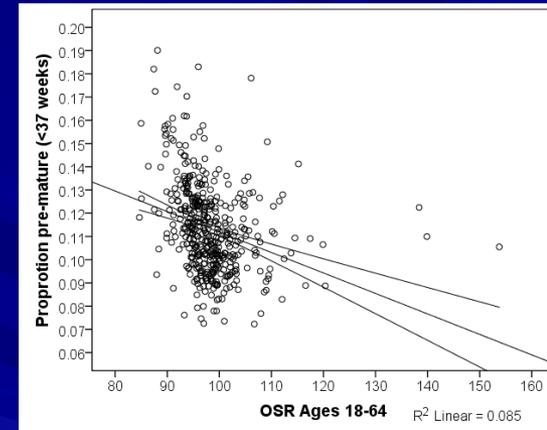
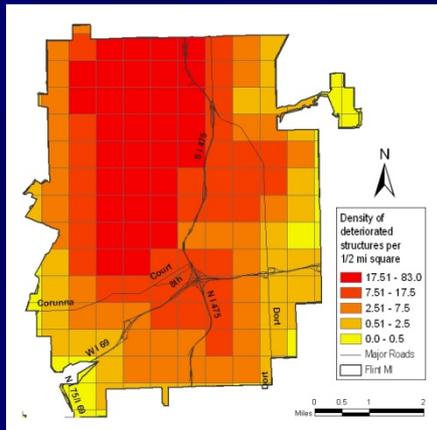


# How life history theory can be viewed as an organizing framework for understanding variation in birth outcomes, and how the built environment and neighborhood contexts offer an opportunities for public health interventions



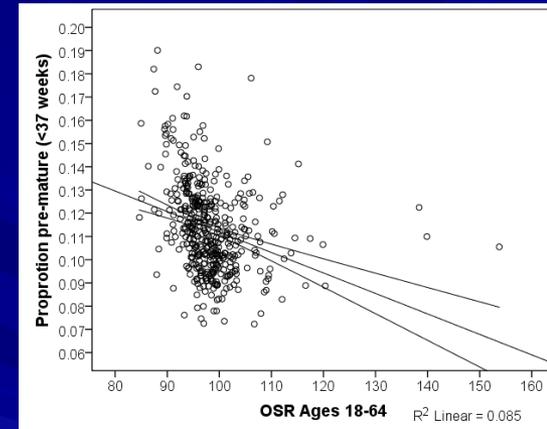
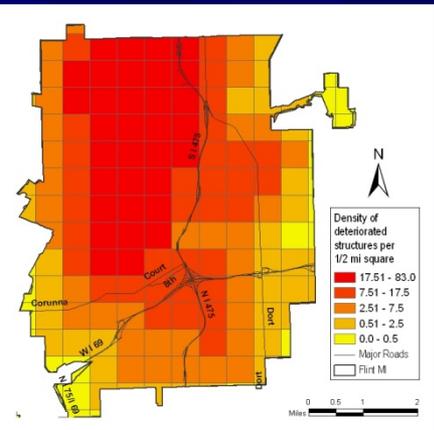
Daniel J. Kruger

University of Michigan

National Conference on Health Statistics

Session: How measurement and modeling of social determinants of health can inform actions to reduce disparities  
Washington, D.C. - 7 August 2012

# Building a healthy baby



Daniel J. Kruger

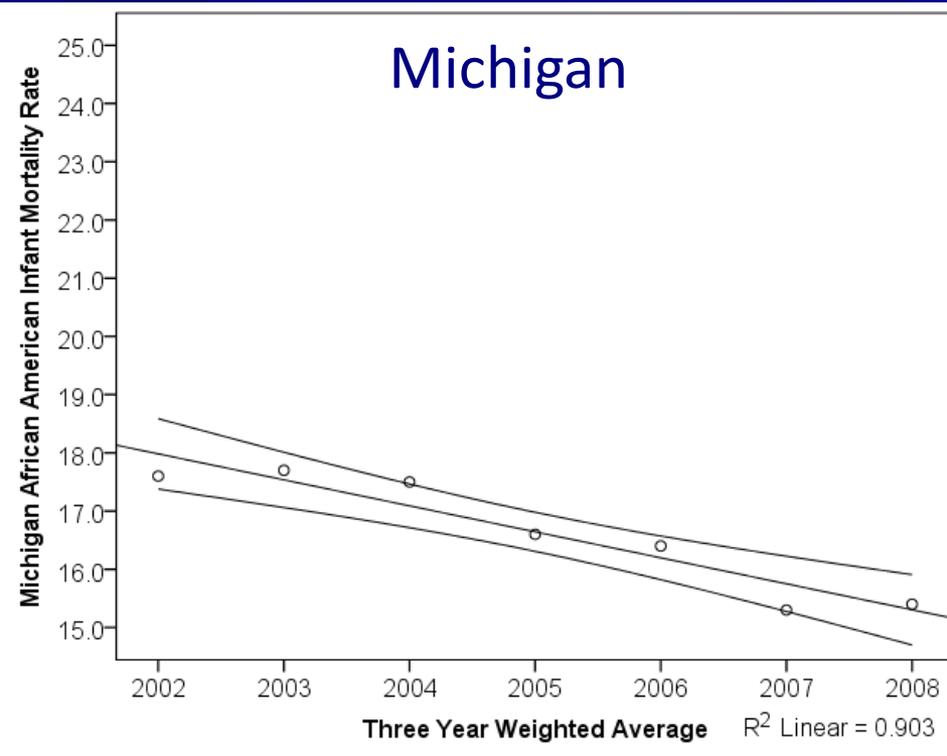
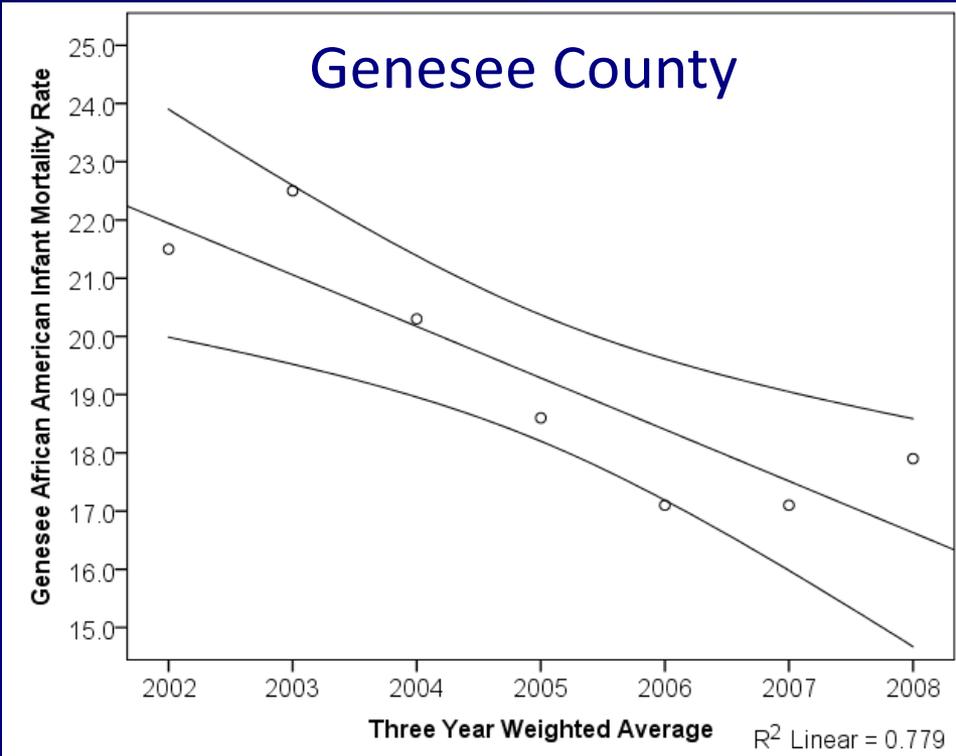
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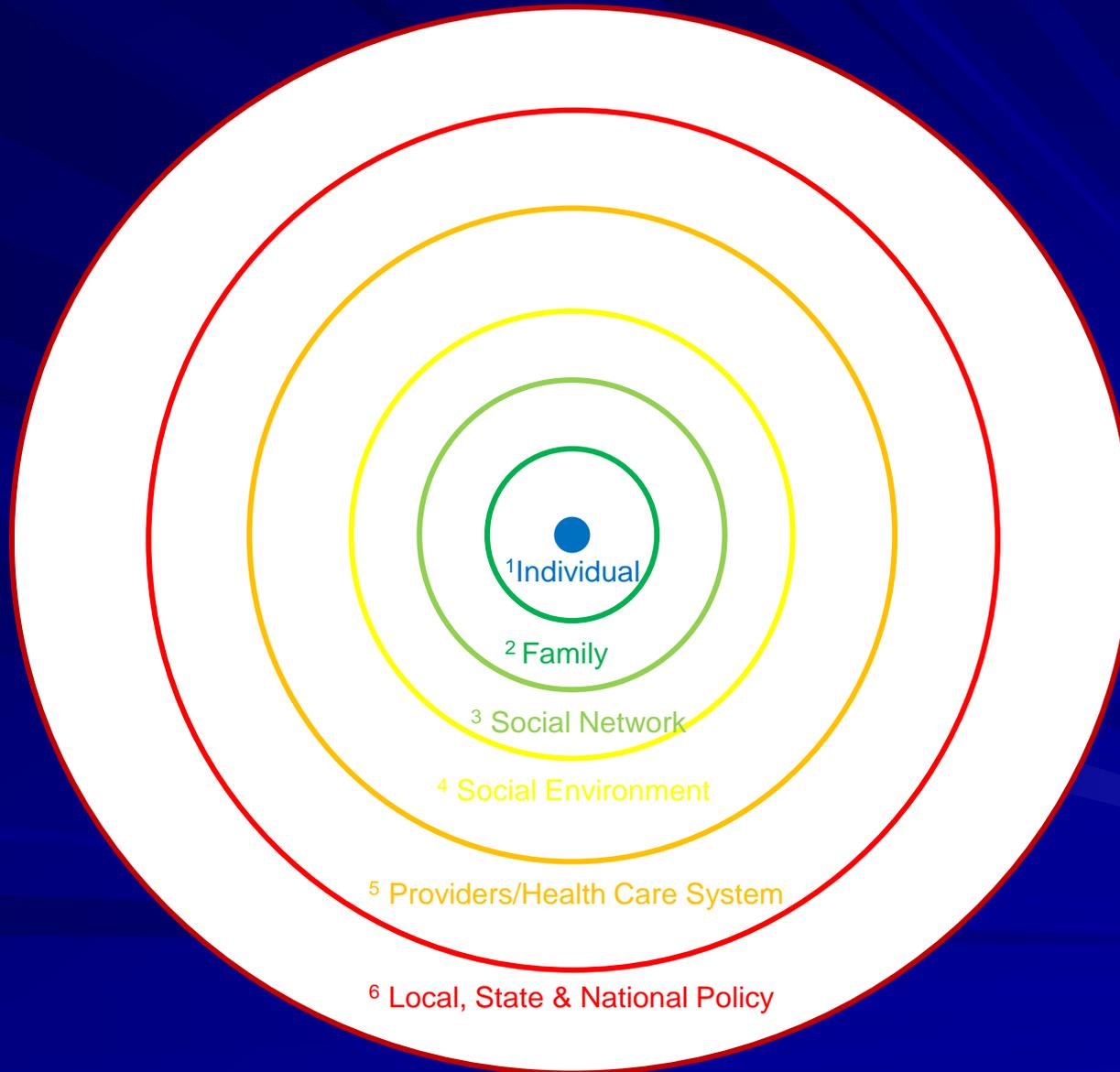
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The Genesee County, Michigan REACH US project is a U.S. Centers for Disease Control and Prevention funded program to reduce the African American health disparity in infant mortality. Coalition partners include the local public health infrastructure, academics, and community-based organizations.

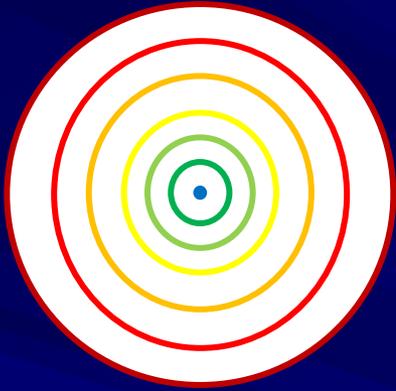
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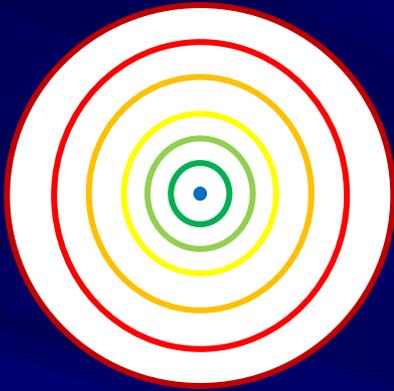
# Socio-Ecological Model



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+





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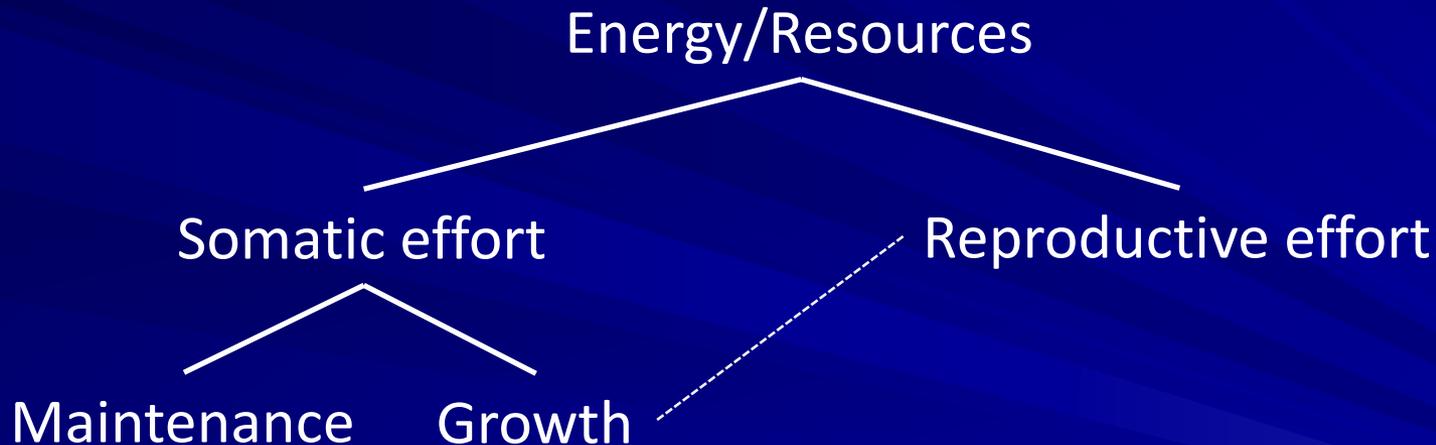
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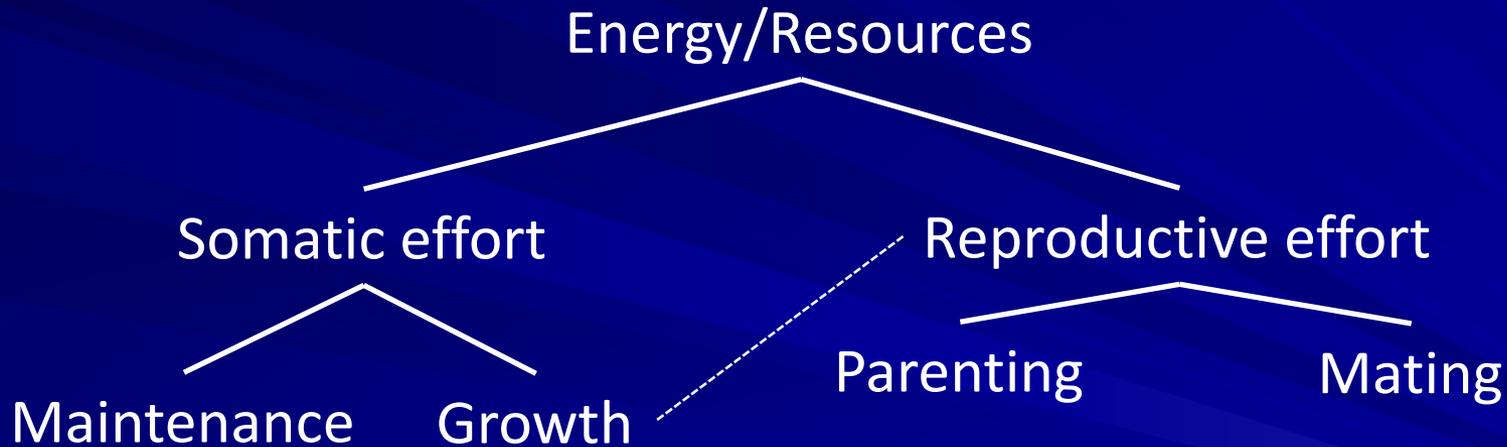
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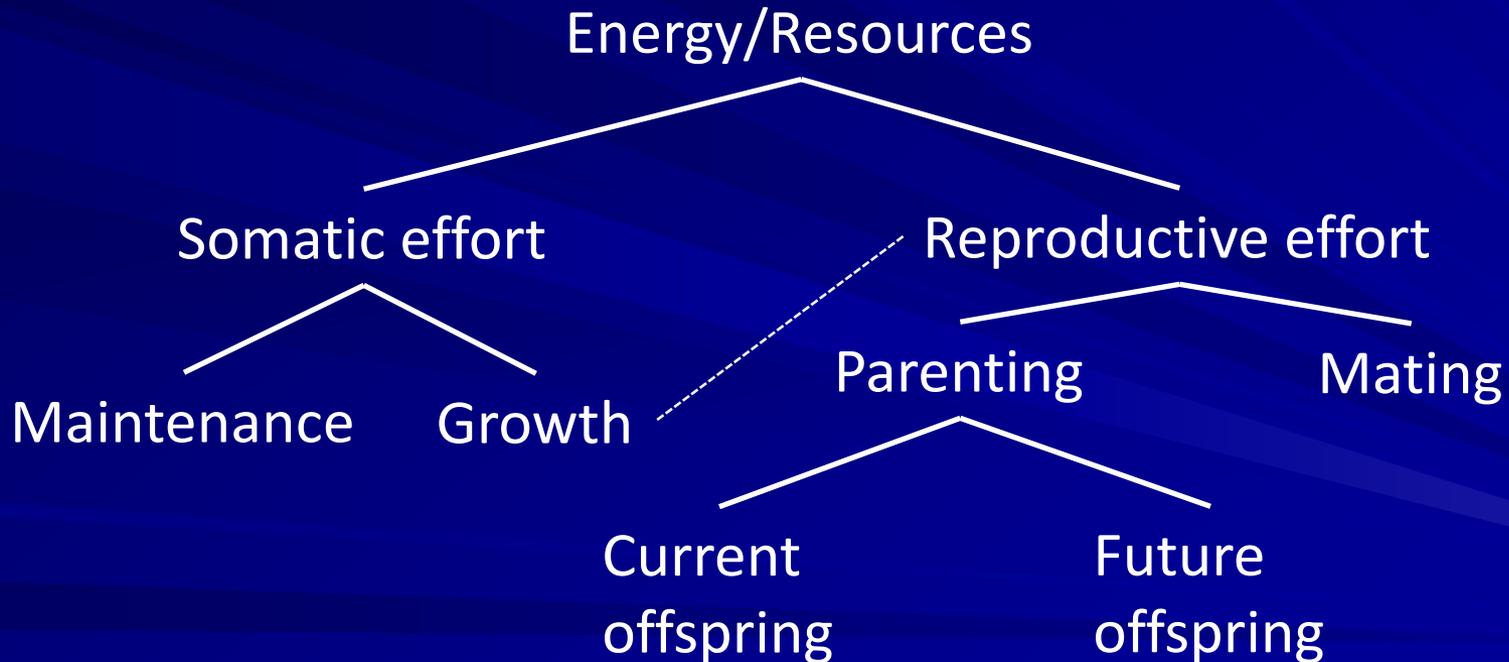
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- Mechanisms that regulate maternal somatic investment (gestational length, weight at birth) may contribute to adverse birth outcomes.
- Conditions suggesting high infant/child mortality risk may shift investment from current offspring to potential future offspring to increase the chance that at least some offspring will survive and reproduce.

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- The physical deterioration of the human built environment is increasingly recognized as an important influence on health.
- Highly deteriorated neighborhoods increase fear of crime and decrease perceptions of personal safety.
- This could reduce maternal somatic investment , as it reflects dangerous conditions for the current offspring.

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**Predictions:** The density of very deteriorated neighborhood structures will be directly related to the densities of premature and low birth weight births.

**Method:** We tested these predictions for births in Flint, Michigan in 2006 with geographically identified birth records from the Michigan Department of Community Health provided. The Flint Environmental Block Assessment project provided systematic data on the condition of 60,000 neighborhood structures.



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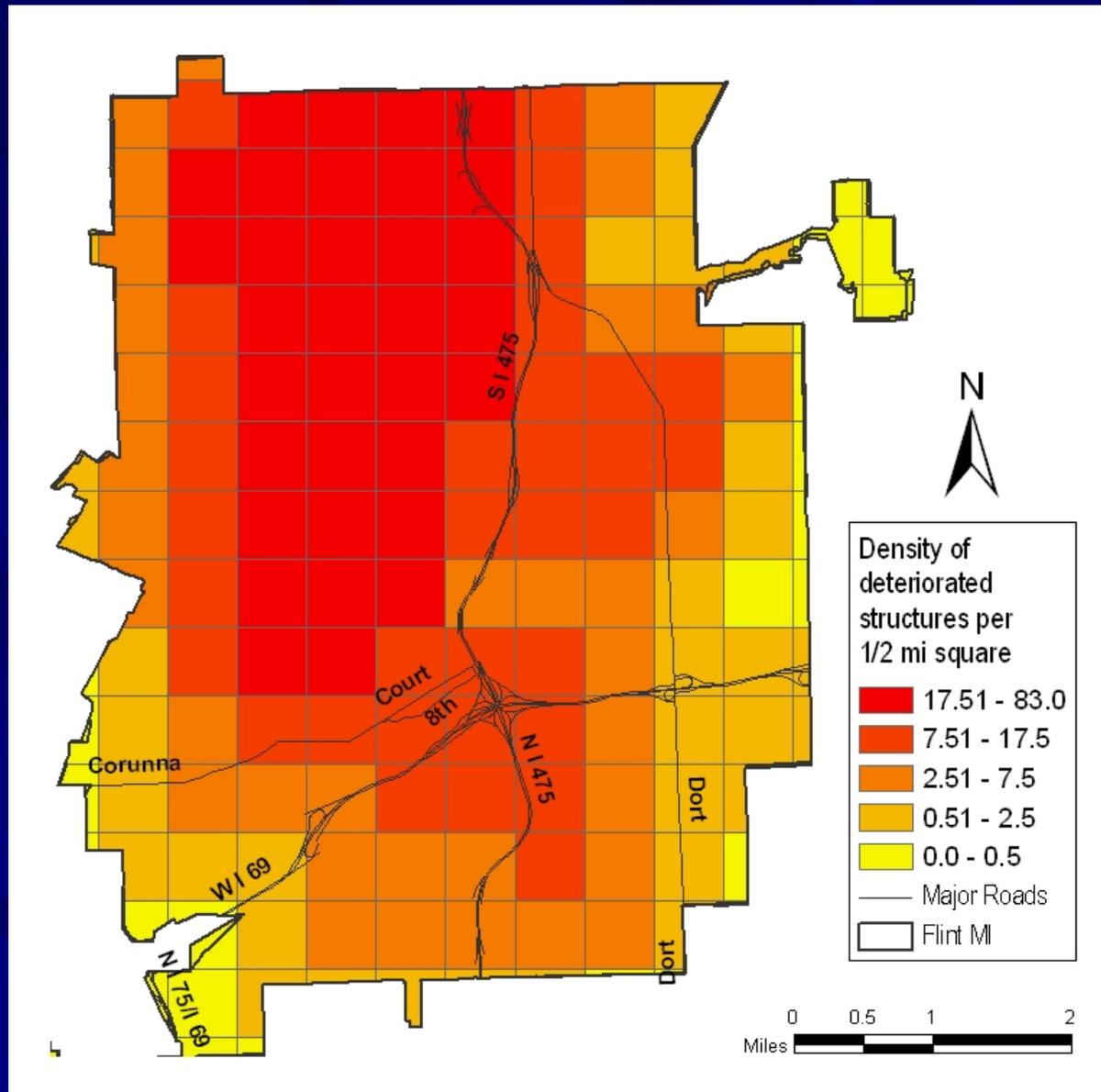
# Flint, Michigan

- Home of General Motors Corporation, the largest employer.
- 82K GM workers in 1970; 16K in 2006.
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- Many vacant and dilapidated properties, especially near the former car factories.

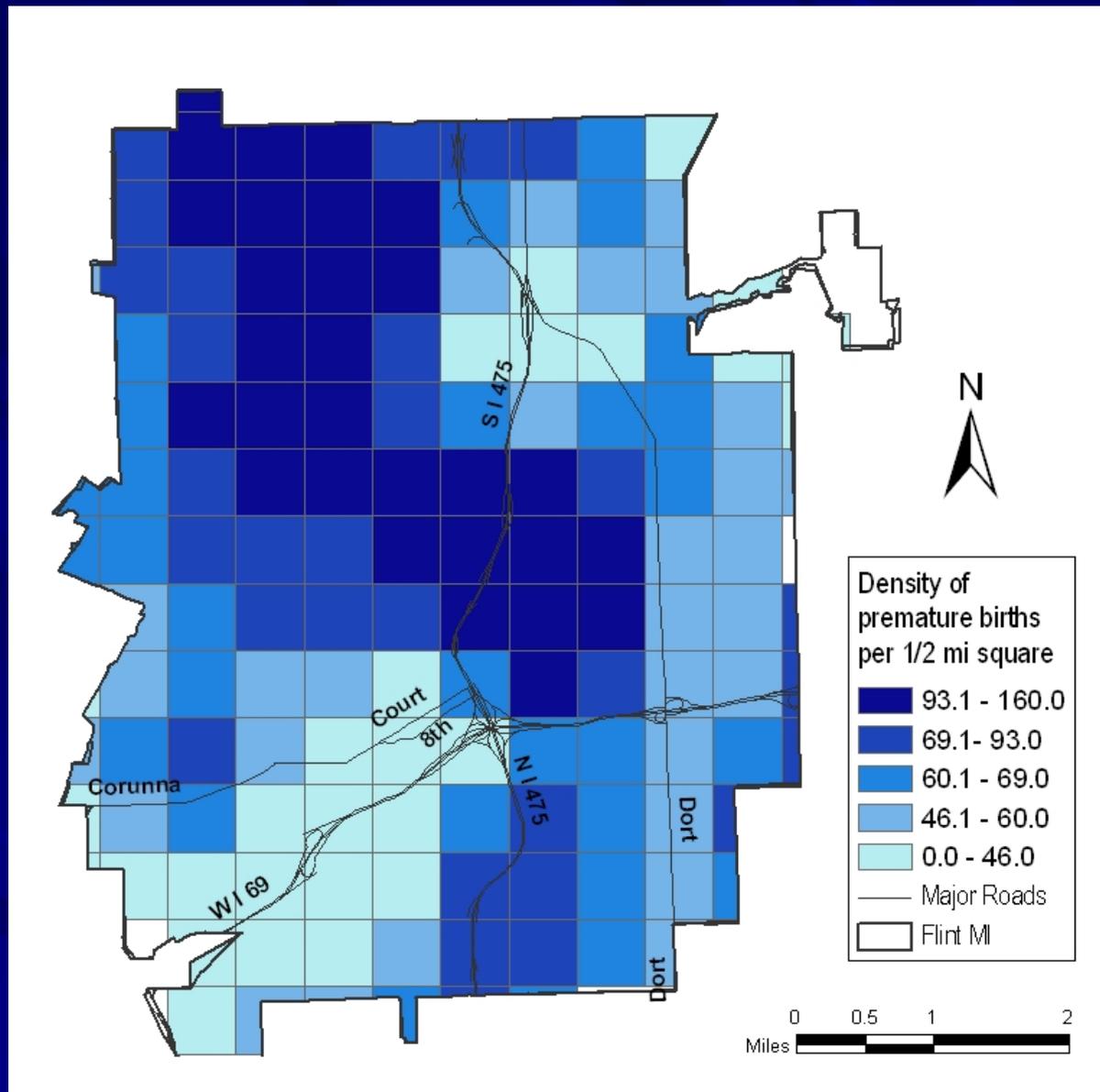
# Method

- We used Geographical Information Systems to calculate the proportional density of outcomes in .25 mi<sup>2</sup> areas:
  - Highly deteriorated residential structures
  - Pre-mature (<37 weeks) singleton births
  - Low birth weight (<2500g) singleton births
- Extracted variance in birth outcomes accounted for by maternal education, paternal education, and private insurance status at the individual level.
- Separate analyses for Blacks and Whites

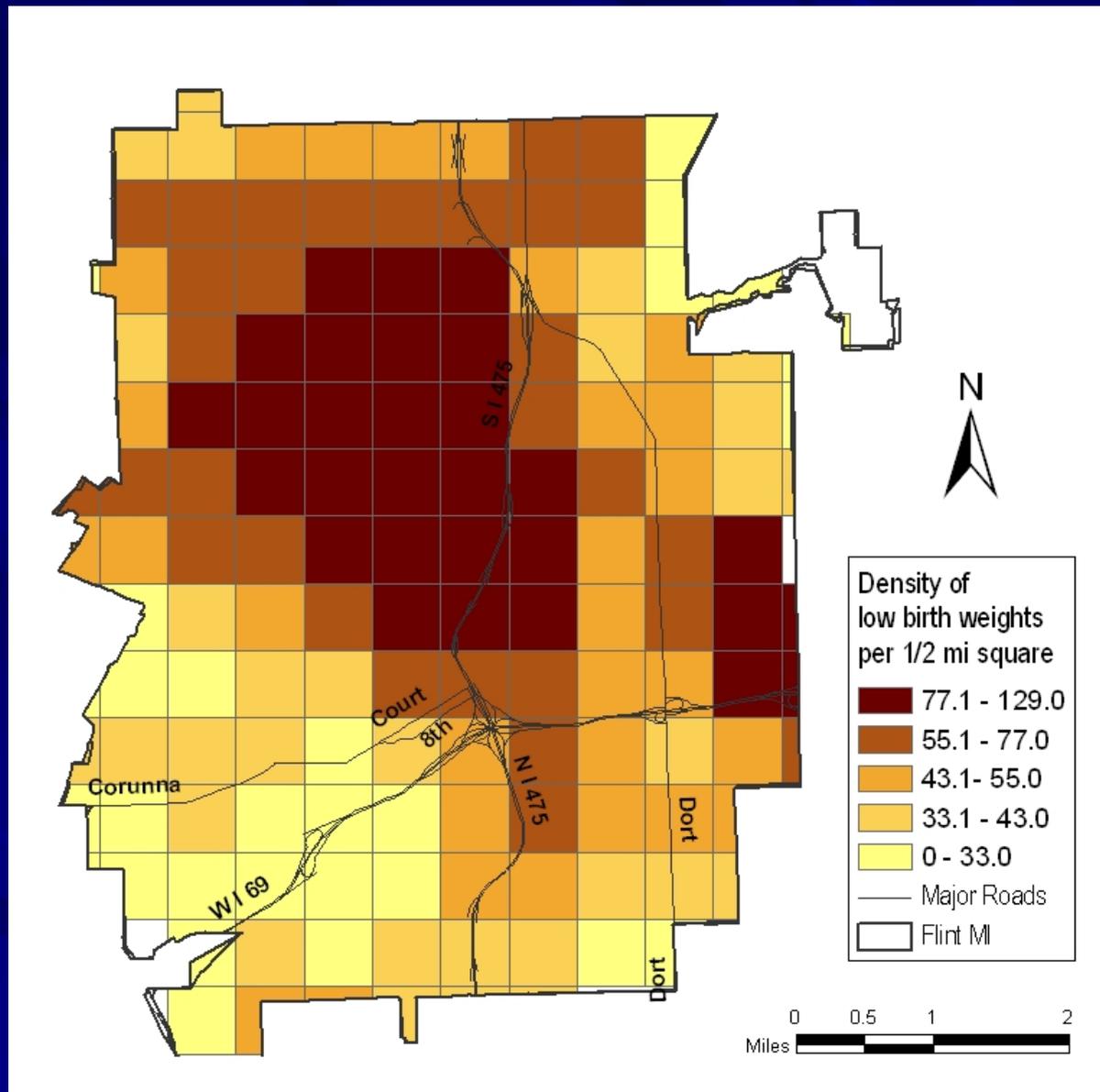
# Density of deteriorated structures



# Density of pre-mature births



# Density of low birth weight births



# Results

## Correlations with density of structural deterioration

Race	Pre-maturity	Low birth weight
All	.441***	.500***
Black	.354***	.336***
White	.228**	.026

$N = 169$ ; \*\* indicates  $p < .01$ , \*\*\* indicates  $p < .001$ . Controlling for maternal education, paternal education, and private insurance status.

# Results

The density of dilapidated structures was highly skewed across sectors (Skewness = 2.02,  $SE = 0.19$ ).

Black births were overrepresented in areas with high structural deterioration

## Proportion of births by area level of deterioration

Race	Top 25%	Top 5%
<b>Black</b>	49%	20%
<b>White</b>	22%	6%

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2. Scarcity of men in a population will predict lower paternal investment and also higher rates of prematurity and low birth weight (directly and/or indirectly).

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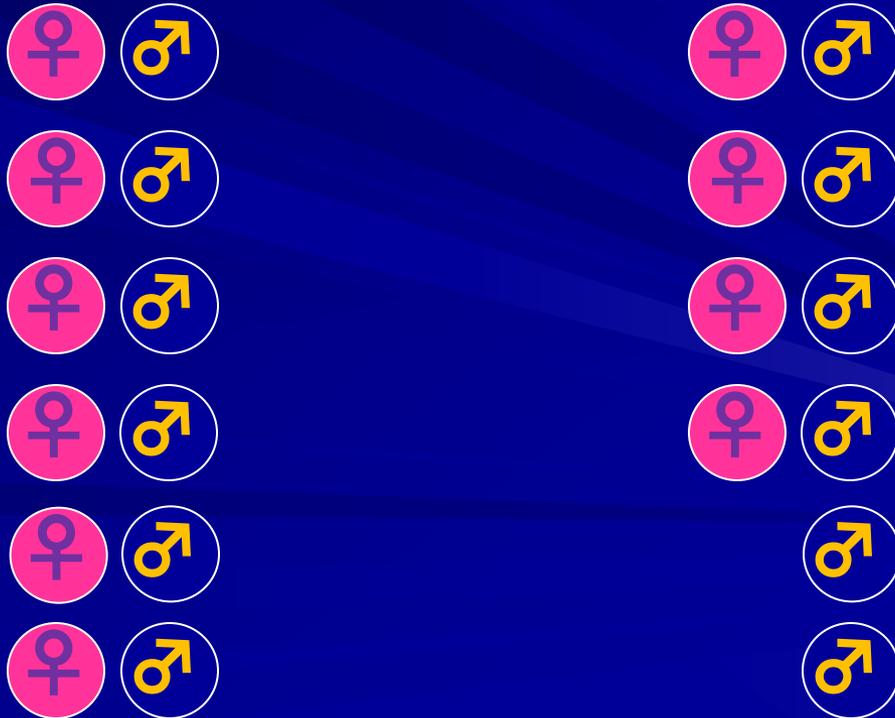
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Scarcity of men in a population will predict lower paternal investment and also higher rates of prematurity and low birth weight (directly and/or indirectly).

Higher incidence of low birth weight and pre-mature gestation



Lower incidence of low birth weight and pre-mature gestation



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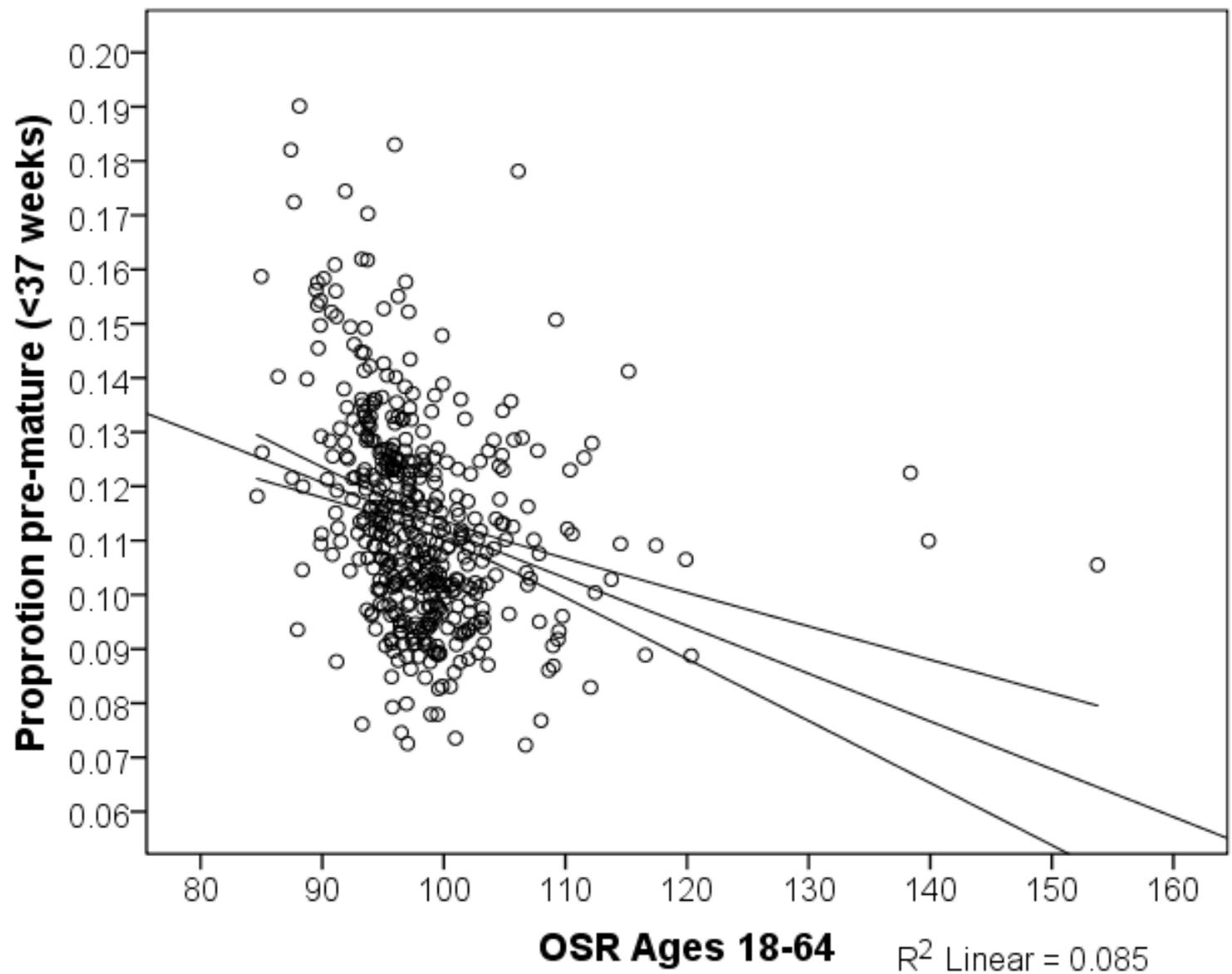
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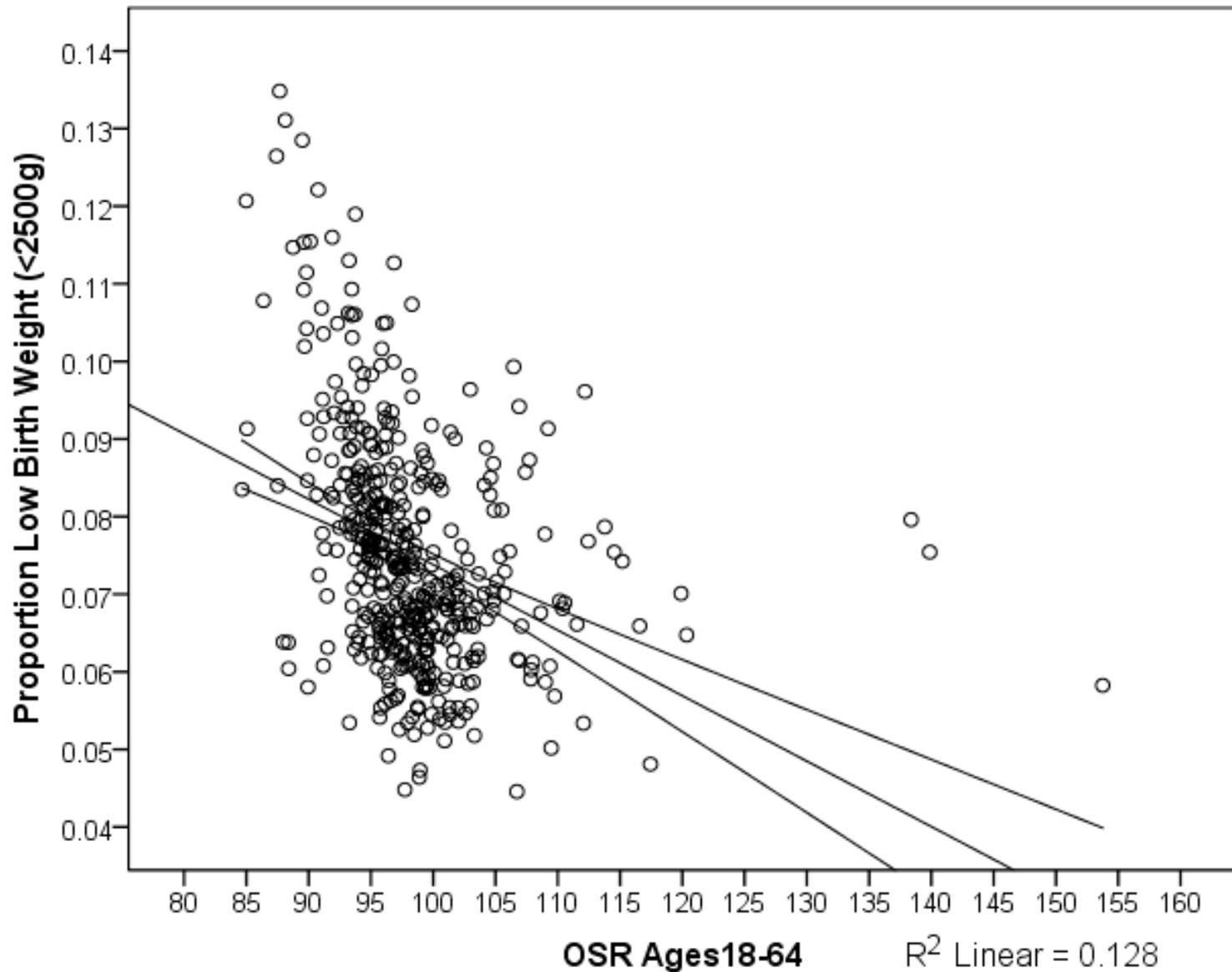
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  - SES:
    - % Income below poverty level
    - Median household income
    - % High School graduates (25 years old and older)
    - % 4-year College graduates (25 years old and older)

# Results

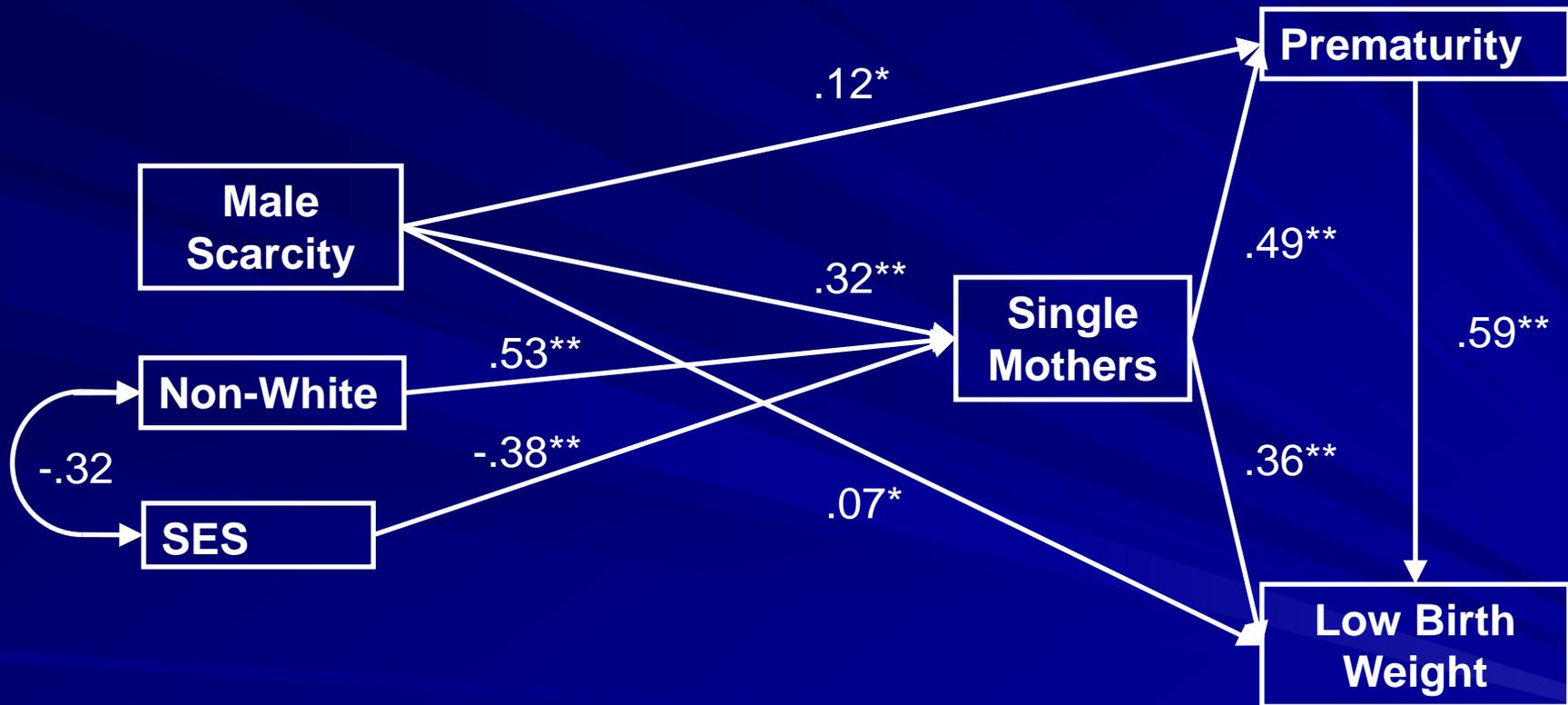


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Standardized regression coefficients

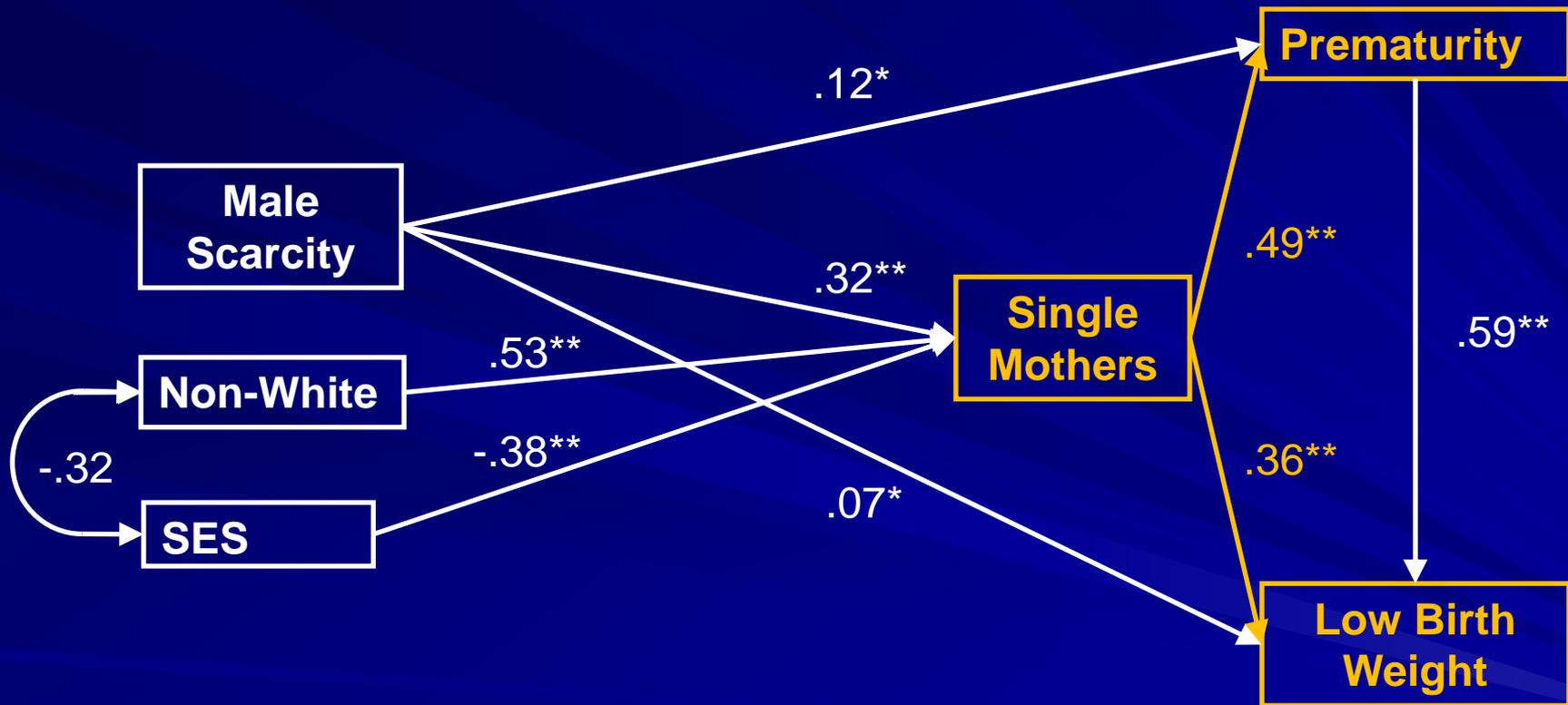


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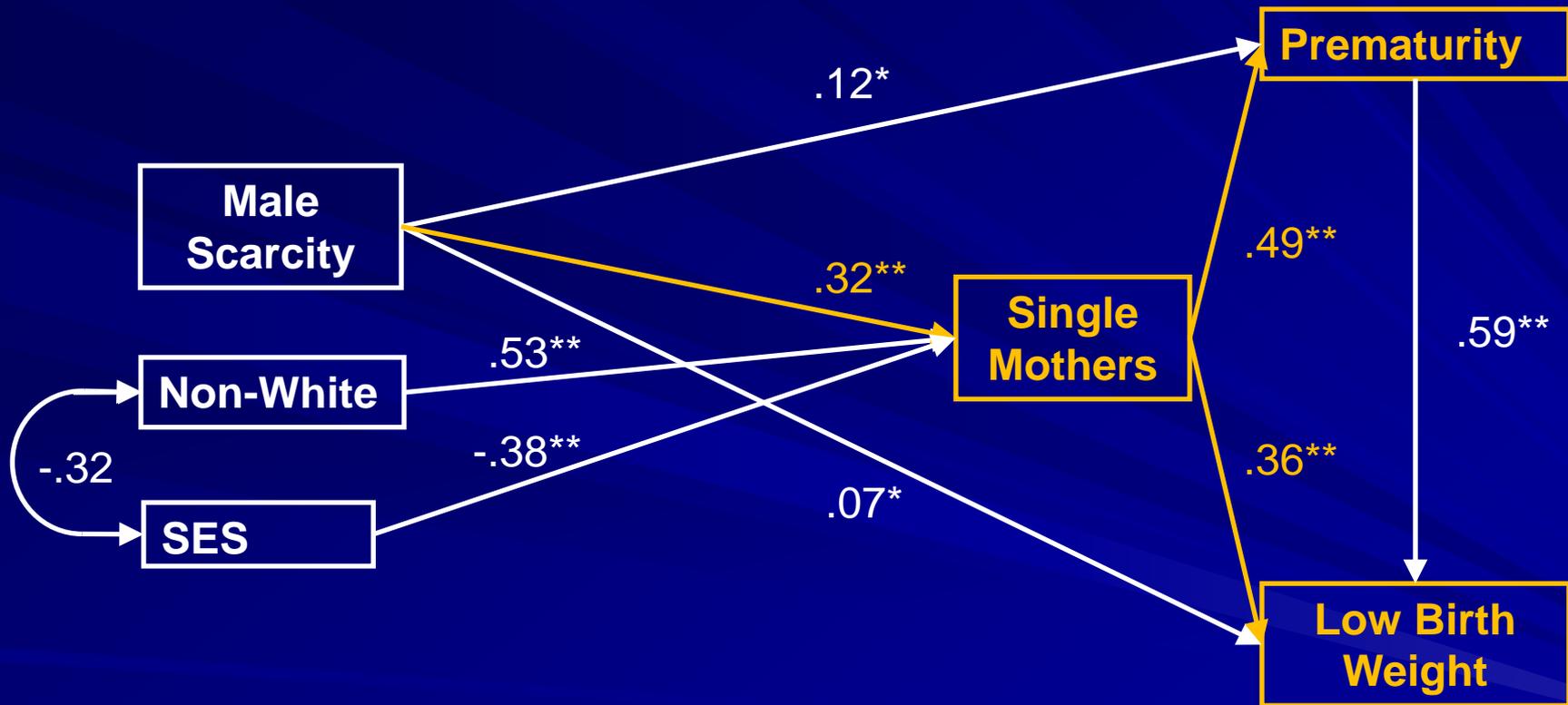


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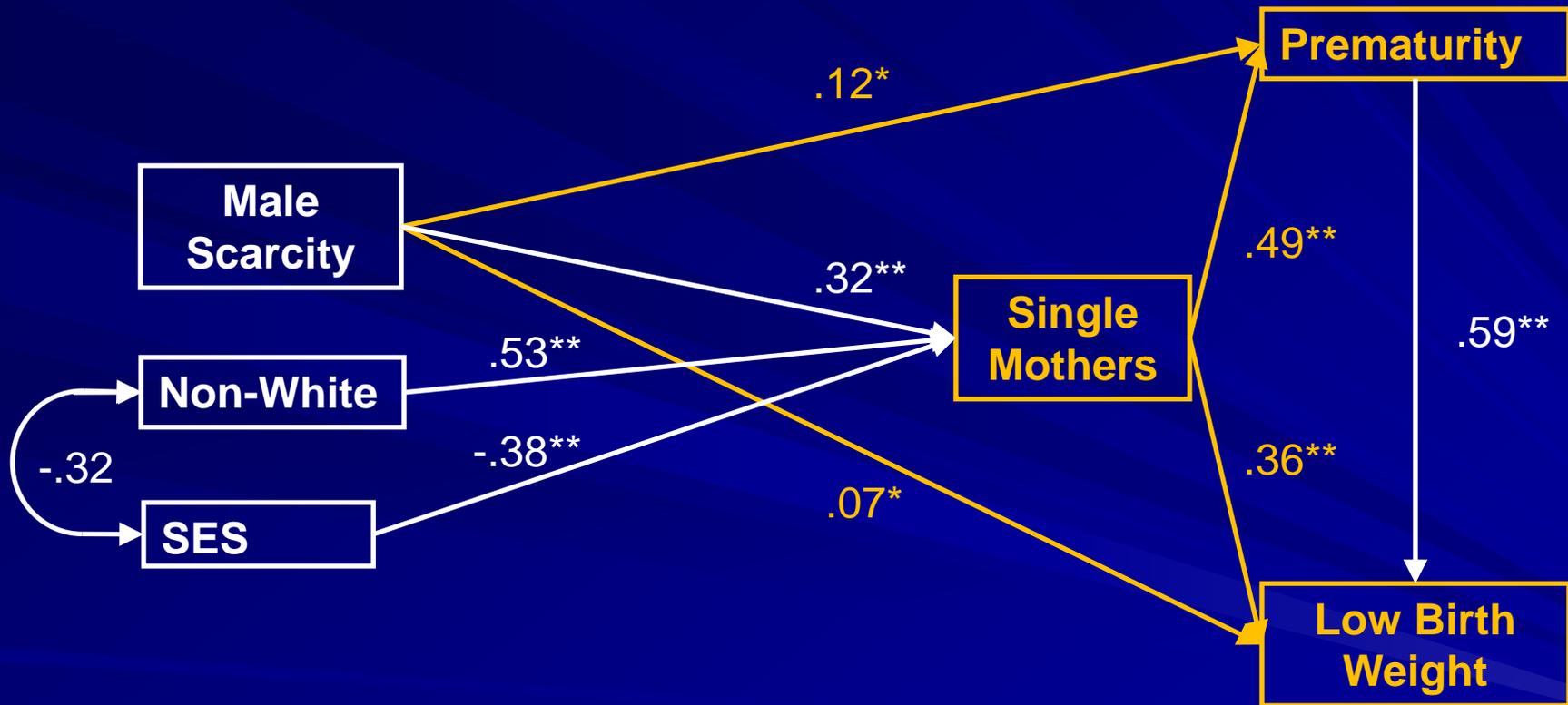


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# Results

## Proportion Premature Gestation

Predictor	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>	<i>p</i>
Constant	.121	.014	---	8.73	.001
% Single moms	.127	.001	.44	7.26	.001
% Non-White	.022	.006	.17	3.50	.001
OSR Ages 18-64	.000	.000	.14	3.88	.001
SES	.000	.000	-.26	3.70	.151

**Adjusted R<sup>2</sup> = .425**

# Results

## Proportion Low Birth Weight

Predictor	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>	<i>p</i>
Constant	.067	.009	---	7.39	.001
% Single moms	.153	.011	.69	13.32	.001
OSR Ages 18-64	.000	.000	.13	3.64	.001
% Non-White	.012	.004	.12	2.83	.005
SES	.000	.000	.09	2.47	.014

**Adjusted R<sup>2</sup> = .592**

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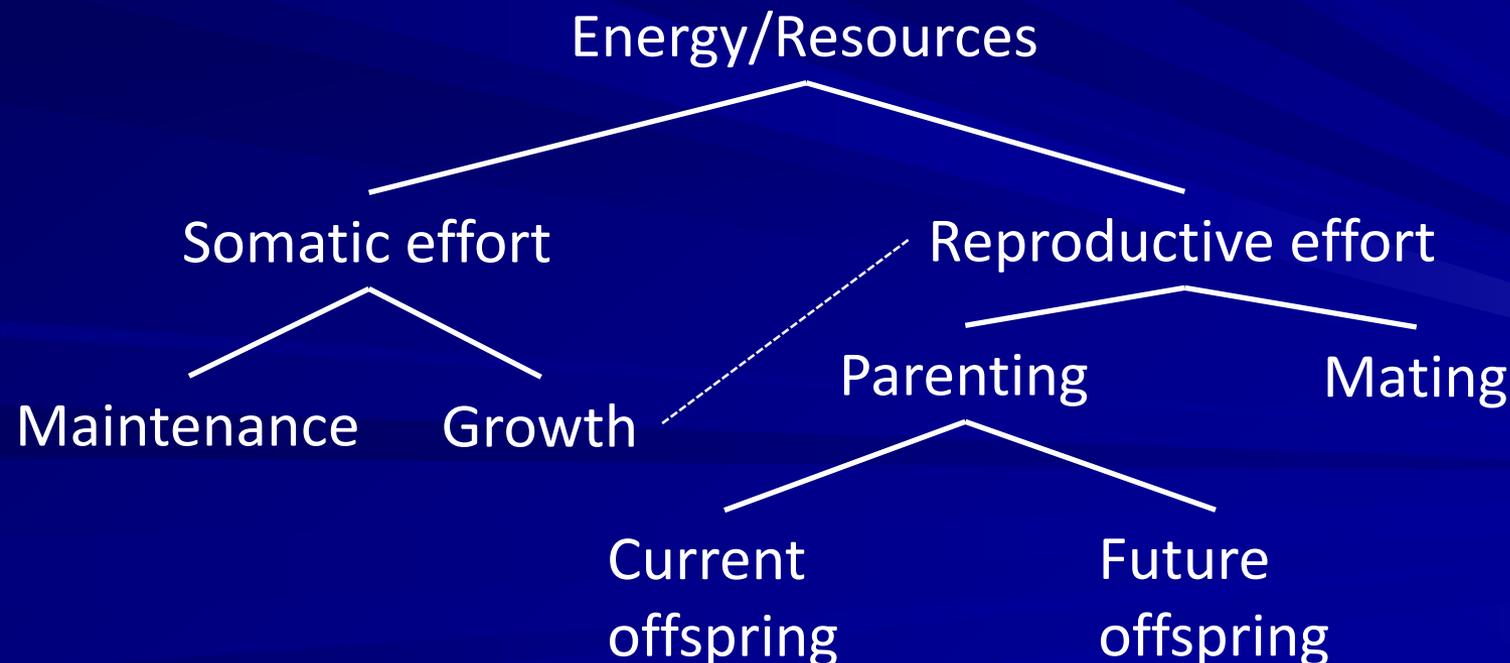
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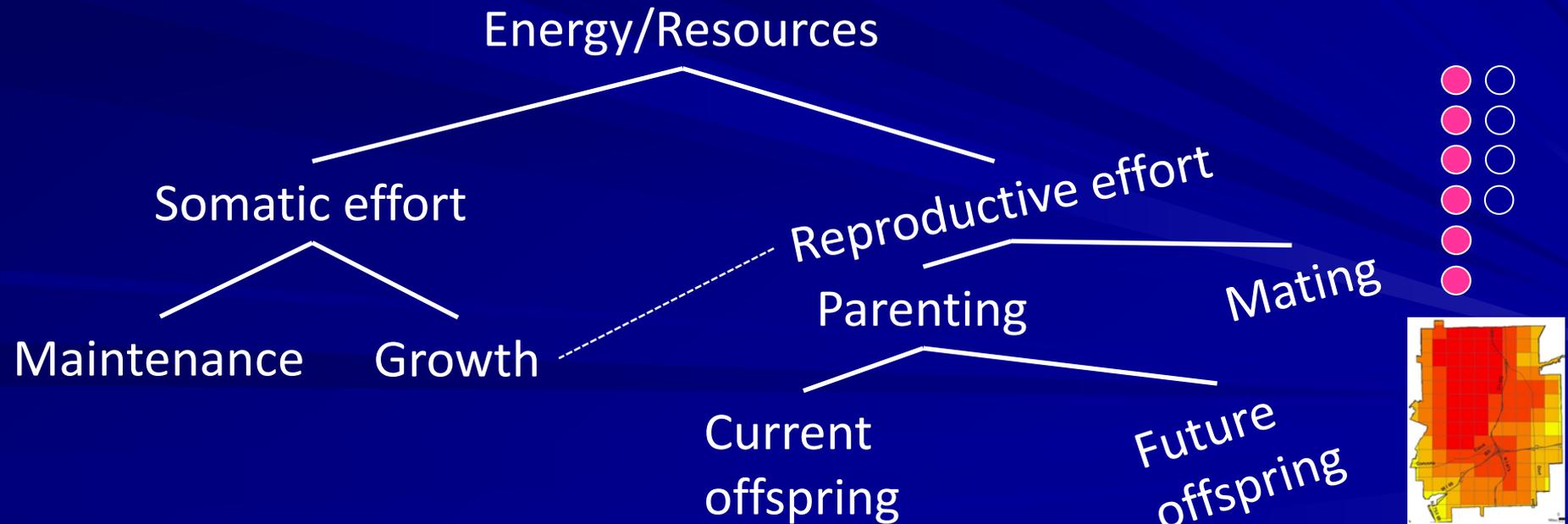
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- Conditions suggesting relatively lower levels of paternal investment rates predicted adverse birth outcomes.
- Interventions promoting desirable birth outcomes may be more effective if they attend to fatherhood and paternal support.
- Life History Theory is a powerful framework for understanding variation in adverse birth outcomes.



FIN



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