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Funded by grant number ES10908  
from the National Institute of  
Environmental Health Science  
(NIEHS).

# **SOCIAL FACTORS AND THE ENVIRONMENT IN PEDIATRIC ASTHMA**

**Black race does not predict home  
allergen sensitization in an inner-  
city population**

**New York University  
Carolyn Berry, PhD**

**Evanston Northwestern Healthcare  
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Supported by grant #1R01109081 from NIEHS

**University of Chicago  
Raoul Wolf, MD**

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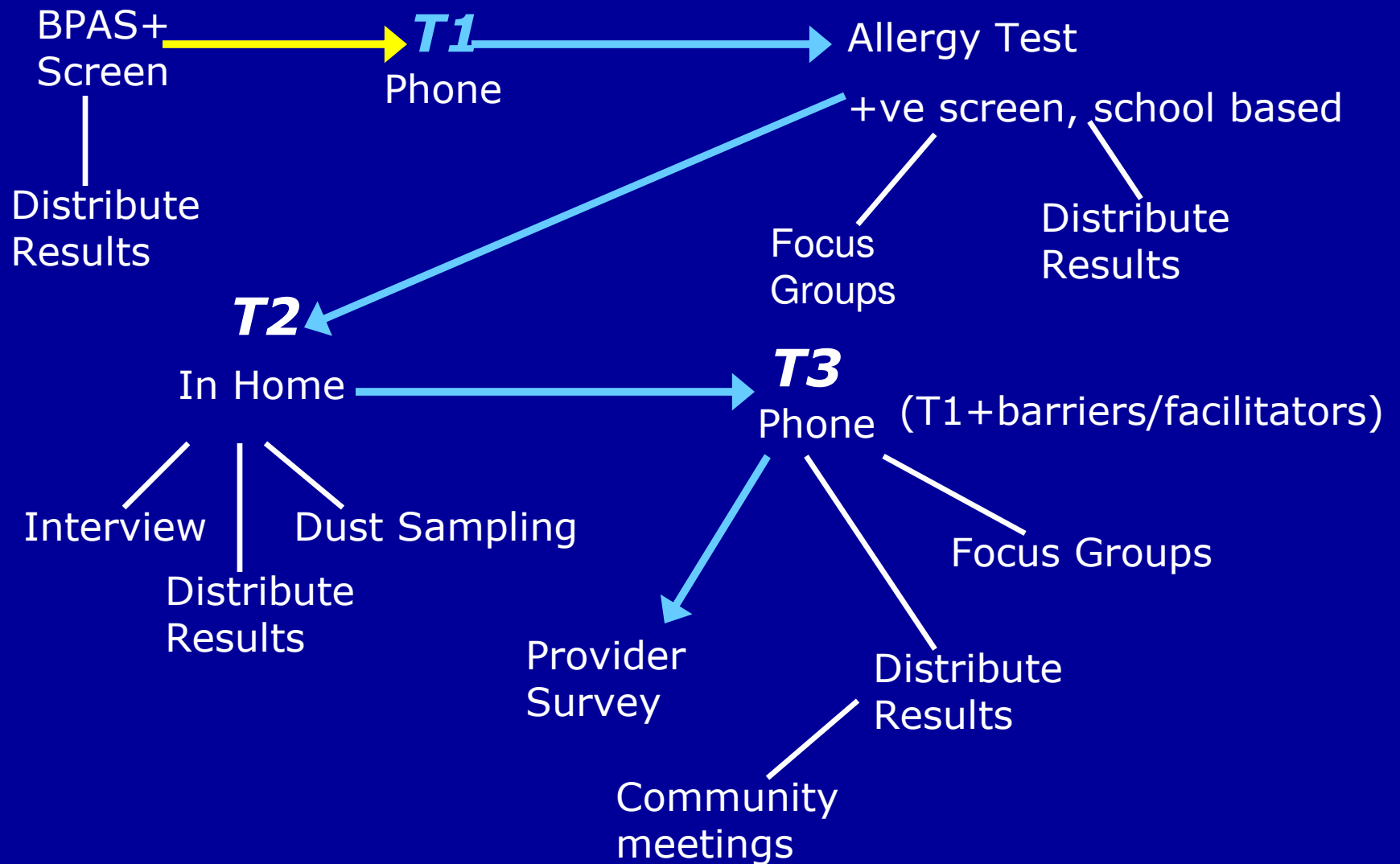
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# Study Design

- Longitudinal model
  - Recruitment over 3 years
  - Five year study
    - 3 data collection points over each recruitment year
- Cross-sectional comparison to children with no signs of asthma

# Study Design



# Sample

- **Low-income children aged 5 – 12 years**
  - 600 children with asthma or possible asthma
  - 600 children with no signs of asthma
  - 1/3 each: White, African-American, Latino
- **Recruited through Chicago Public Schools**
  - No magnet schools
  - Racially diverse
  - > 70% on school lunch program

# Instruments

- BPAS +
  - Validated school screen for asthma and allergies
- CRYISIS
  - Validated stress and depression scale
- Caregiver health status (SF-12v2 TM)
- Caregiver depression (CES-D)
- Caregiver social support (MOS)
- SES/demographics

# Overall Screen Results for Asthma (N=8,981)

No Asthma	Diagnosed Asthma	Possible Asthma
<b>6,554</b> <b>(73%)</b>	<b>1,112</b> <b>(12%)</b>	<b>1,285</b> <b>(14%)</b>

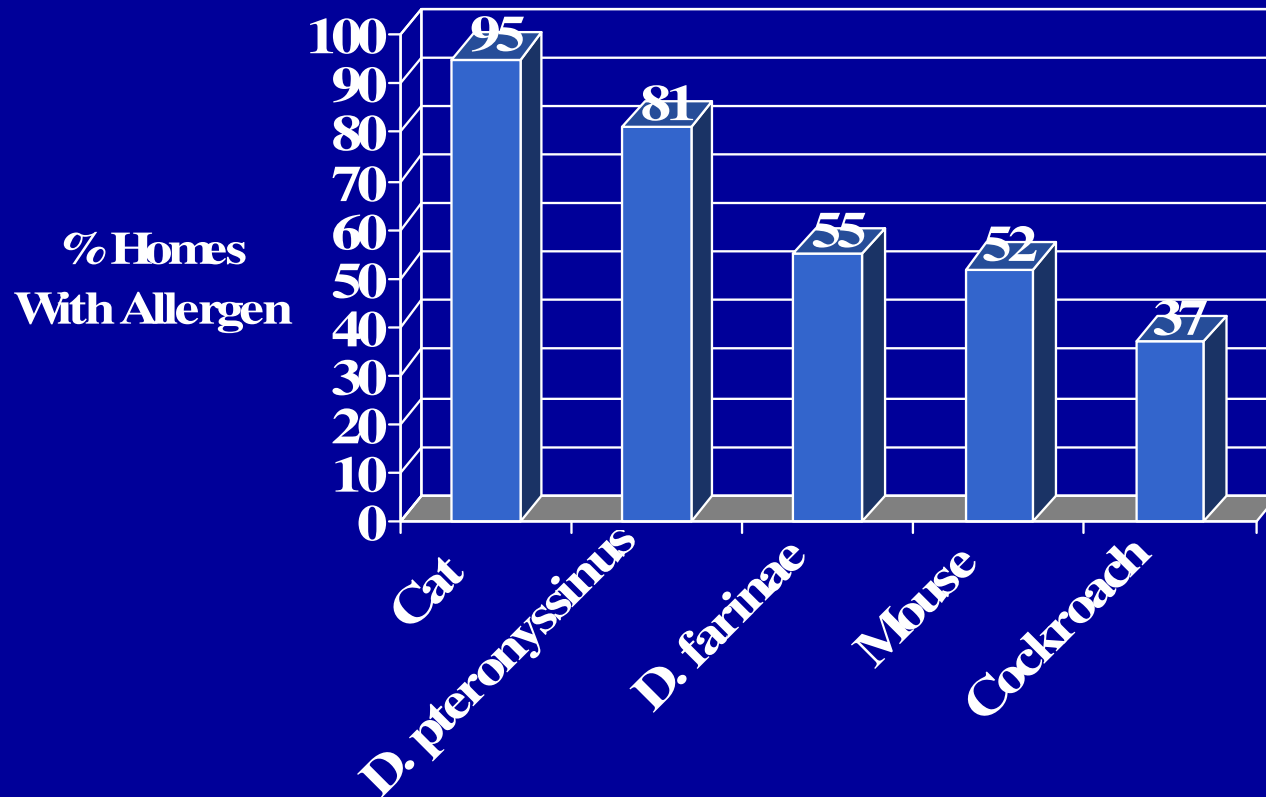
# Screen Results by Race

	<b>White (n=1,338)</b>	<b>African- American (n=2,668)</b>	<b>Latino (n=4,413)</b>	<b>Other (n=323)</b>
<b>No Asthma</b>	1,071 (80%)	1,766 (66%)	3,316 (75%)	262 (81%)
<b>Diagnosed Asthma</b>	114 (9%)	487 (18%)	450 (10%)	25 (8%)
<b>Possible Asthma</b>	153 (11%)	415 (16%)	647 (15%)	36 (11%)

# CRYSIS – Caregivers of Asthmatic Children

	Mean Caregiver Negative Life Stressors		Mean Caregiver CES-D		Asthma Morbidity (%)			
		Sig		Sig	Low	Intermediate	High	Sig
<b>African-American Other</b>	4.5 2.3	p<.001	12.4 9.6	NS	32 55	34 18	34 27	p<.05
<b>Medicaid Other</b>	4.7 2.8	p<.01	13.4 9.6	p<.05	29 49	33 25	38 26	NS
<b>Urban Suburban</b>	4.7 1.6	p<.001	13.1 7.8	p<.01	35 51	30 26	36 23	NS

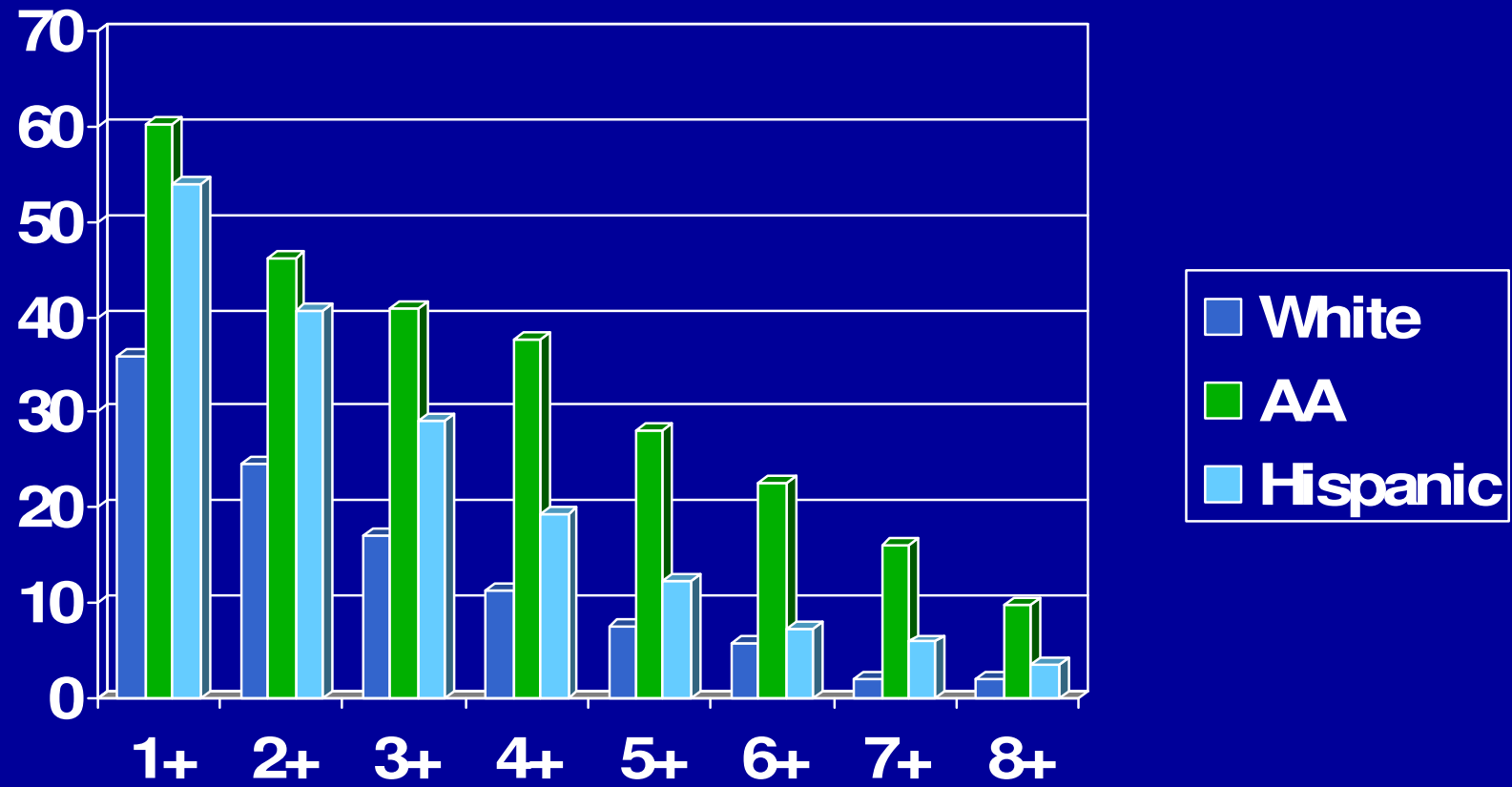
# Antigen Distribution



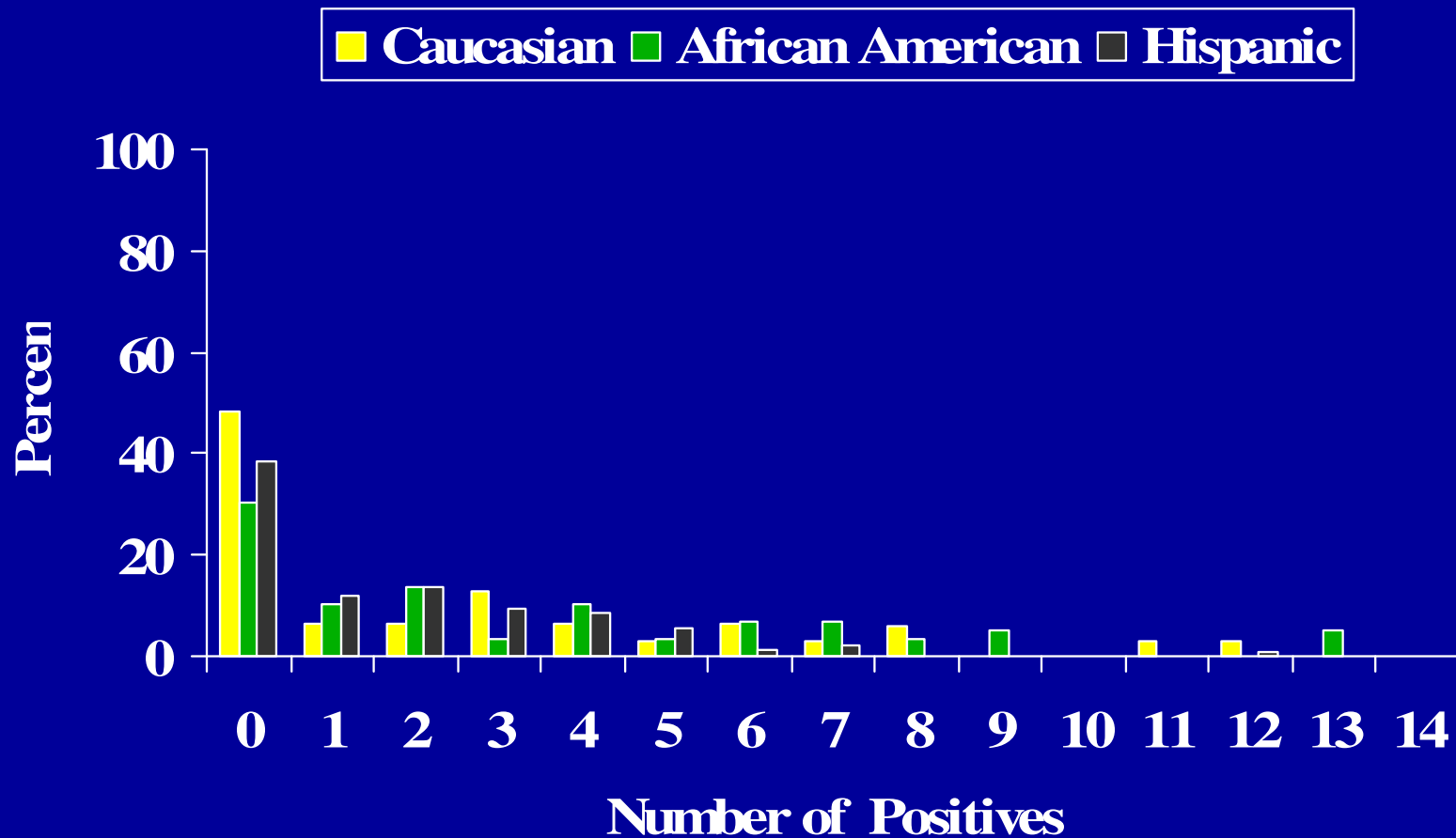
# Positive Allergy Tests

- Cohort
  - 268 children in 11 elementary schools
- Positive tests
  - One positive 61%

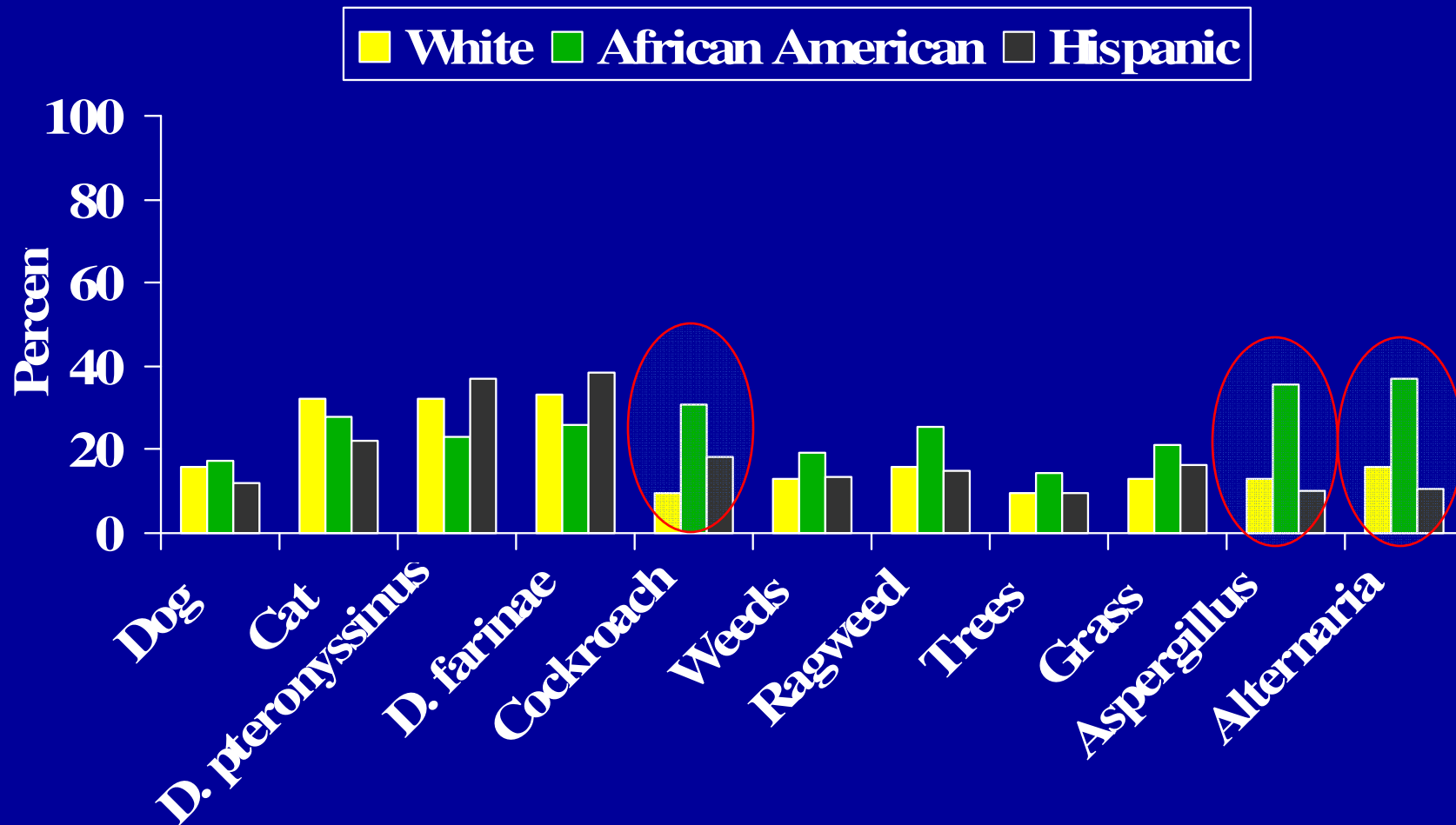
Mite	65%
Cat	24%
Cockroach	21%

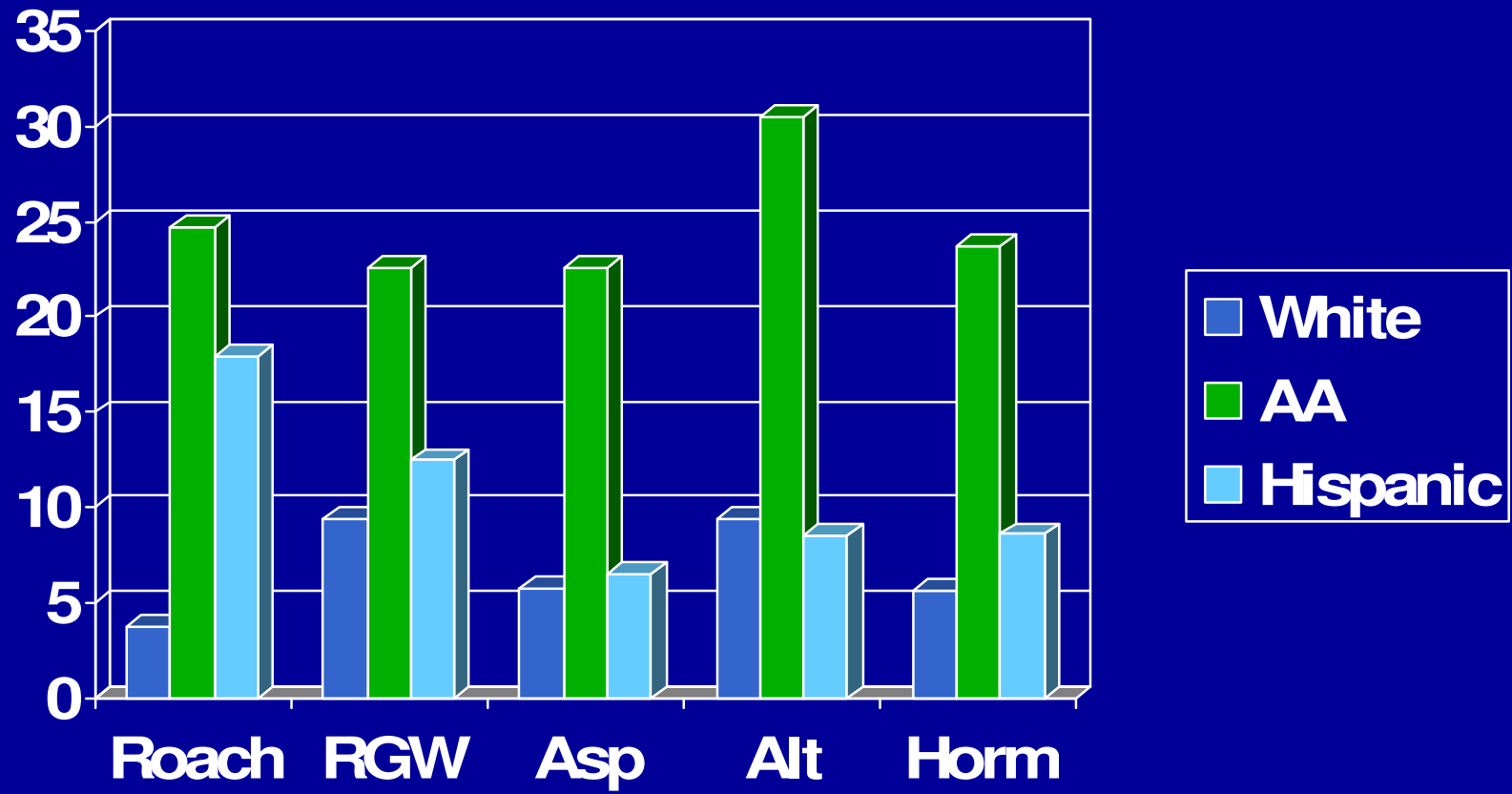


# Positive Allergy Tests by Race



# Allergen Response by Race





# Black race does not predict home allergen sensitization in an inner-city population

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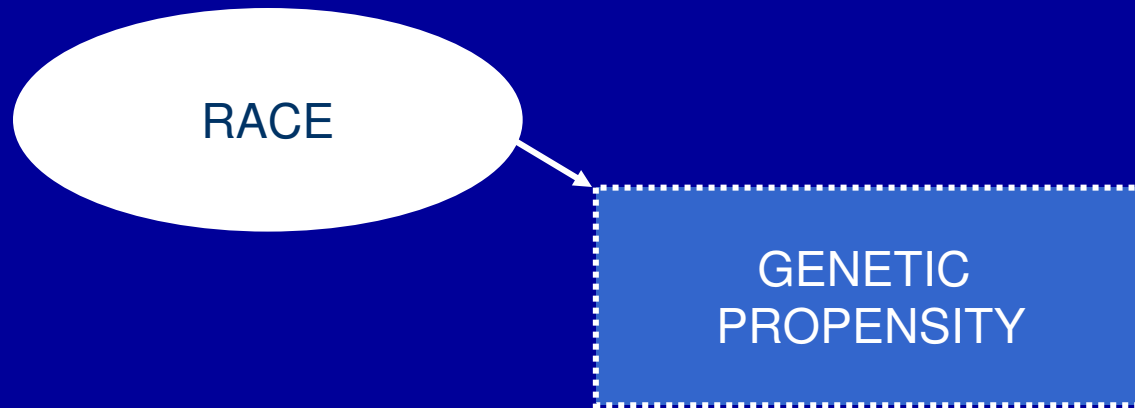
# Why examine the role of race

- To better understand the relative contributions of genetic propensity and social/environmental risk
- To improve interventions in the prevention or treatment of allergic diseases

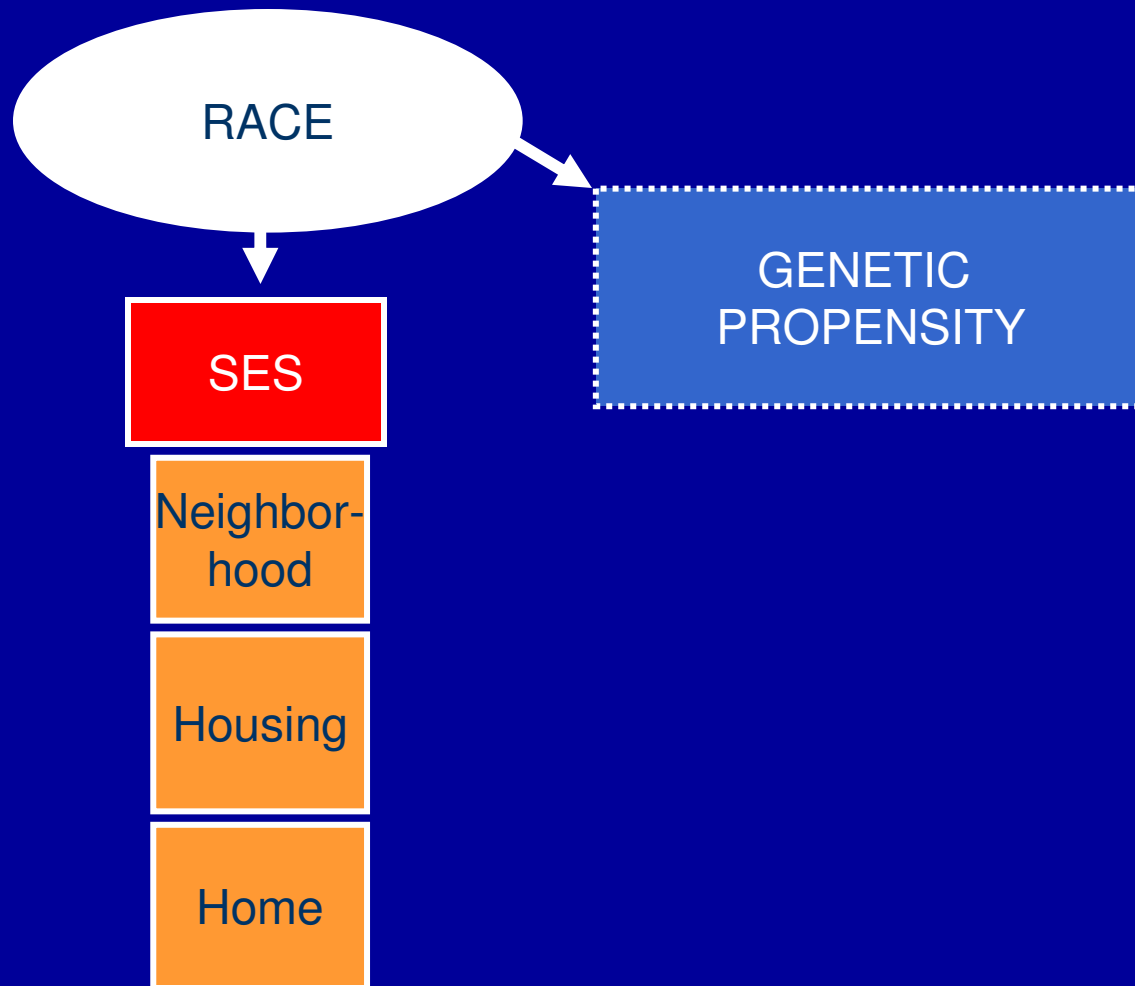
# Background

- Prior studies have independently associated Black race with greater home allergen sensitization
- These studies vary in their ability to account for confounding factors affect allergic sensitization

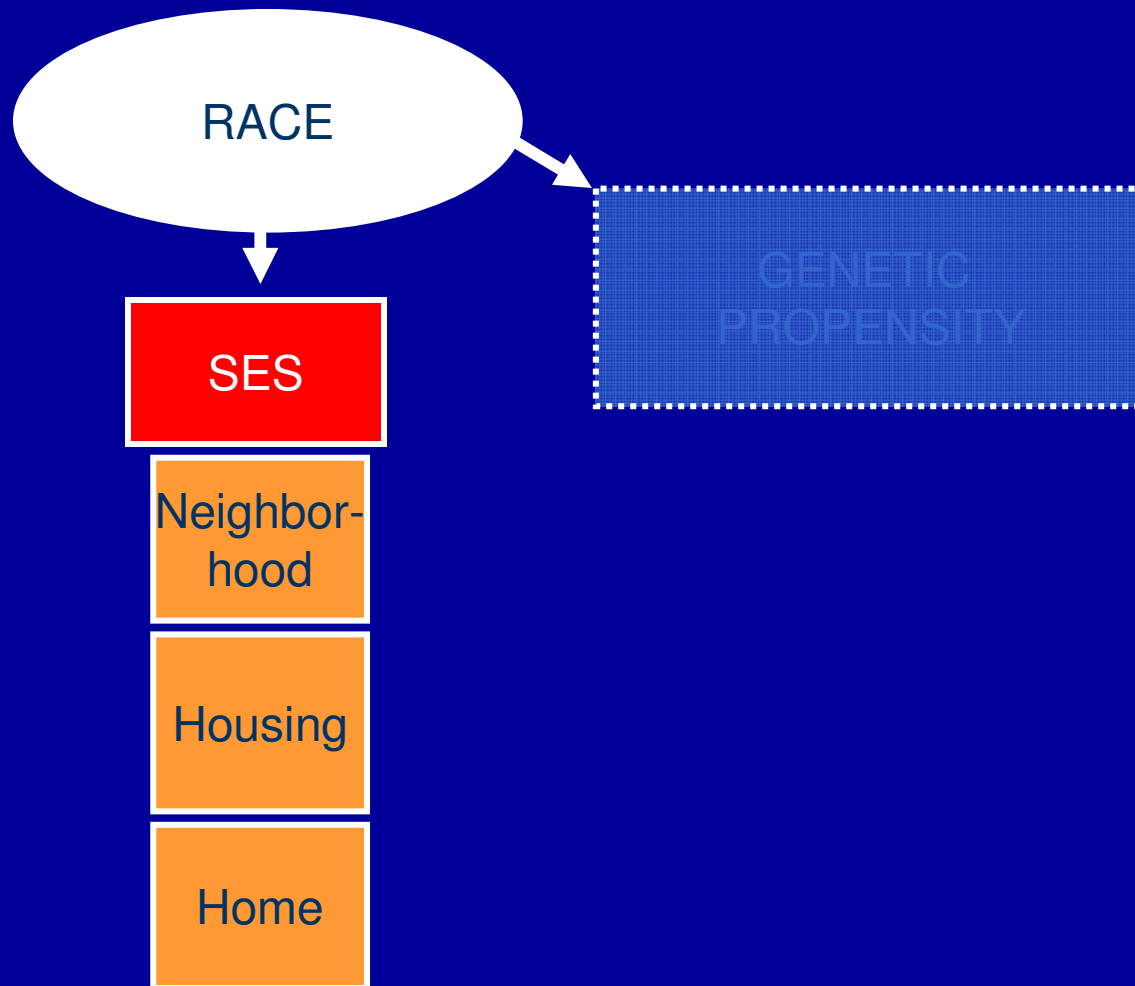
# Studying the role of race



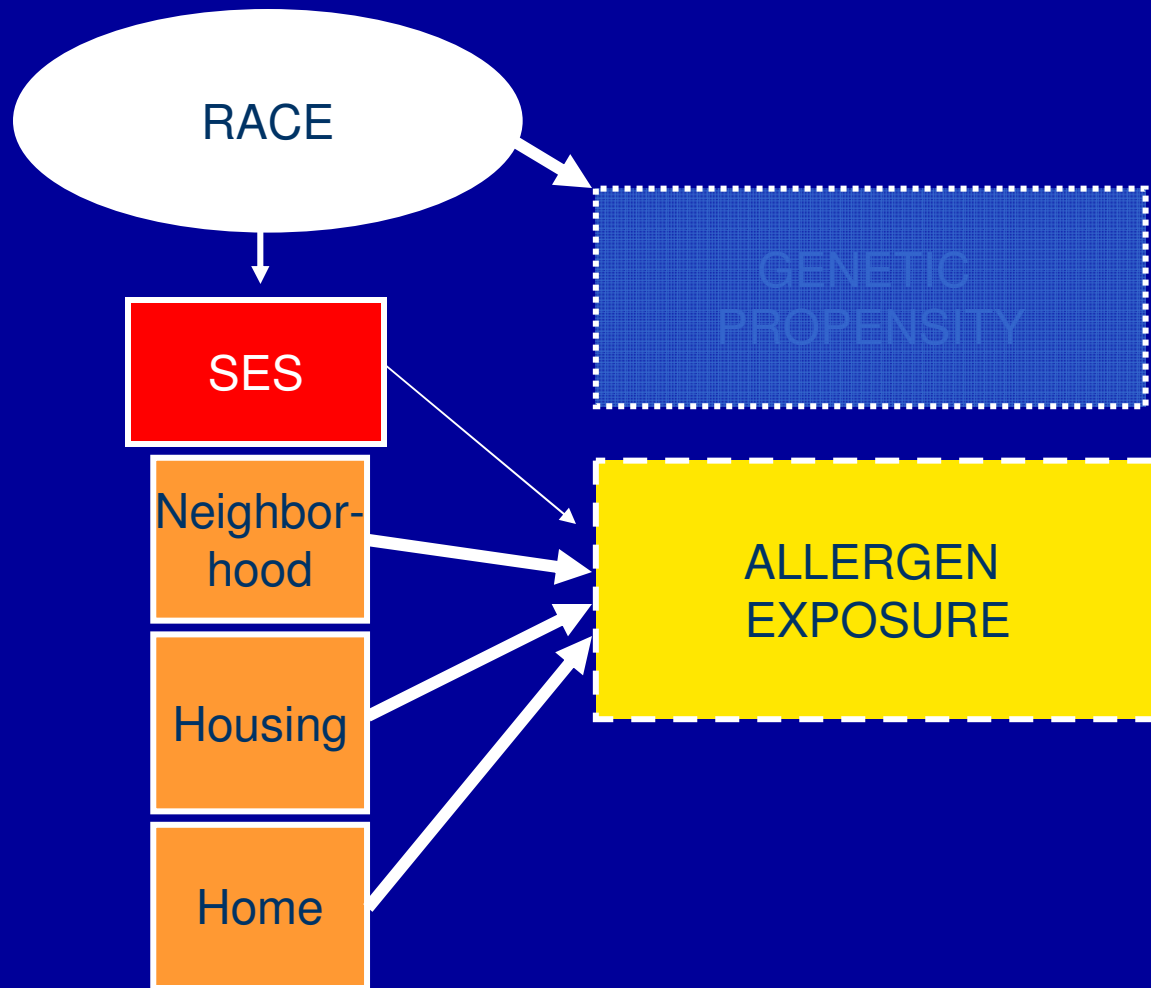
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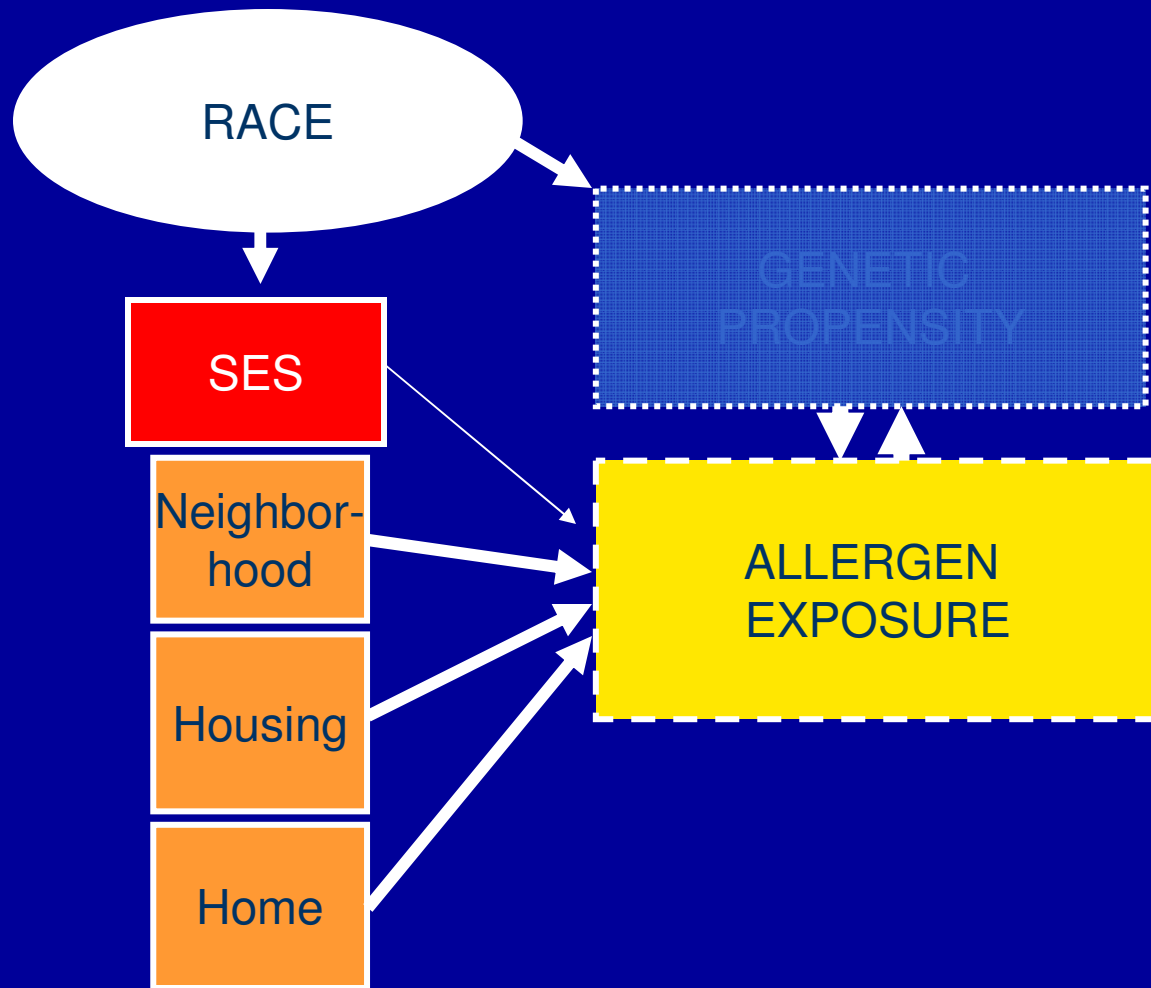
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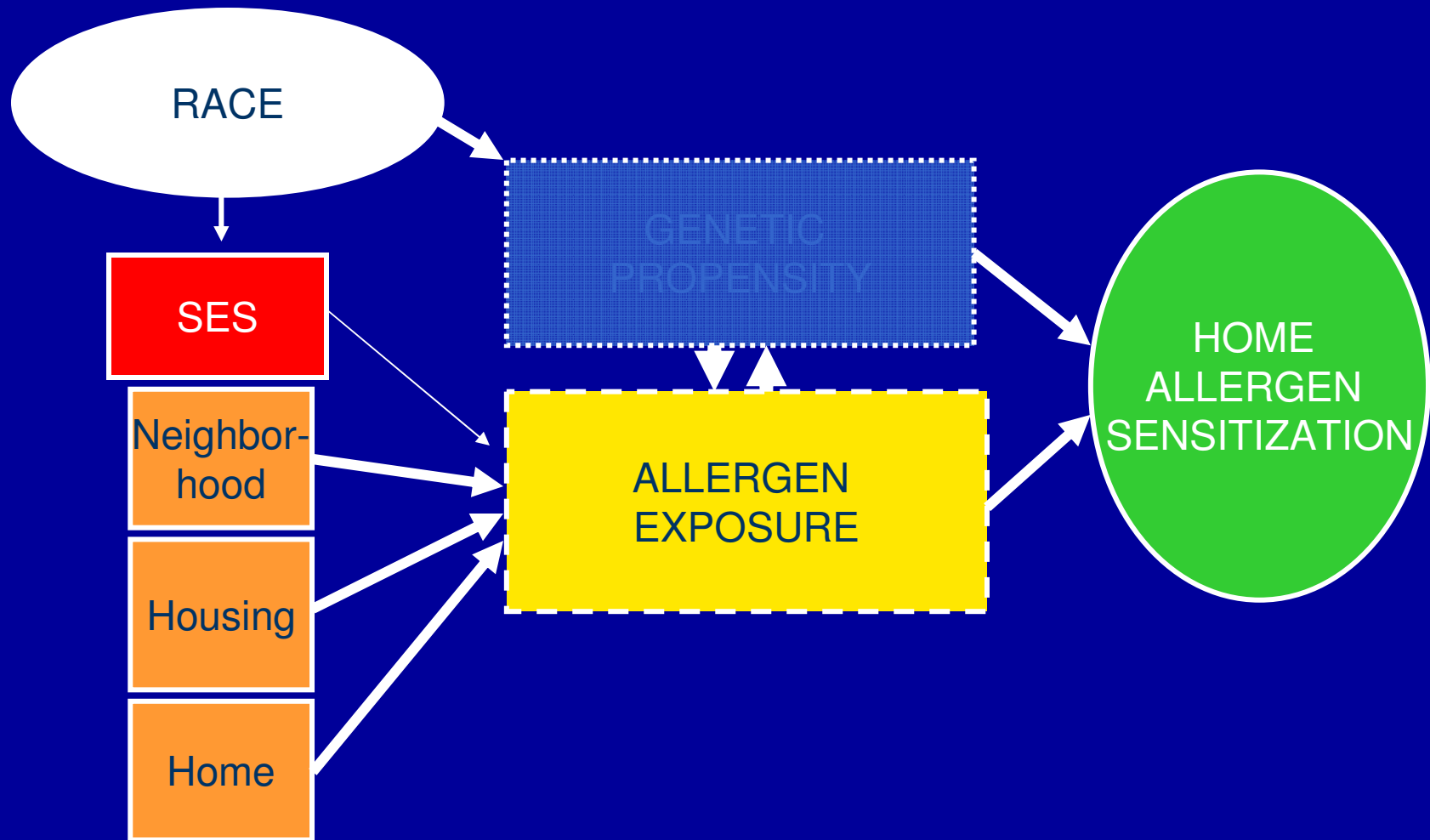
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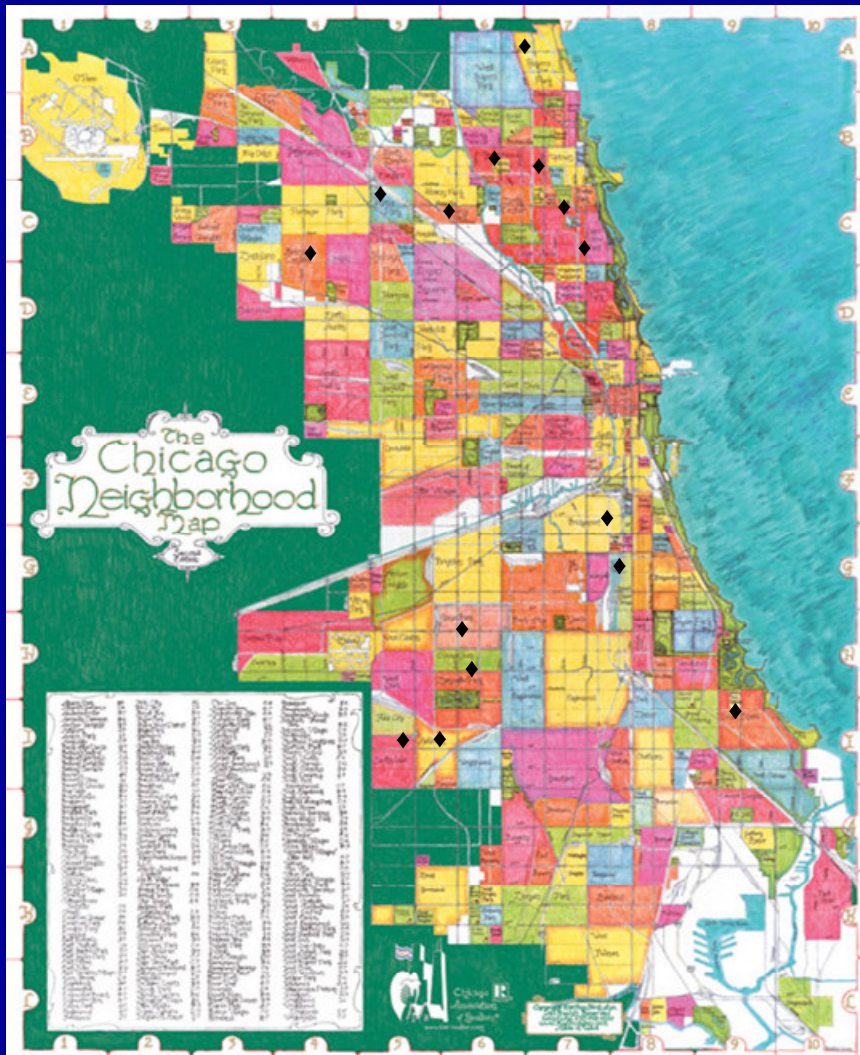
# Studying the role of race



# Study Aim

- To examine the role of race in home allergen sensitization in a racially diverse population that is socioeconomically and environmentally comparable

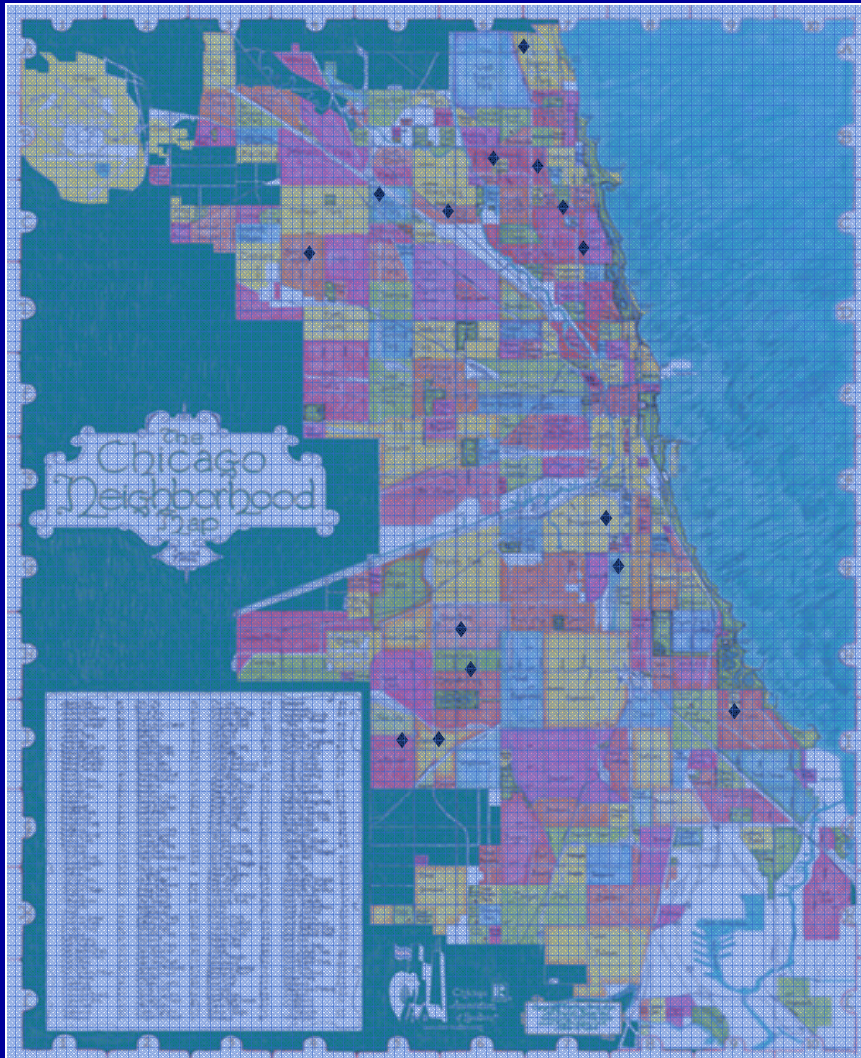
# Methods - Target Population



School-based Asthma Research in Chicago (SPARC) recruited from:

- 15 racially/ethnically heterogeneous
- non-Magnet and low-income
- elementary schools (K-8<sup>th</sup> grades)
- Chicago Public School system
- n = 14,632

# Methods – Study Population



Families interested in being in SPARC study  
n=6713

Brief Pediatric Asthma Screen Plus (BPAS+)  
and baseline surveys completed  
n=1315

“Probable” & “definite” asthmatics by BPAS+  
asked for home visit  
n=682

Agreed to home visit;  
Allergic sensitization determined by  
standard skin prick testing while at school  
n=319

Completed home visit  
**n=217**

# Methods – 2x2 Comparisons

- Compared study versus eligible population
- Compared by race:
  - individual, caregiver, neighborhood, housing and home characteristics
- Compared by race:
  - Home allergen levels roach, mite, cat, mouse

# Methods – Role of Race

## Logistic Regression Model

- Outcome of interest: Sensitization
- Predictors of interest:
  - Atopy
  - Respective allergen level
  - White race (compared to Hispanic)
  - Black race (compared to Hispanic)

# Results

<b>Characteristic</b>	<b>Allergen Study Arm n=217</b>	<b>Eligible SPARC Population n=682</b>
<b>Children</b>		
Age (years)	9 ± 2	9 ± 2
Sex (% male)	56	58
Race		
% White	12	12
% Black	29*	44
% Hispanic	58	44
-% Mexican	69	74
-% Puerto Rican	11	11
% Other	1	1
BPAS		
% Possible asthma	50.7	47.3
% Definite asthma	49.3	52.7
<b>Primary Caregivers</b>		
Age (years)	36 ± 8	35 ± 8
Sex (% female)	93	94

<b>Child Characteristics</b>	<b>Hispanic (n=125)</b>	<b>Black (n=62)</b>	<b>White (n=26)</b>
Age (years)	9 ± 2	9 ± 2	9 ± 2
Sex (% male)	53	55	73
BPAS			
Possible asthma	55	45	42
Definite asthma	45	55	58

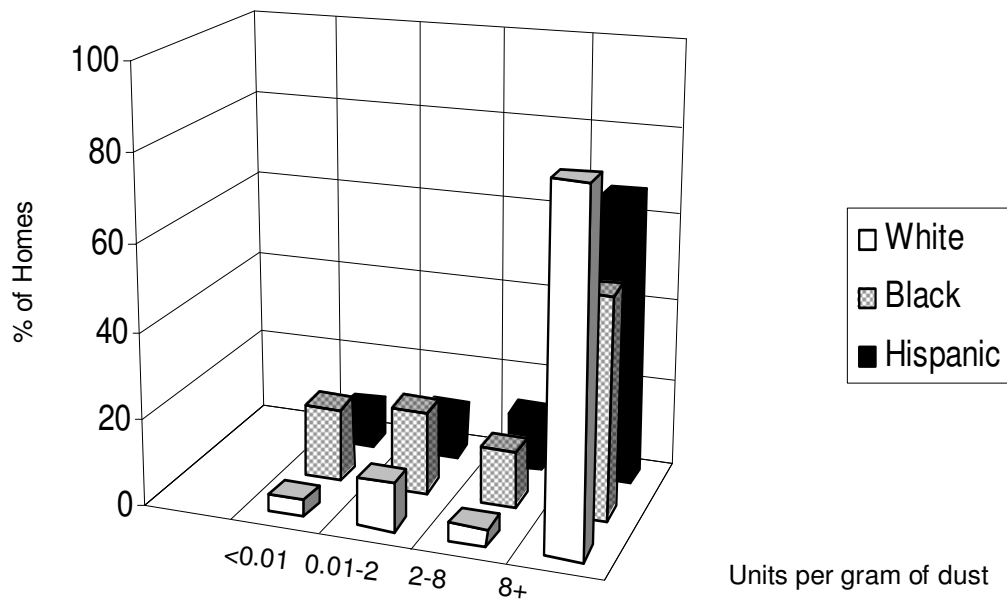
<b>Primary Caregivers</b>	<b>Hispanic</b> (n=125)	<b>Black</b> (n=62)	<b>White</b> (n=26)
Age (years)	34 ± 6	39 ± 10*	36 ± 6
Female (%)	92	95	96
English primary language (%)	38*	98	96
Education			
High school diploma (%)	35	31	35
College and above (%)	7*	10	19
Mean Income (in \$K)	15-20	15-20	20-30*
Married (%)	78	37*	62
Health Insurance			
Pay out-of-pocket (%)	11*	3	0
Medicaid/Kidcare (%)	59	56	35*
Own home (%)	34	27	54

<b>Neighborhood Characteristics (%)</b>	<b>Hispanic (n=125)</b>	<b>Black (n=62)</b>	<b>White (n=26)</b>
· People can be trusted	68	57	69
· Not noisy	72*	49	46
· Litter not a problem	45	51	58
· Homes not deserted/vacant	64	70	88
· Garbage collection good	86	81	81

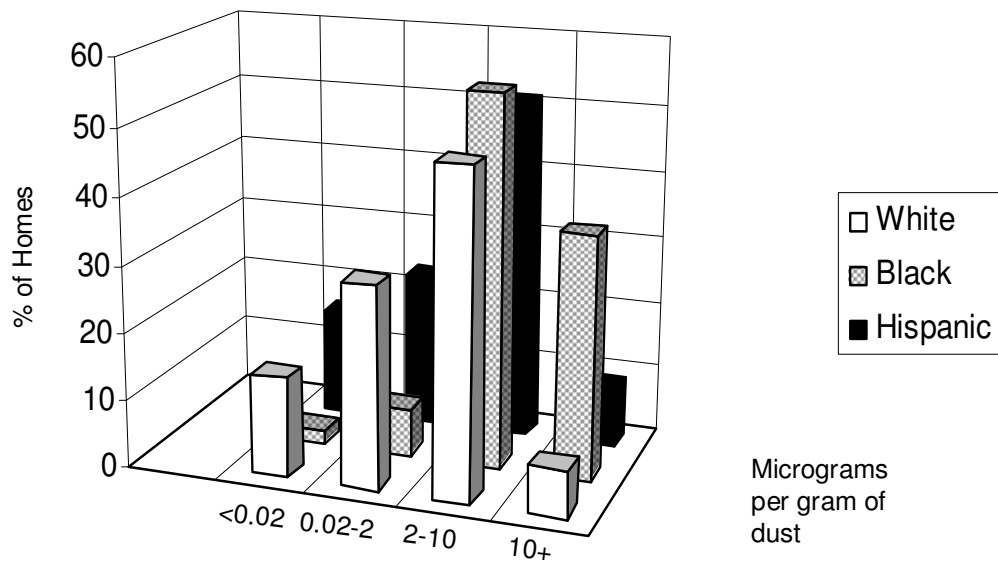
<b>Housing Characteristics (%)</b>	<b>Hispanic (n=125)</b>	<b>Black (n=62)</b>	<b>White (n=26)</b>
· Renting	75	100	100
· In single family home	44	37	46
· In building with > 4 flats	23	31	19
· With forced air heating	49	48	39
· With electric stove	86	90	97
· With basement as living space	23	32	26
· With leaking ceiling/walls	12*	26	26

<b>Home Characteristics</b>	<b>Hispanic (n=125)</b>	<b>Black (n=62)</b>	<b>White (n=26)</b>
Average # of people/room	1.31*	1.06	1.03
<b>Furnishings (%)</b>			
· Bare floor	11^	26	27
· Fan	35	52	38
· Air conditioning	50	32	46
<b>Toxins (%)</b>			
· With smoker	8*	37	30
<b>Pests (%)</b>			
· Roach problem	49	67	42
· Professional roach extermination	10	41*	25
· Rat/mouse problem	24	18	19
· Professional rat/mouse extermination	9*	20	18
<b>Pets (%)</b>			
· Dog in home	16	12	48*
· Cat in home	6	16	26*

### Roach Allergen Levels by Race



### Dust Allergen Levels by Race



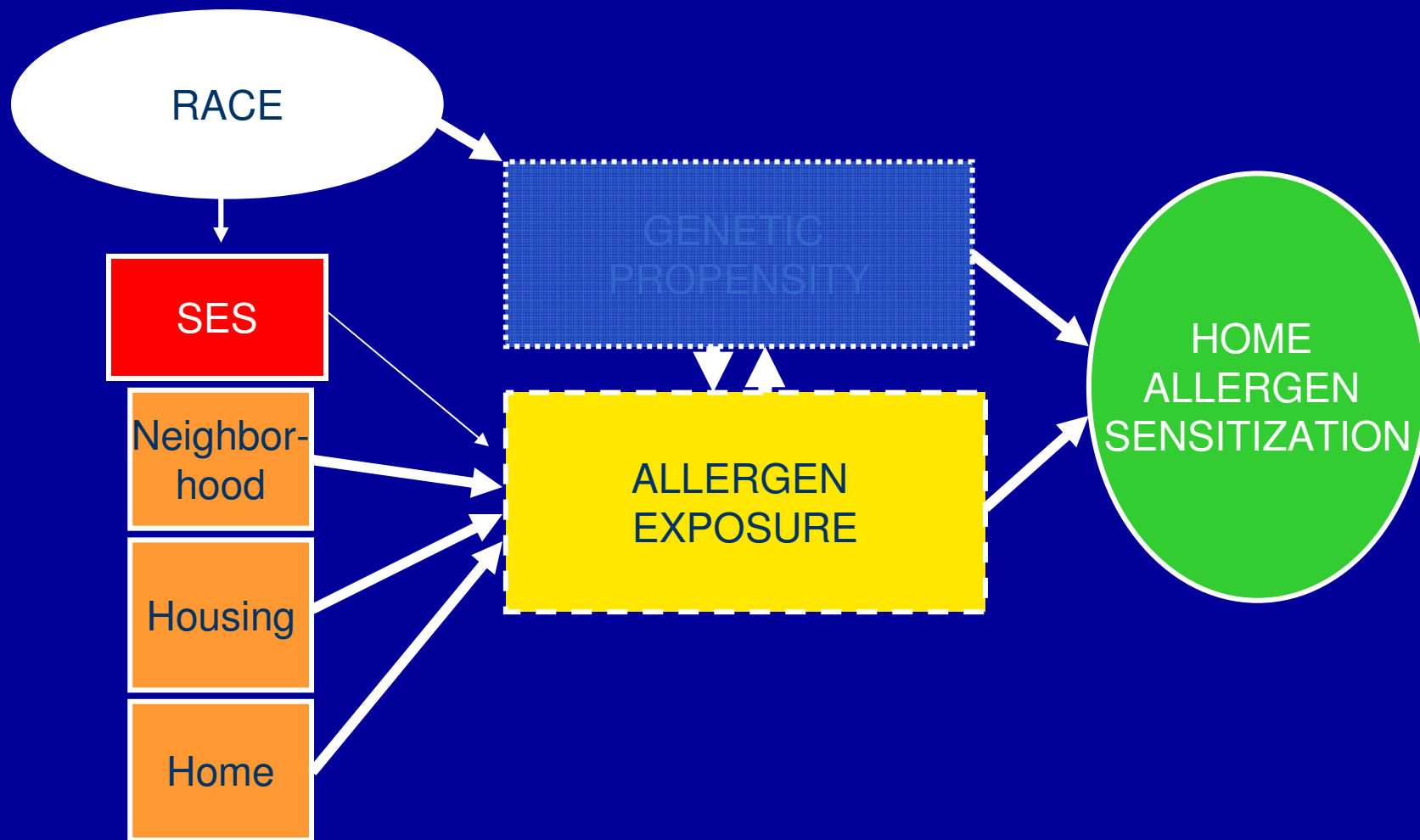
Sensitization to:	Predictor	Adjusted Odds Ratio	Confidence Interval	P-value
Roach	Atopy	1.51	1.30-1.75	0.000
	Roach/Blag1 level	1.14	1.06-1.23	0.001
	White race	0.29	0.05-1.60	0.16
	Black race	0.27	0.10-0.74	0.01+
Mite	Atopy	1.55	1.31-1.83	0.000
	Mite/Derf1Derp1 level	1.04	0.95-1.14	0.43
	White race	0.53	0.19-1.53	0.24
	Black race	0.32	0.13-0.80	0.01+
Cat	Atopy	1.52	1.27-1.81	0.000
	Cat/Feld1 levels	1.00	0.88-1.14	0.98
	White race	0.66	0.20-2.15	0.49
	Black race	0.30	0.11-0.78	0.01
Mouse	Atopy	1.02	0.63-1.64	0.95
	Mouse/Musm1 levels	1.15	0.85-1.56	0.36
	White race	--	--	--
	Black race	1.73	0.25-12.09	0.58

# Limitations

- Convenience sample
- Power
- Racial composition of Hispanic group
- Cross-sectional exposures
- Concepts of atopy

# Summary

- Black race is not independently associated with a greater for allergic sensitization in a racially/ethnically diverse yet socioeconomically and environmentally comparable population



# Summary

- Heretofore unmeasured or poorly measured factors may confound the previous associations between race and allergen exposure and/or allergic sensitization
- Future studies of racial/ethnic disparities should carefully consider how unmeasured environmental factors can confound associations attributed to race/ethnicity