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OPERATIONAL DEFINITIONS OF WALKABLE NEIGHBORHOOD: Empirical and Theoretical Insights

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Objectives

- (1) Theoretical frameworks defining neighborhoods
- (2) Measurable attributes of walkable neighborhoods.
    - Thresholds measures
    - Subjective and objective measures
- 3) Implications for urban planning practice
    - existing neighborhoods
    - regulatory frameworks guiding the design of future neighborhoods.
- (4) Implications for future research

Neighborhood, Physical Activity, and Health

- Evidence: socio-physical structure of neighborhoods may relate to sufficient amounts of health-enhancing physical activity and physically active transportation (ALR and transportation research)
- Relevance: “Investigating how places are related to health will require learning to characterize places as well as we have learned to characterize the biology and behavior of people” (Diez 02)

Theory: Conceptualizing Neighborhood

- Community is place-based
- Neighborhood is a spatial, geographically defined construct of place Galster 2001
- “Places and people, with the common sense limit as the area one can easily walk over” (Morris and Hess 1975)
- Practice: Residents and policy makers perceive neighborhoods as meaningful congregations of people with common interests.
- Research: Neighborhoods as key spatial units of intervention, planning, and organization

Theory: Models of Walkable Neighborhood 1930-Present

1. Walkable neighborhood surrounded by a “super block” of arterials
2. Geographic extent: Super block of approx. ½ mile square
3. Neighborhood Center:
    - school, community center and open space (Clarence Perry 1929 and Garden City Movement)
    - retail and open space (Congress for New Urbanism 2000)

Theory: Measuring Neighborhood 1

- "Multiplicity" of definitions: relevant sociologic measures vary by behavior, domain, and outcome of interest (Subramanian, O'Campo, others)
- Temporal dimension (individual life span, time cycles)
- Dynamic: people as consumers and producers of neighborhoods

Theory: Measuring Neighborhood 2

- Four scales (Galster 2001)
    1. block face, or the area over which children can play without supervision
    2. "defended neighborhood," smallest area with a corporate identity contrasted to another area.
    3. "community of limited liability," district represented by a local governmental body, with individual social participation selective and voluntary.
    4. the "expanded community of limited liability," a sector of the city
- Objective (actual) and subjective (perceived) measures

Method: Data

Walk and Bike Communities Project

- A 30-min telephone survey of 608 able-bodied adults randomly sampled from 84 square miles of urbanized King County, WA : Socio-demographic, neighborhood perception, and walking behavior data
- Assessor's GIS files with half-million parcels: More than 200 environmental variables

Methods-Neighborhood Measurements

Walk and Bike Communities Project

- (1) Self-defined attributes of neighborhood from telephone survey
- (2) Objective environmental measures: More than 200 environmental variables considered in the models
    - Within 1km and 3km of respondents' home locations
    - Up to 3km distance to 24 destinations and 11 neighborhood "centers" hypothesized to be associated with walking
    - Airline and Network

Methods-Bivariate

Walk and Bike Communities Project

- Amounts of walking (sufficiently for health)
  - Walking sufficiently (>150 min/week)
  - Walking moderately (<150 min/week)
  - Not walking
- Neighborhood perception (presence or absence of destinations, time distance traveled to destinations)
- Objective measures of individual respondents' physical environment (count of and distance to destinations).
- T-test, one-way ANOVA , Kruskal-Wallis tests

Methods- Multinomial logit models

Walk and Bike Communities Project

- Odds of:
  - Walking sufficiently (>150 min/week)
  - Walking moderately (<150 min/week) (reference)
  - Not walking (reference)
- Base model with survey variables
- Final models with environmental variables

Final Models Pseudo R-square up to 0.47, with one quarter of their overall variations, or more than 10%, captured by objectively measured environmental variables.

Methods-Logistic regression model

Walk and Bike Communities Project

- Dependent variables, odds of:
  - perceiving presence of grocery store, park, and school, in the neighborhood.
- Independent variables:
  - Corresponding objectively measured environmental variables, and
  - Three categories of walking: non walkers, (reference category), moderate walkers, and sufficient walkers

Walkable Neighborhood

Results: Objectively Measured Thresholds

RESPONDENT HOME LOCATION [PARCEL]	
◆ DENSITY OF HOUSEHOLD PARCEL [RES UNITS PER ACRE]	>18.14
SIZE OF THE HOUSEHOLD BLOCK [ACRE]	<7.70
AIRLINE DISTANCE [FEET]	
◆ TO THE CLOSEST GROCERY STORES OR MARKETS	<1545
TO THE CLOSEST EATING OR DRINKING PLACE	<1090
1 KM NEIGHBORHOOOD	
◆ GROCERY STORES OR MARKETS [COUNT]	<3
EDUCATION LAND USES [COUNT]	<5
◆ GROCERY + RESTAURANT + RETAIL NEIGHBORHOOD CENTERS [COUNT]	>2
◆ RESIDENTIAL DENSITY [RES UNITS PER ACRE]	<13.03
SIDEWALK LENGTH ALONG MAJOR STREETS	>52,316
3 KM NEIGHBORHOOOD	
SIZE OF CLOSEST OFFICE ONLY NEIGHBORHOOD CENTER	>12.10
ROUTE DIRECTNESS BETWEEN AIRLINE AND NETWORK DISTANCE TO CLOSEST SCHOOL	73.86

◆ Consistently strong in several models

THRESHOLD MEASURES –IMPLICATIONS FOR URBAN PLANNING

Residential Density 1km Buffer <13dua

THRESHOLD MEASURES –IMPLICATIONS FOR URBAN PLANNING

Resident Parcel Density > 18dua

THRESHOLD MEASURES –IMPLICATIONS FOR URBAN PLANNING

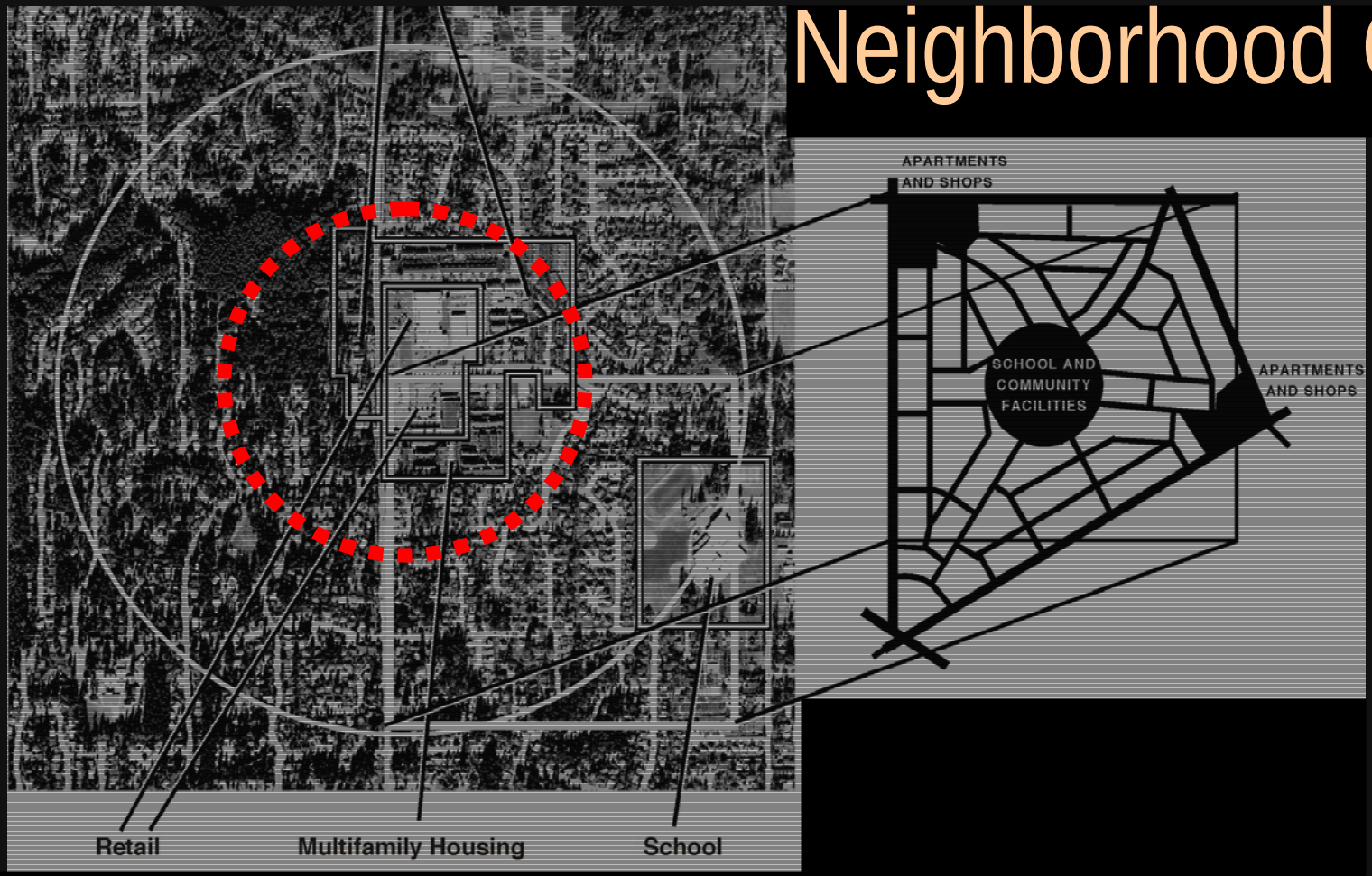
Block Size at Home Location <7a

Queen Anne = 3.8a

Kirkland = 8a

Size of Office Complexes in 3km Buffer <12a

Neighborhood Center

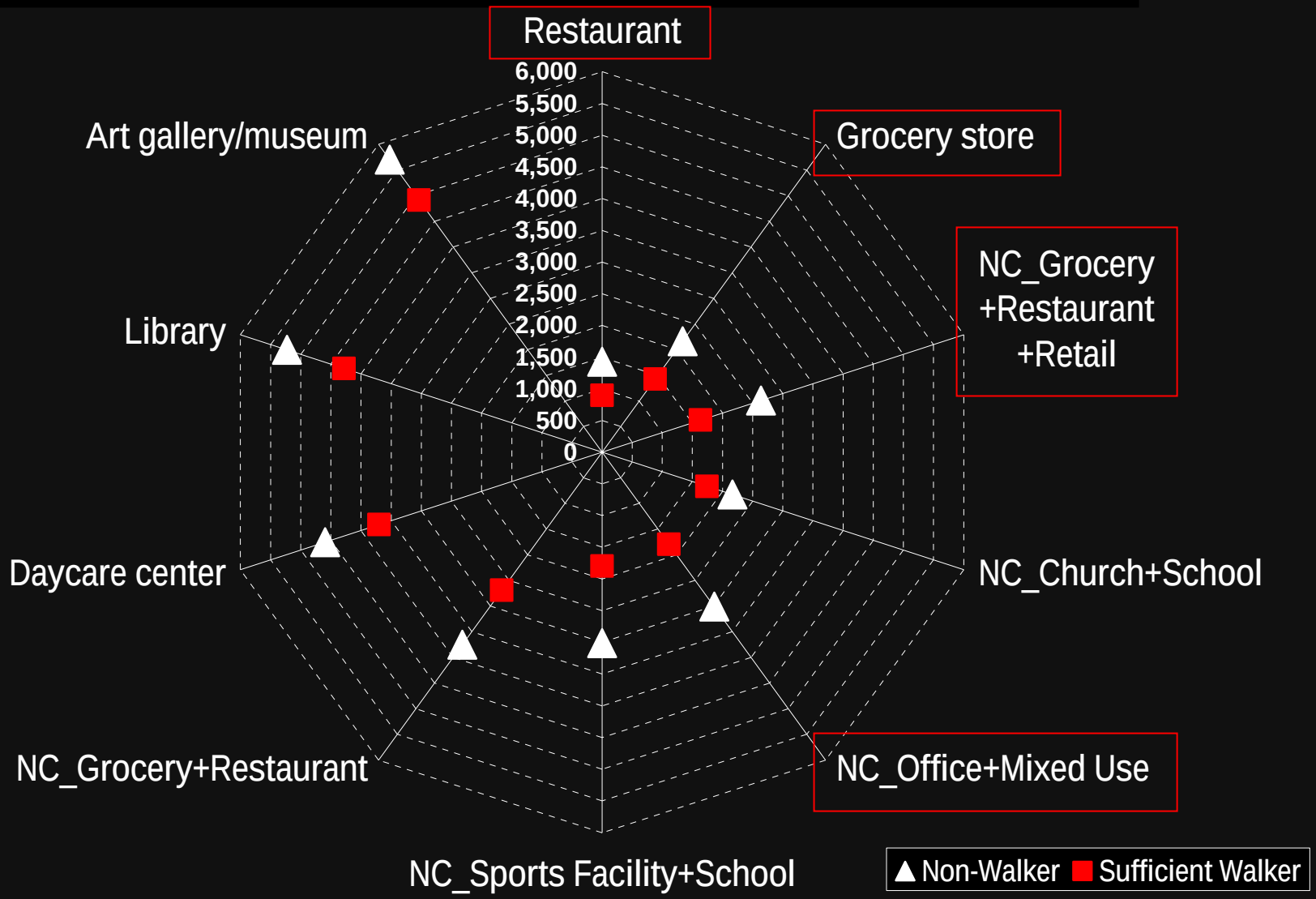


1930s: Schools, Community Centers, and Open Space

Today: Food Environments and Retail

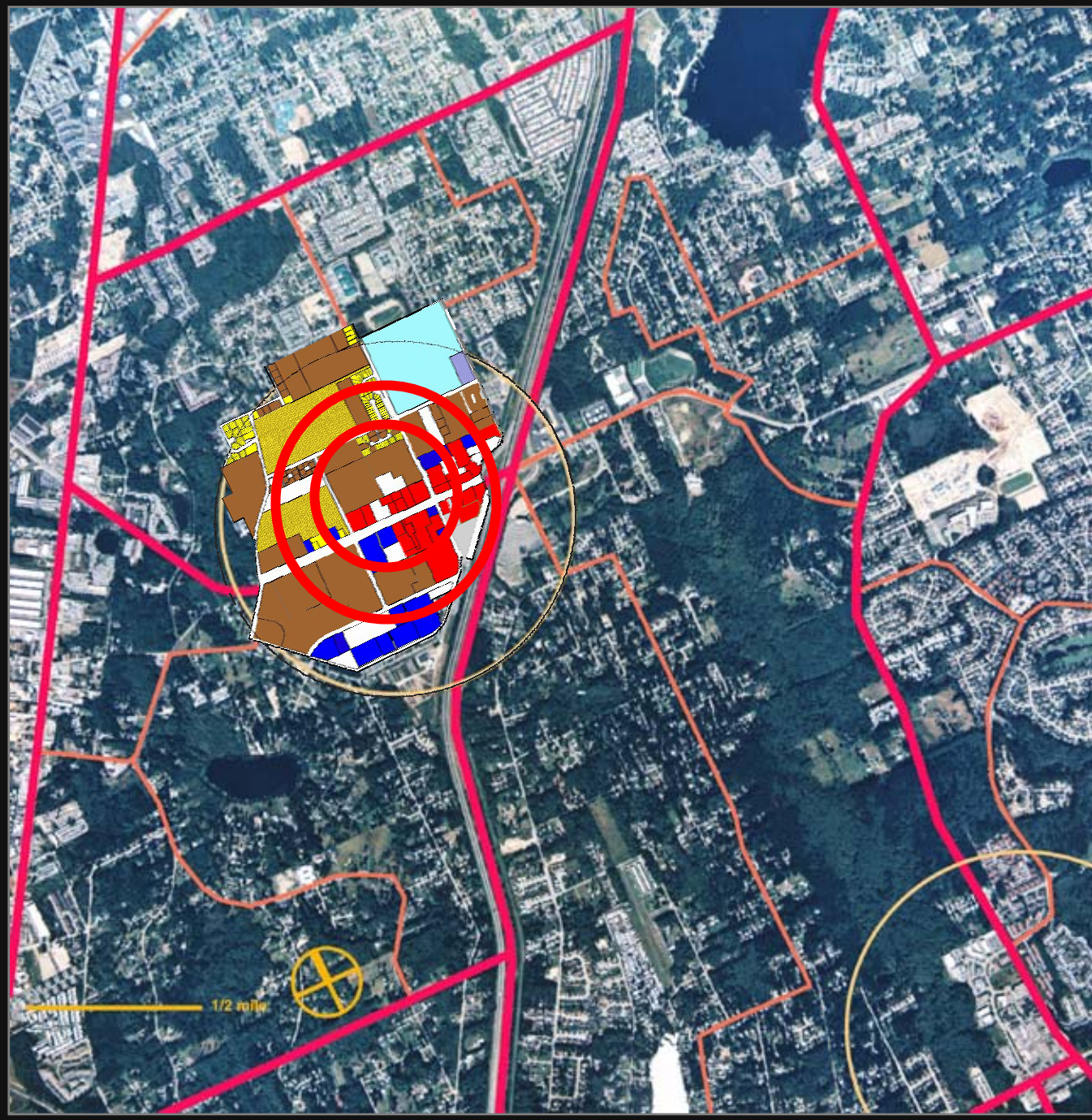
Bivariate Analyses

Distance to Closest [Non-Walker; Sufficient Walker]



Implications for Research

Mariner Area
1990 Census
- 6,300 people
- 3,500 units
- 590 acres
- Red=tract (2) [4000 residents]
- Orange= Block group (4) [1000 residents]

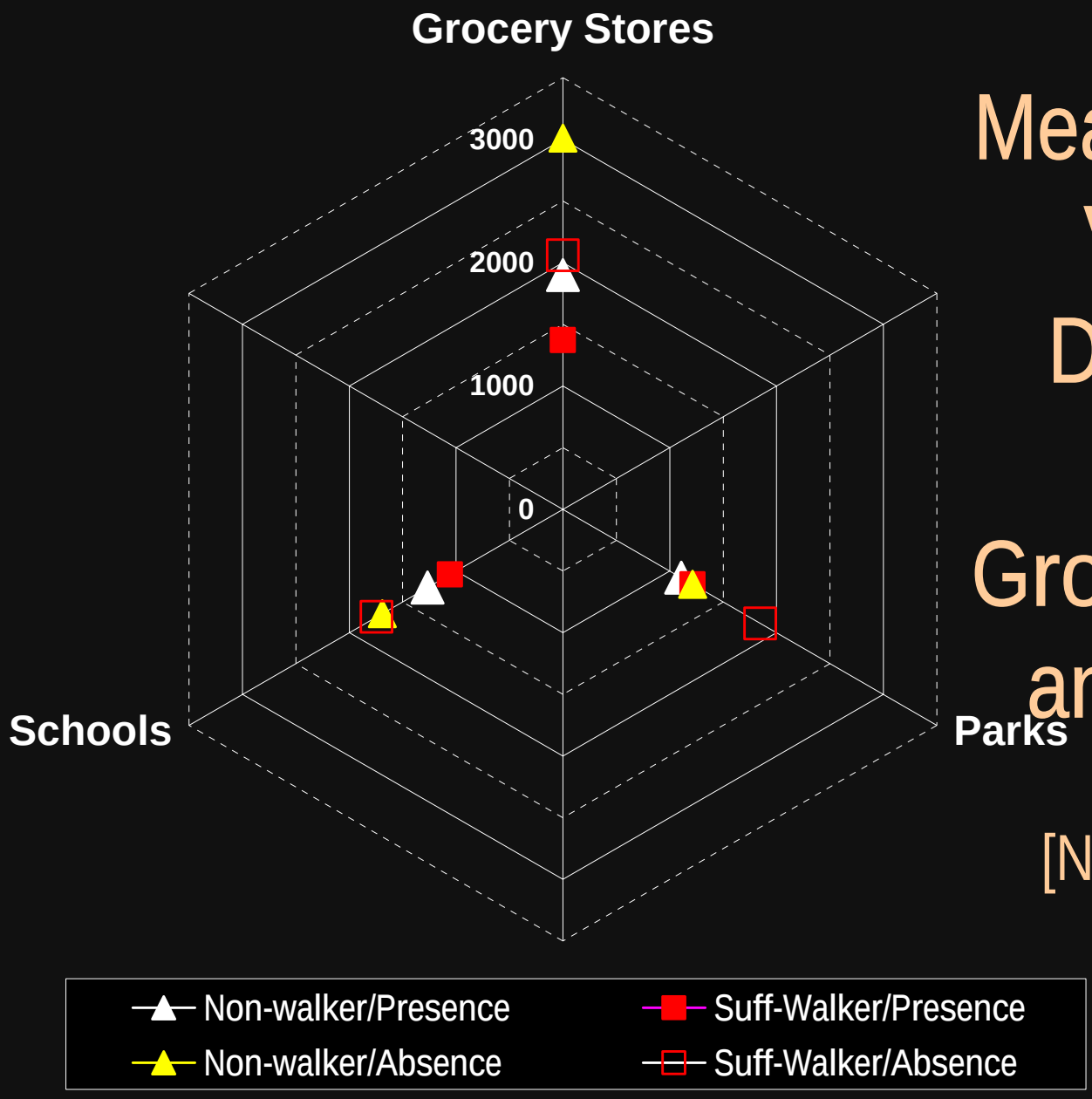


PERCEPTION

Logistic Regression Results: Perceived Presence of Destination in 1km Airline Buffer

***Significant at the 0.001 level; ** at the 0.01 level; * at the 0.05 level

	Objective Measure			Walking Level				
				Non walker	Moderate walker		Sufficient walkers	
Destination		β	Odds ratio	Reference	β	Odds ratio	β	Odds ratio
Grocery stores	Count 1km Airline buffer	0.181***	1.20		0.655	1.92	0.781**	2.18
	Count 1km Network buffer	0.282***	1.33		0.595	1.81	0.730**	2.08
	Airline distance to closest, logged feet	-0.772***	0.46		0.488	1.63	0.635**	1.89
	Network distance to closest, logged feet	-0.920***	0.40		0.484	1.62	0.619**	1.86
Parks	Count 1km Airline buffer	0.755***	2.13		0.543	1.72	0.738**	2.09
	Count 1km Network buffer	0.680**	1.97		0.518	1.68	0.857**	2.36
	Airline distance to closest, logged feet	-0.594***	0.55		0.497	1.64	0.718**	2.05
	Network distance to closest, logged feet	-0.667***	0.51		0.492	1.64	0.633	1.88
Schools	Count 1km Airline buffer	0.522***	1.69		0.186	1.20	0.064	1.07
	Count 1km Network buffer	0.349**	1.42		0.202	1.22	0.090	1.09
	Airline distance to closest, logged feet	-1.283***	0.28		0.163	1.18	0.000	1.00
	Network distance to closest, logged feet	-1.040***	0.35		0.070	1.07	-0.081	0.92



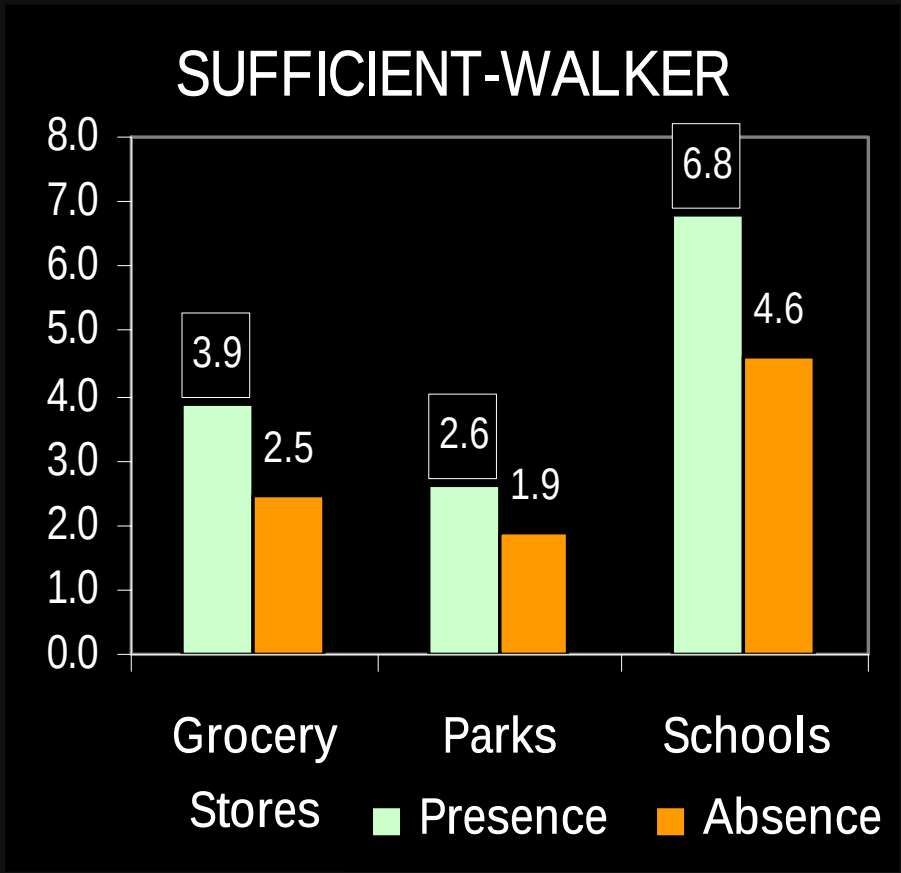
Mean Objective Values of Distance to Closest Grocery, Parks, and Schools

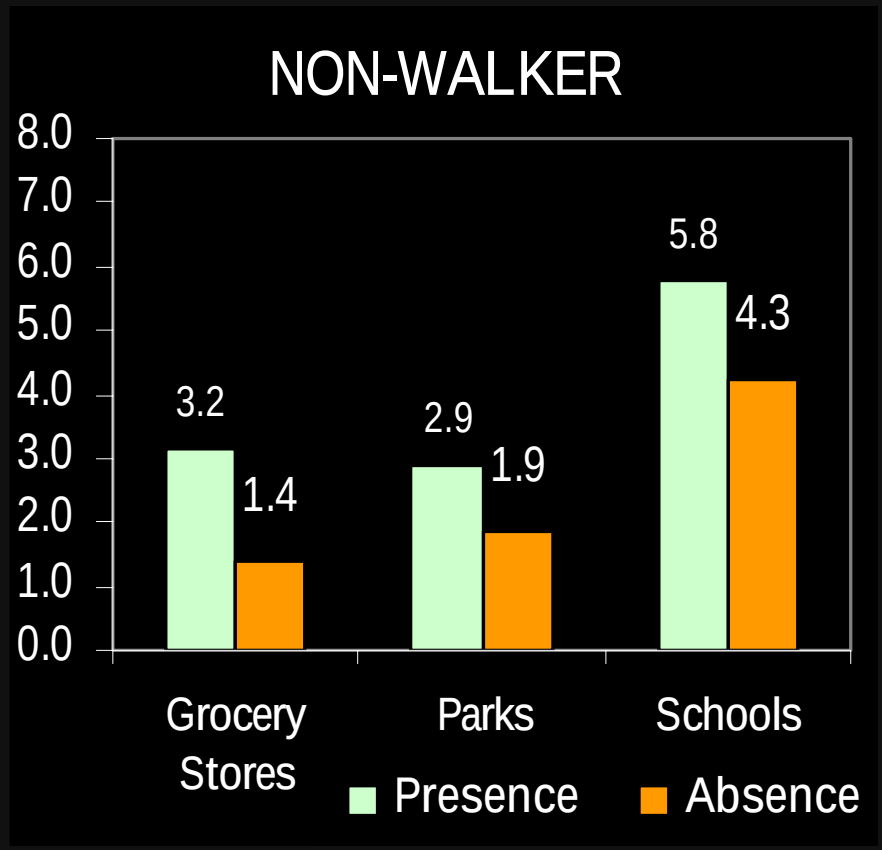
[feet]

[Non-Walker/Suff-Walker]

PERCEPTION

Mean/ median objective values of parcel counts





Conclusions: THEORY

- Sociologic measures; Behavior (walk no walk), Domain (personal, physical environmental variables), Outcome of interest (more walking)
- Multiplicity of neighborhood definitions: Sufficient-Walker versus Non-Walker neighborhood
- Multi-level analysis: individual, and environmental (Galster's two first scales)
- Scales/levels of neighborhood definition: <1 KM buffer around residents
- Temporal and dynamic dimensions: Not able to address

Conclusions: Urban Planning PRACTICE

- Center of walkable neighborhood = Grocery, Restaurants, and daily Retail
- Thresholds measures of land use type and intensity are achievable within current practices
- Very small distances between land uses related to increasing the probability of walking for health — smaller than those generally considered by planners and designers. Scale of land use mix is very small.

Conclusions: RESEARCH METHODS

- Spatial unit: Census units “wash out” built environment of walkable neighborhood

- Both airline and network distances to destinations are useful to understand and interpret perception of neighborhood (Sufficient Walkers seem to know neighborhood based on networks)
- Objective measures of environment significantly correlated with perception measures for attributes of neighborhood environmental attributes that are significantly associated with walking
    - Consistently correlated for Sufficient-Walkers, but not for Non-Walkers
    - Both significant mainly in <1km buffer

Conclusions: LIMITATIONS

- Generalizability limited to spatial sample frame of medium-low residential densities and above and residential areas in proximity to retail [not low-density suburban areas, small towns or rural areas

Thank you