- Home is THE anchor point of routine activities
  - start and end point of trips
  - physical, social, and financial constraints
- Adjust for residential context
- Exclude home activities

# The Current Study

1. understand activity-space-based exposure after accounting for the local context at the **individual** level

2. at the **individual** level, to what extent are any observed tendencies for exposures to deviate from the local context explained by travel related to employment and education, particularly among residents of disadvantaged neighborhoods?

# Graphical Illustration (+MSA)




$$SO_i = \sum_t^{T_i} E_{tij} \cdot w_{ti} - N_i$$

where

$E_{tij}$ represents the characteristic of the neighborhood $j$ person $i$ is located in at time $t$

$w_{ti}$ is a time weight

$N_i = \sum_j^J E_{ij} \cdot w_{ij}$

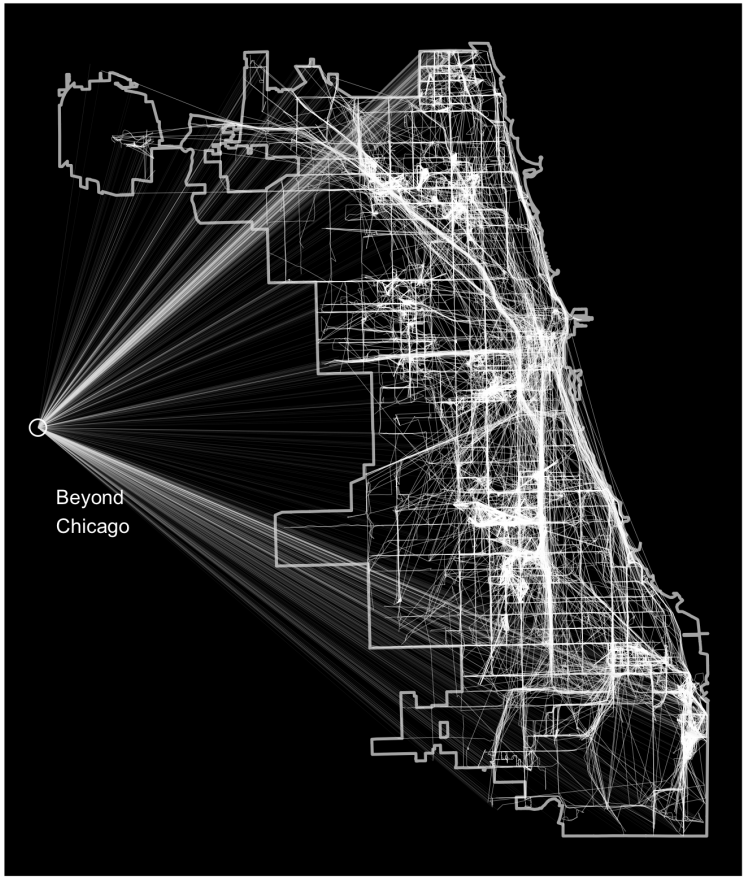
# Data

Two Datasets:

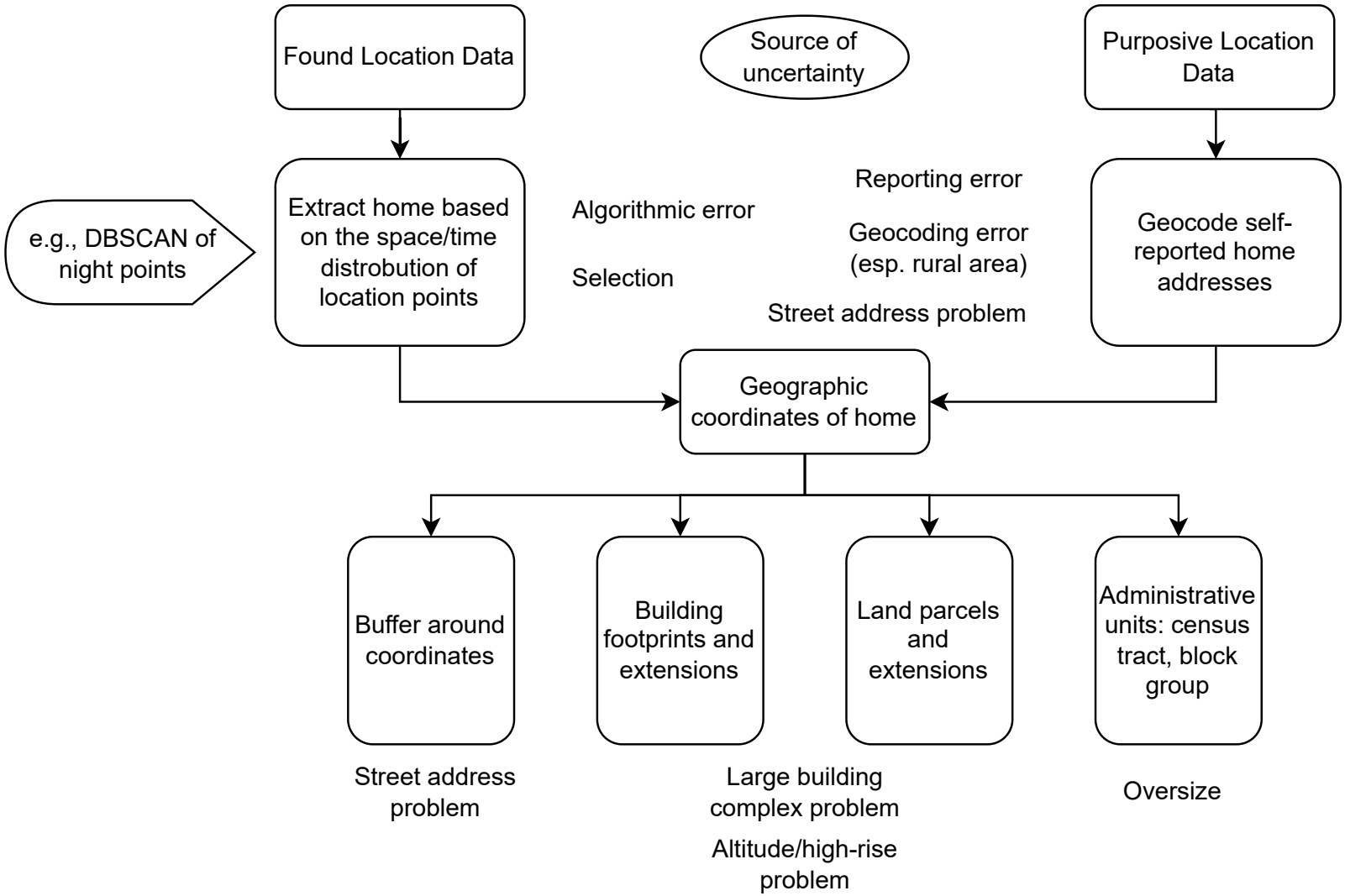
- CHART
  - A probability sample of 450 urban seniors in 10 Chicago NBHD
  - GPS + Ecological Momentary Assessment + Baseline
  - GPS algorithm: 20m geofenced
  - Identify at-home activities: 50m buffer (calibrate against ATS)
- CMAP
  - Non-probability sample

# Data: CHART

- CHART wave 2
- ACS Census Tracts
* (also BG)
- Chicago MSA (99%+)
- Exposure to %White
- Outside home (50m buffer)

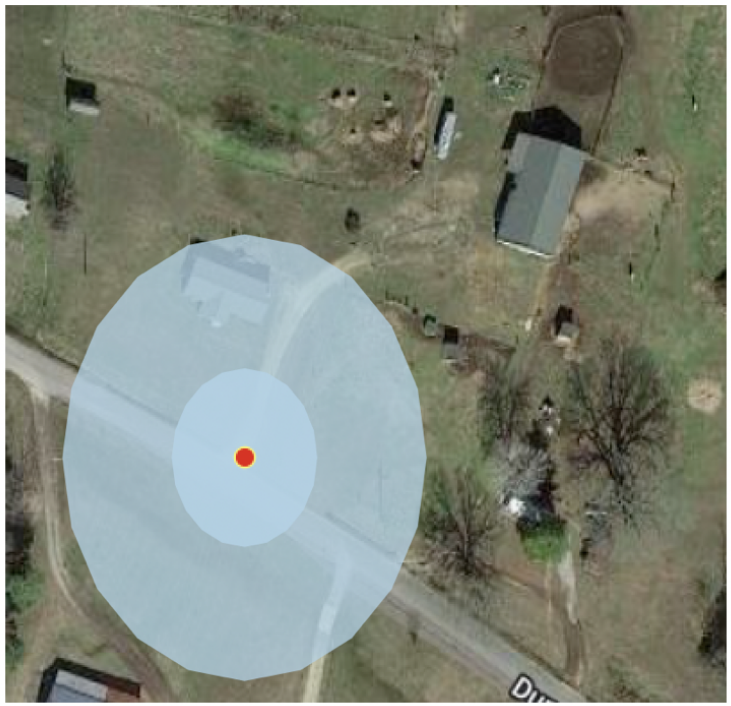


# Sources of Uncertainty in Identifying Home



# Definitions of home

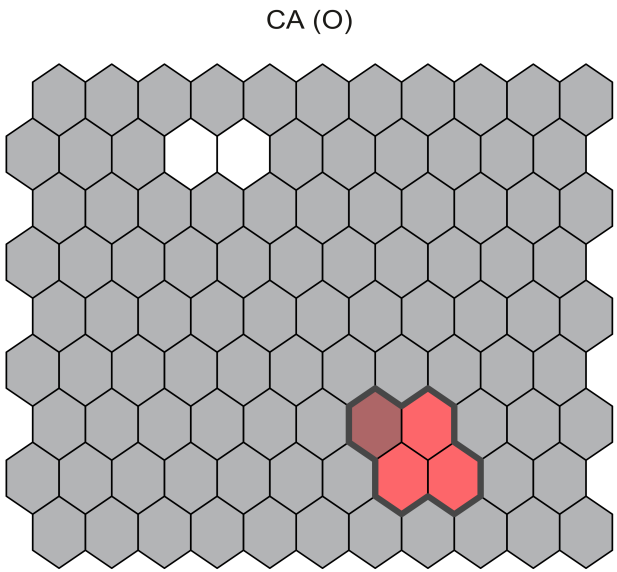
Street address buffer

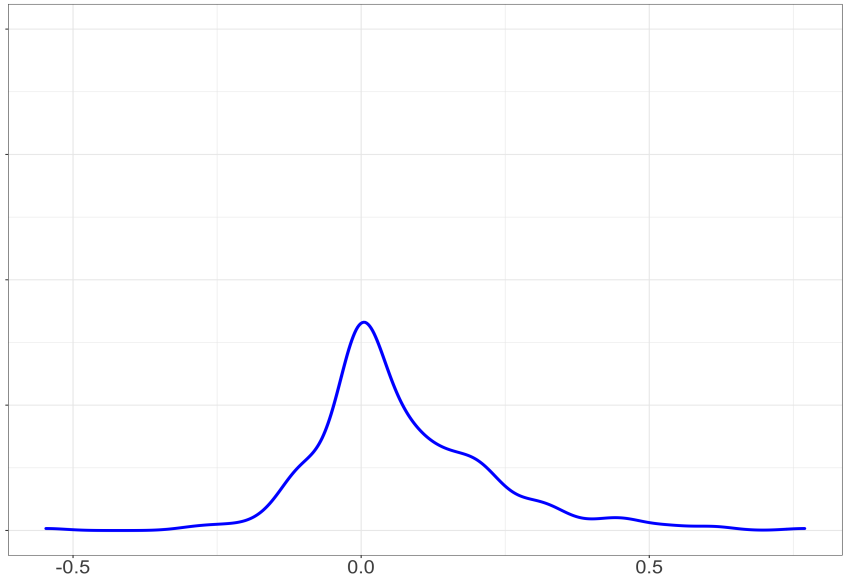


Footprint & parcel

# Results: Community Area CA

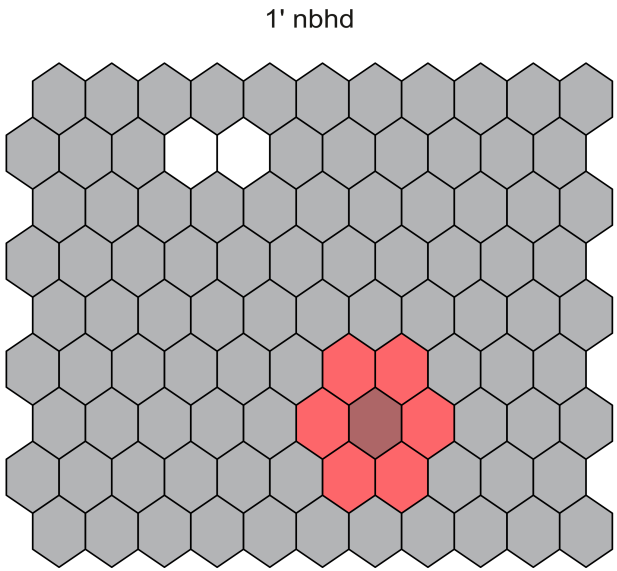
Origin-based Community Area adjustment

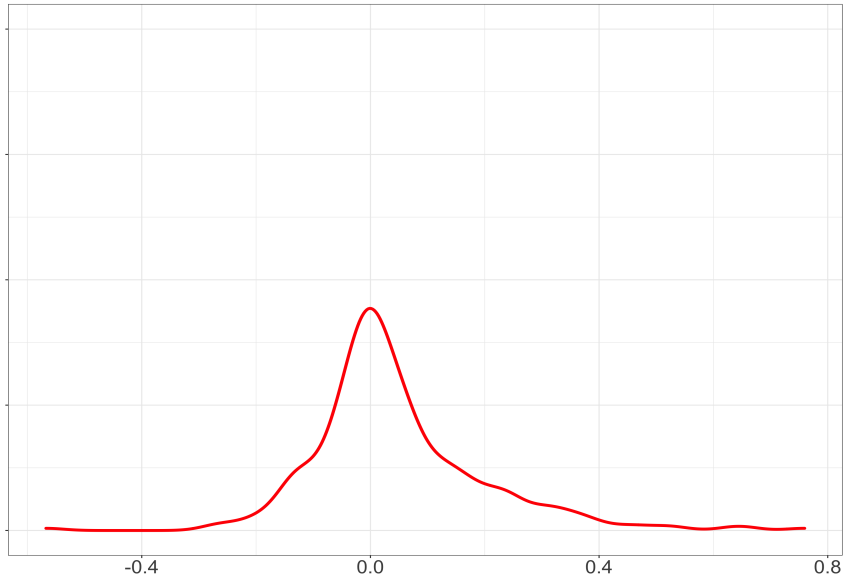


# Results: 1' nbhd

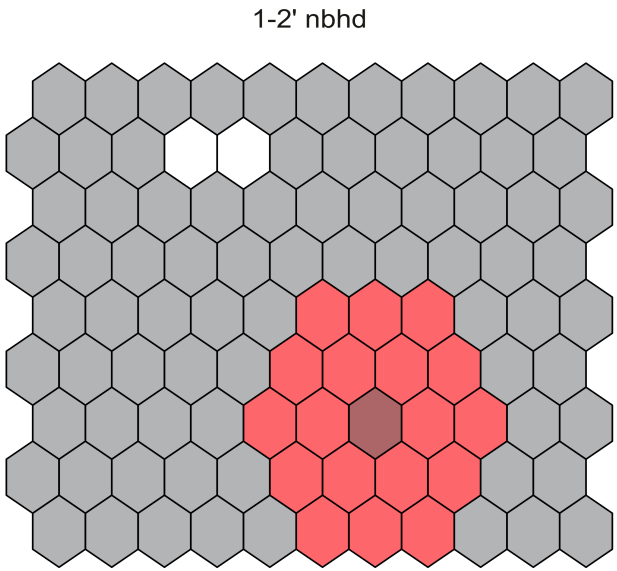
Origin-based 1st order contiguity neighbor adjustment

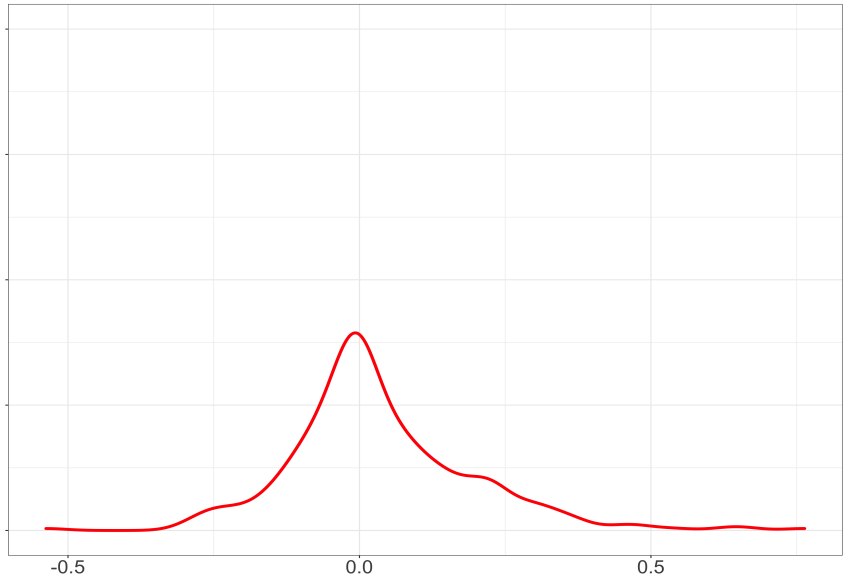


# Results: 1-2' nbhd

Origin-based 1-2nd order contiguity neighbor adjustment



# Residential, activity space, and adjusted characteristics

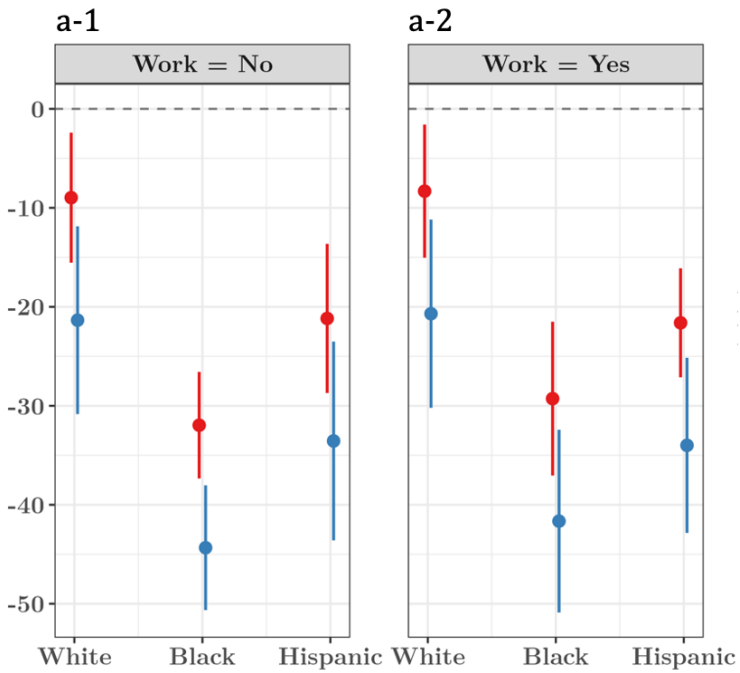
*Characteristics of MSA, City, Residential Context, and Activity Space: CHART (N=287)*

| | %White | %Black | %Hispanic | %Non-Poor | %Non-Poor White |
|---|---|---|---|---|---|
| **Global Ref.** | | | | | |
| Chicago MSA Average | 49.411 (31.613) | 21.400 (31.935) | 21.387 (23.577) | 94.868 (22.069) | 35.604 (47.894) |
| Chicago City Average | 30.604 (29.682) | 36.248 (39.838) | 25.854 (28.726) | 88.889 (31.447) | 14.482 (35.214) |
| **Residential Ref.** | | | | | |
| Home CT | 20.431 (25.132) | 43.973 (41.927) | 30.630 (30.356) | 75.958 (42.808) | 7.317 (26.087) |
| Reference Points (home CT incl.) | | | | | |
| Home Comm. Area | 20.164 (22.677) | 40.308 (38.572) | 34.640 (27.804) | 79.545 (35.479) | 7.016 (21.706) |
| 1' Neighbor CTs | 21.532 (22.041) | 41.913 (36.039) | 30.912 (24.909) | 80.878 (26.778) | 6.742 (21.680) |
| 1-2' Neighbor CTs | 21.840 (20.835) | 41.970 (32.404) | 28.612 (17.491) | 81.973 (20.546) | 6.379 (18.098) |
| 1-3' Neighbor CTs | 22.098 (20.096) | 43.214 (29.687) | 26.570 (13.556) | 82.547 (16.273) | 6.251 (15.567) |
| 1-4' Neighbor CTs | 22.750 (19.568) | 43.638 (28.384) | 25.595 (11.706) | 83.943 (12.966) | 6.555 (13.425) |
| 1-5' Neighbor CTs | 23.628 (18.992) | 42.875 (26.877) | 25.667 (10.267) | 85.476 (10.267) | 7.298 (11.879) |
| **Observed Activity Space** | | | | | |
| Activity Space (non-home) | 25.841 (23.464) | 41.381 (36.637) | 26.146 (23.322) | 80.765 (32.013) | 10.100 (21.574) |
| **Deviation (Observed – Ref.)** [a] | | | | | |
| Chicago MSA | -23.571 (23.464) | 19.981 (36.637) | 4.759 (23.322) | -14.105 (32.013) | -25.5534 (21.574) |
| Chicago City | -4.763 (23.464) | 5.133 (36.637) | 0.292 (23.322) | -8.124 (32.013) | -4.382 (21.574) |
| Reference Points (home CT incl.) | | | | | |
| Home/Origin Comm. Area | 5.676 (13.759) | 1.073 (21.675) | -8.494 (20.575) | 1.220 (29.226) | 2.547 (19.086) |
| 1' Neighbor CTs | 4.309 (13.347) | -0.532 (16.817) | -4.766 (16.134) | -0.113 (23.829) | 2.891 (18.069) |
| 1-2' Neighbor CTs | 4.000 (13.071) | -0.589 (18.049) | -2.466 (15.993) | -1.207 (23.127) | 3.366 (16.756) |
| 1-3' Neighbor CTs | 3.742 (13.253) | -1.833 (20.759) | -0.424 (18.091) | -1.782 (24.056) | 3.505 (16.586) |
| 1-4' Neighbor CTs | 3.090 (13.537) | -2.257 (23.451) | 0.551 (19.045) | -3.178 (25.067) | 3.271 (16.627) |
| 1-5' Neighbor CTs | 2.213 (13.814) | -1.493 (25.767) | 0.479 (20.161) | -4.711 (26.899) | 2.514 (16.897) |

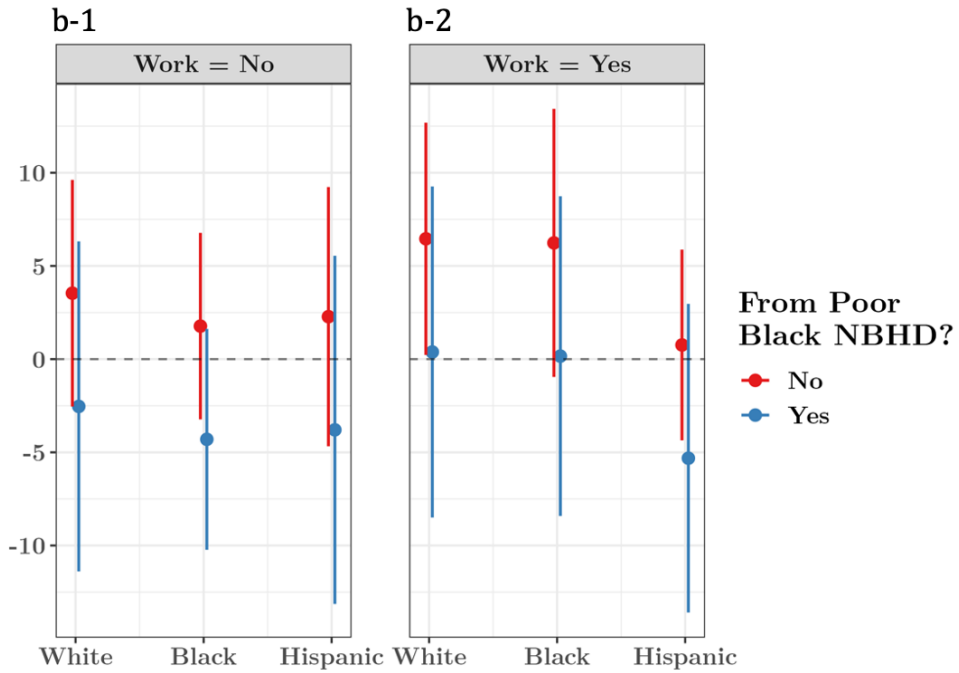
*Note:* [a] Deviation is the difference between average characteristics of all visited contexts and the reference points.
MSA: Metropolitan Statistical Area. CT: Census Tract.
Standard deviations in parentheses.

# Prediction: adjusted exposure to %White

a. MSA Adjustment




b. 1-3' Neighborhood Adjustment



# Data

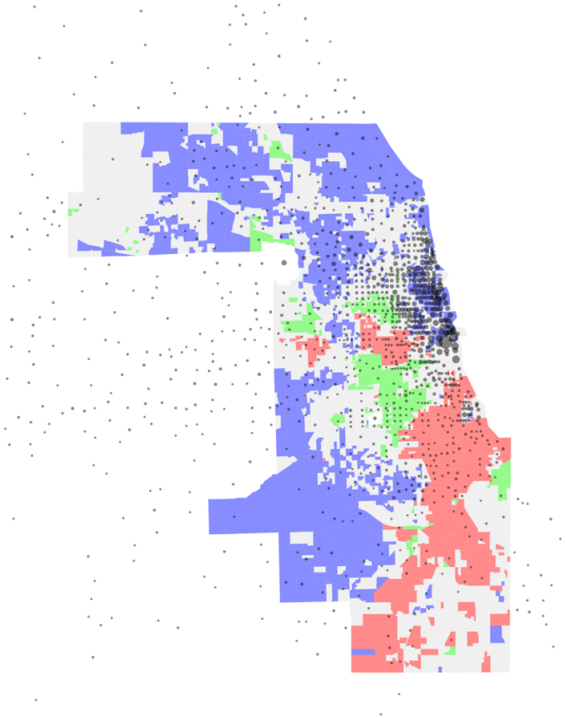
CMAP's **My Daily Travel** project is a large-scale publicly available transportation survey conducted between Aug. 2018 and April 2019. It samples over 12,000 households (head and members) in 8 Chi-MSA counties to ensure a good representation* of the total population in the region.

For the purpose of this study, we focus on respondents who are 1) from the City of Chicago, 2) the first/major participant of the households (one per hh), 3) reporting more than 5 hours non-home time*, 4) black, white, or Hispanic. The analytical sample size is 3,369.

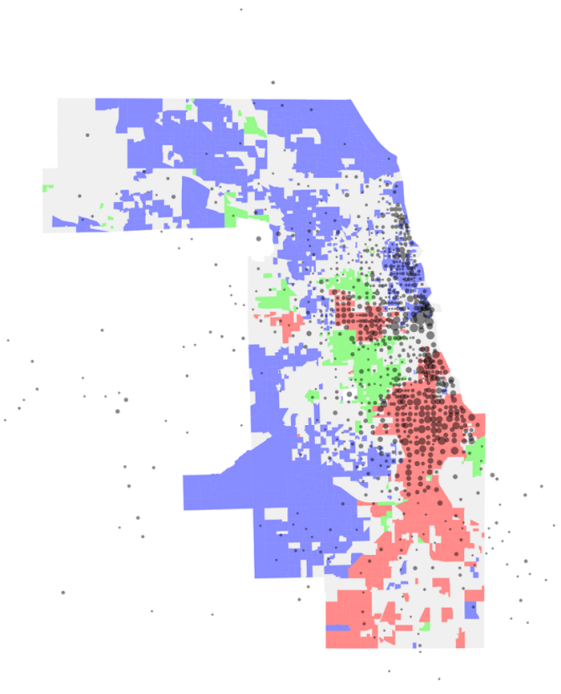
Again, we look at **non-home** activity space. The unit of analysis here is **census tract** as a result of data limitation. We obtain neighborhood characteristics from **ACS** (2018).

# CMAP: Respondents Distribution

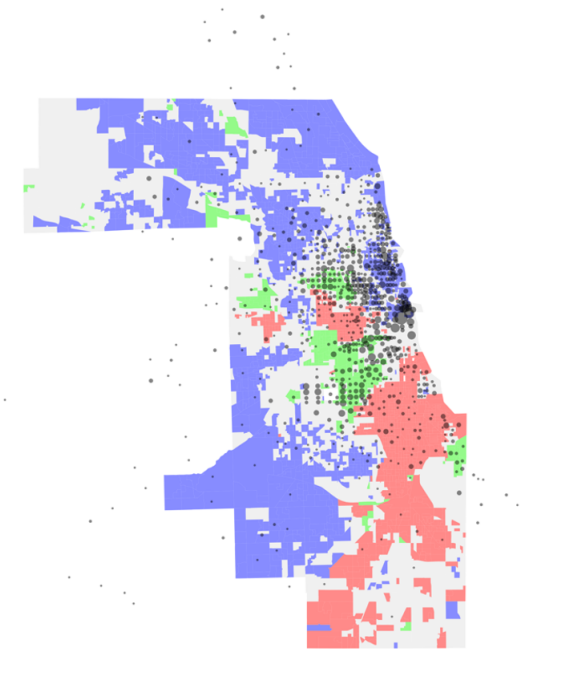
a. Trip Locations of White Respondents



b. Trip Locations of Black Respondents



c. Trip Locations of Hispanic Respondents



# CMAP: Descriptive Stats vs. CHART

| | CHART | | CMAP | |
|---|---|---|---|---|
| | Mean | SD | Mean | SD |
| **Individual Characteristics** | | | | |
| Female | 0.589 | | 0.655 | |
| Age | 74.726 | 6.669 | 37.384 | 13.136 |
| Race | | | | |
| Non-Hispanic Black | 0.505 | | 0.188 | |
| Non-Hispanic White | 0.282 | | 0.690 | |
| Hispanic | 0.213 | | 0.121 | |
| Household Income | | | | |
| Low (<$25,000) | 0.516 | | 0.164 | |
| Medium ($25,000 - $50,000) | 0.394 | | 0.182 | |
| High (>$50,000) | 0.090 | | 0.655 | |
| Education | | | | |
| Less than high school | 0.301 | | - | |
| High school | 0.178 | | 0.089 | |
| Some college | 0.252 | | 0.167 | |
| College [a] | 0.269 | | 0.406 | |
| Graduate degree | - | | 0.337 | |
| Work/School [b] | 0.385 | | 0.928 | |
| **Neighborhood Characteristics** | | | | |
| Poor Black Census Tract | 0.240 | | 0.045 | |
| Non-Poor White Census Tract | 0.073 | | 0.260 | |
| **N** [c] | 287 | | 3,369 | |

*Note:*

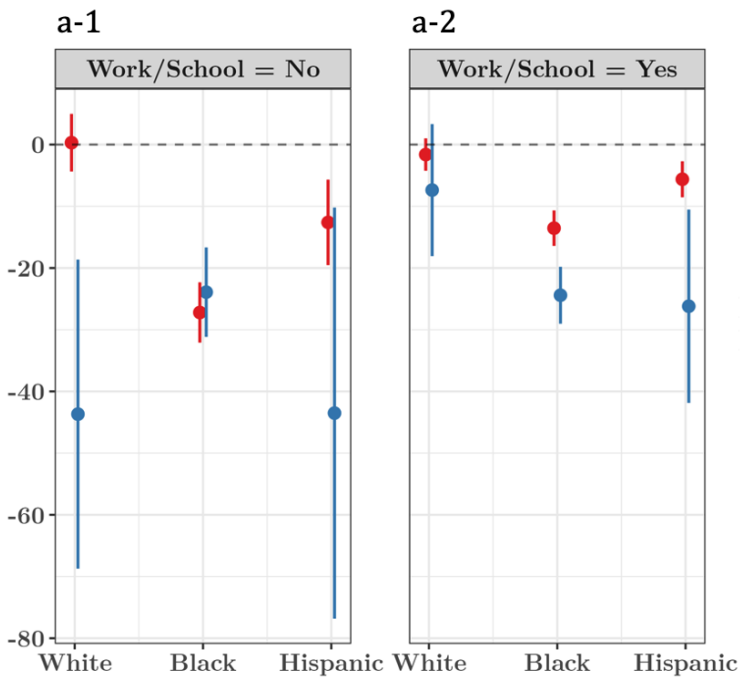
[a] For CHART, this category includes those with higher-than-college education. For CMAP, this group only includes those with college education.

[b] 0 = not employed in any form in CHART. 0 = not enrolled in school or working in CMAP.

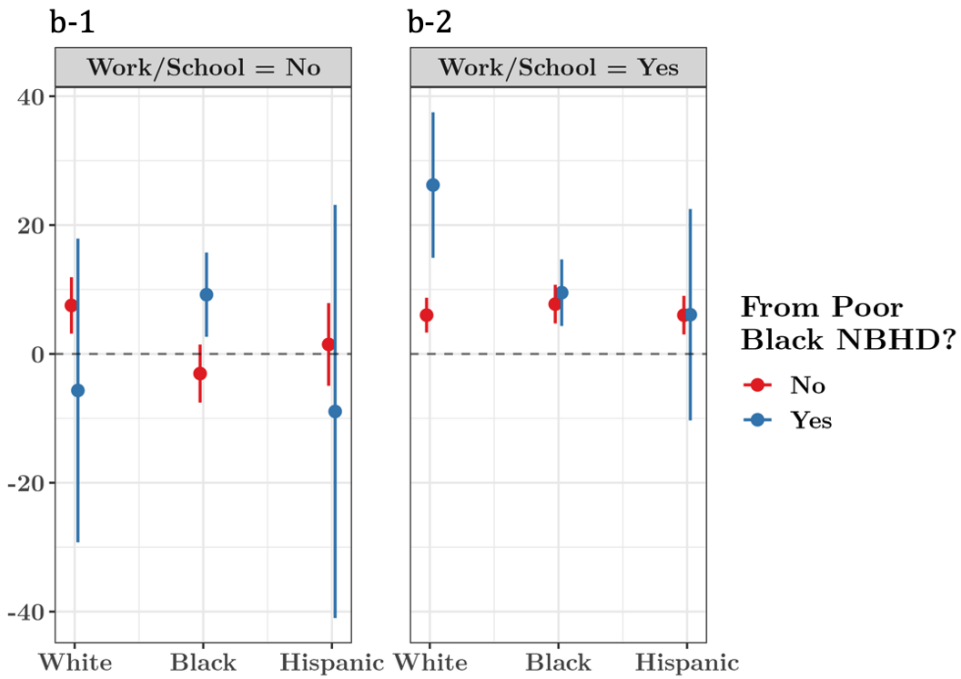
[c] All respondents with valid activity space measures.

# Prediction: adjusted exposure to %White

a. MSA Adjustment




b. 1-3' Neighborhood Adjustment



# Conclusion

- Less segregation in activity space than in residential spaces
- Activity space contexts mimic the racial/ethnic and socioeconomic landscape of respondents' broad residential environment, variously defined
- Even after adjusting for the residential context, people on average are drawn to whiter, less black, and non-poor contexts. There remains non-trivial systematic exposure in where people spend time by race after adjustments

# Conclusion cont.

- After residential-based adjustment, Black younger (CMAP) adults from poor Black neighborhoods are disproportionately drawn out of Black neighborhoods into more affluent and Whiter neighborhoods.
- Older (CHART) adult activity spaces align more closely with their residential areas; however, activity spaces of poor-Black-neighborhood-residing CHART Blacks are systematically poorer and, less consistently, more Black and less White after local area adjustment.
  - Age effect?
  - Cohort effect?
- *Push/Pull factors (job opportunities, institutions, social networks, escape violence, etc.)

# Issues/Puzzles/Limitations

- Samples: urban older adults CHART & non-probability CMAP
- Contextual uncertainty (ever-changing pop. comp. *institutional resources)
- Temporality and co-presence
- Co-presence $\neq$ social interaction: environmental and functional characteristics

# Thank you!

Questions/Comments:

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