JOHNS HOPKINS BLOOMBERG SCHOOL of PUBLIC HEALTH

Neighborhood Effects on Birth Weight: An Exploration of Psychosocial and Behavioral Pathways

Ashley Schempf, Donna Strobino, Pat O'Campo

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Background

- Growing interest in exploring the impact of neighborhood environment on health
  - Promise of population-based prevention
- Experimental evidence of effects on mental health (Moving To Opportunity study)
- Consequences for failing to consider neighborhood effects
  - Mis-state individual level effects
  - Undermine effectiveness of preventive efforts

Important Neighborhood Features

- Physical Environment
  - Housing quality, pollution, noise, walkability
- Social Environment
  - Collective efficacy, social norms, incivilities
- Service Environment
  - Access to health care, parks and fitness facilities, food outlets, drugs and alcohol

Perinatal Literature

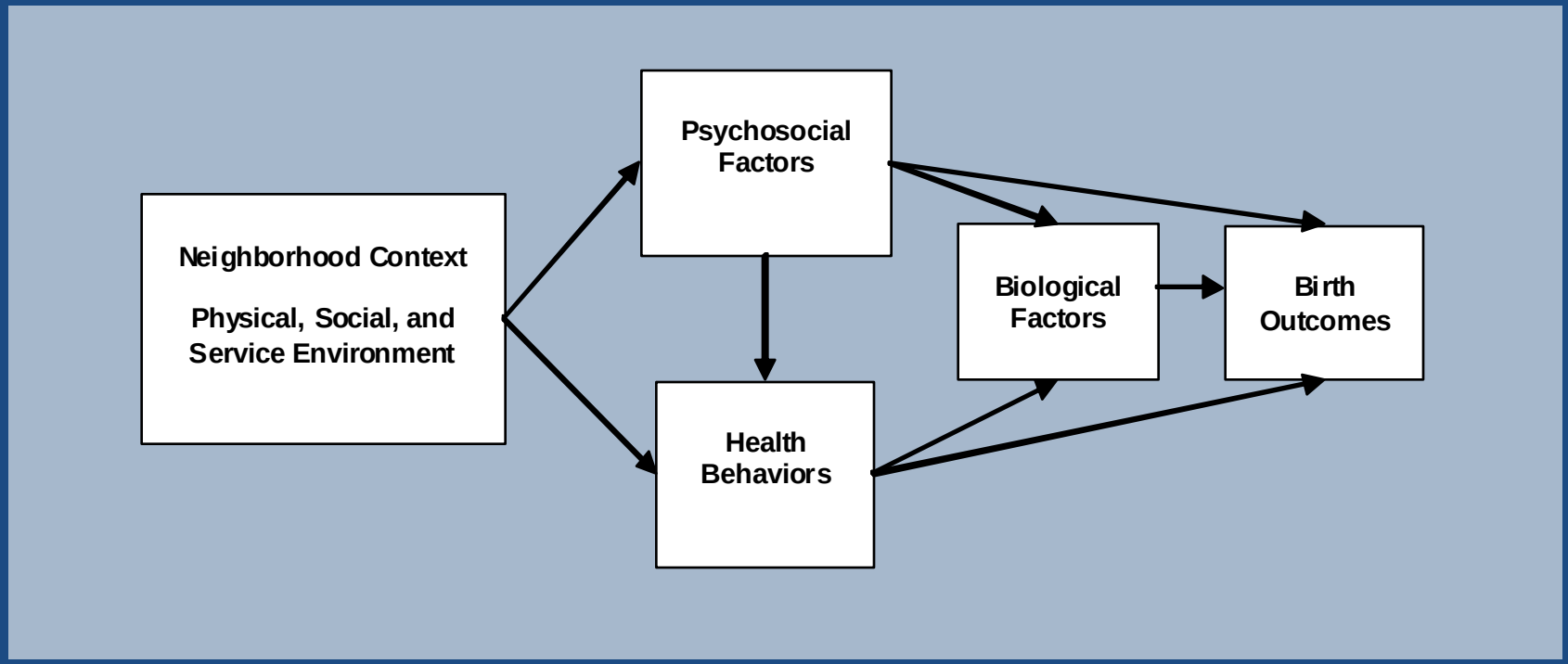
- Neighborhood effects on birth weight, LBW, PTB, and growth restriction have been noted
  - Structural indicators
    - socioeconomic disadvantage, racial segregation
  - Process indicators
    - violent crime, vacant housing, social cohesion
  - Resource indicators
    - density of clinics, outlets for food, alcohol, tobacco
- Also effects on pregnancy-related behaviors: prenatal care utilization, dietary quality, smoking, and drug use
- Proposed psychosocial and behavioral pathways have not been empirically tested

Objectives

1) To determine the impact of neighborhood context on birth outcomes independent of individual sociodemographic confounders

2) To assess mediation via psychosocial and behavioral factors

Conceptual Model



Study Design and Methods

Johns Hopkins Hospital clinic sample of low-income women

- February 1995 - May 1996
- Oversampling for drug use and no prenatal care
- 726 women geocoded to Baltimore City census tracts (90%)
- 95% Black, 47% < high school educated

Data Sources

- Postpartum interview and medical records
- Census tract data from 1990 Census and 1995 police reports

Analytic Methods

- Random intercept multilevel models (SAS Proc MIXED)

$$BW_{ij} = \mathrm{B}_{00} + \sum \mathrm{B}X_{ij} + \mathrm{B}Z_{j} + \mu_{0j} + \varepsilon_{ij} \qquad \mu_{0j} \sim N(0, \tau_{00}) \quad \varepsilon_{ij} \sim N(0, \sigma^2)$$

Neighborhood Risk Index

- 126 tracts with an average of 5.8 subjects per tract, range 1-40

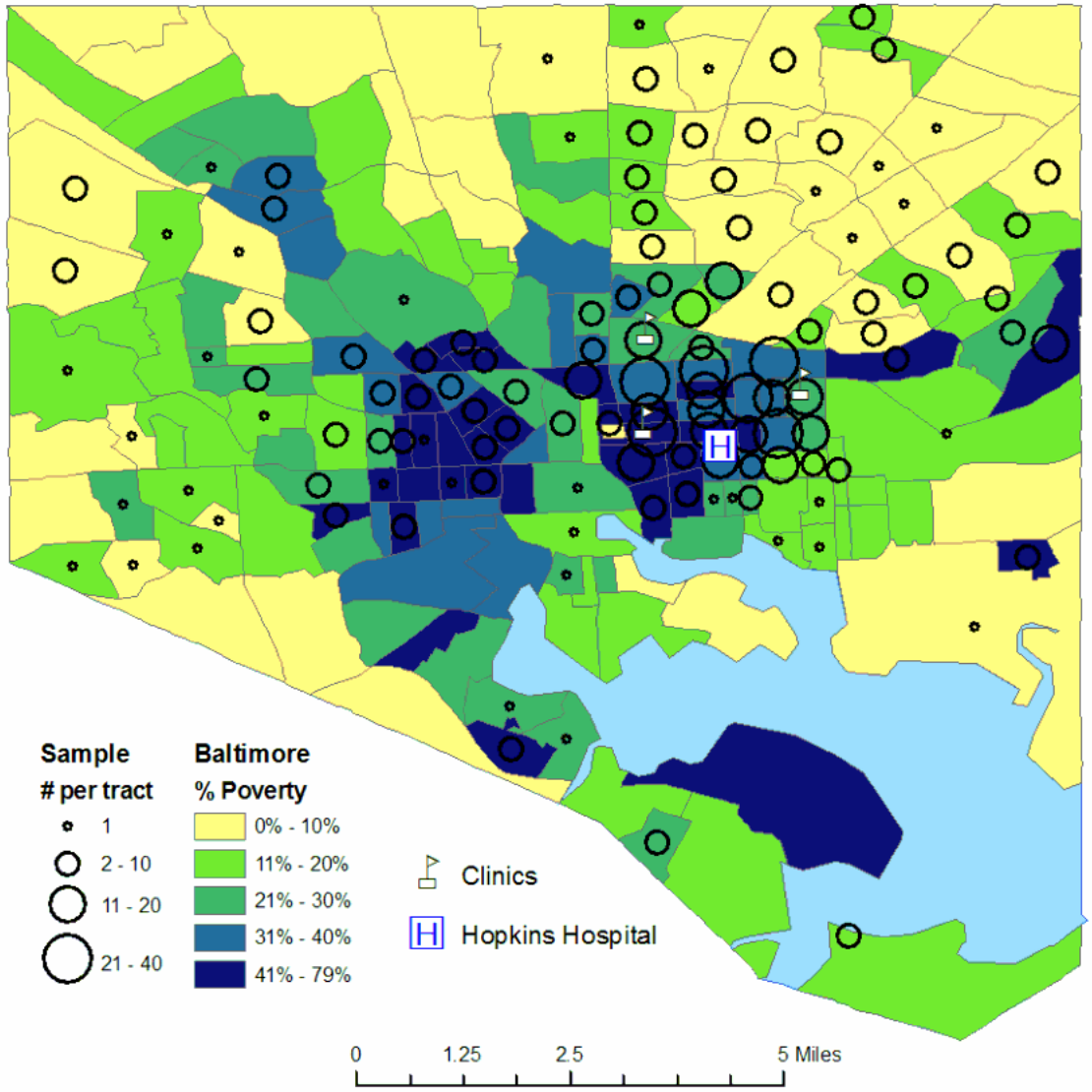
Variable	Mean (SD)	Min	Max	Factor Loadings
% Poverty	26.1 (17.3)	2.5	79.2	0.85
% Black	69.2 (35.0)	0.9	99.7	0.68
Violent Crime Rate	35.3 (21.4)	4.3	113.5	0.86
% Boarded-Up Housing	1.9 (2.7)	0	13.8	0.84

Cronbach α=0.82

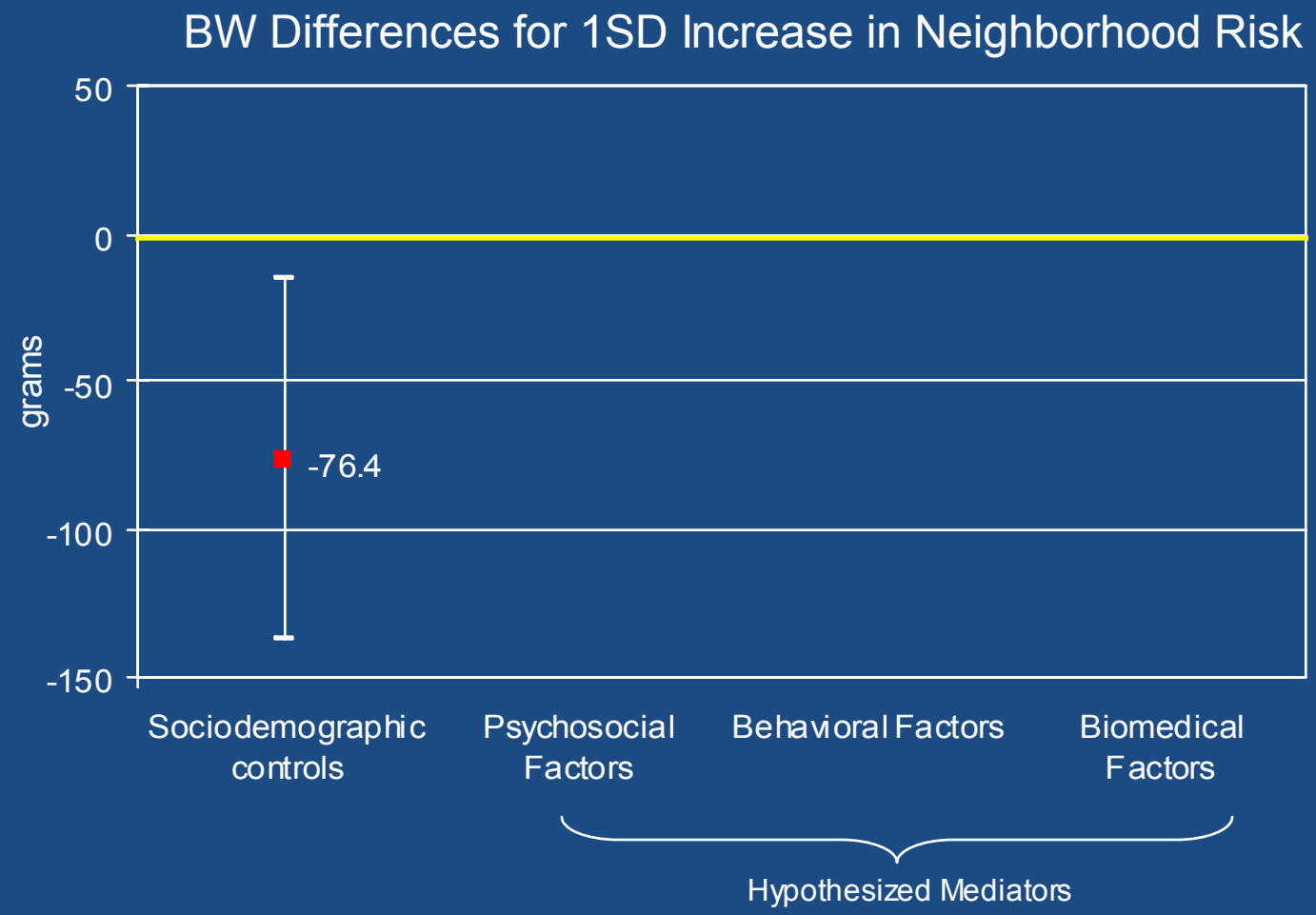
Key Individual Level Variables

- Sociodemographic Control Factors
  - Maternal age, race, marital status, education, money for necessities, public assistance, home ownership
- Psychosocial Factors
  - Stress (daily hassles), Pregnancy Locus-of-Control, Social Support (2+ network members to discuss problems with sometimes/often)
- Behavioral Factors
  - Smoking, Drinking, Hard Drug Use, Early Prenatal Care
- Biomedical Factors
  - Hypertensive Disorders, Infection, Nutritional Status

Spatial Distribution of Sample According to Census Tract Poverty Rates, Baltimore City

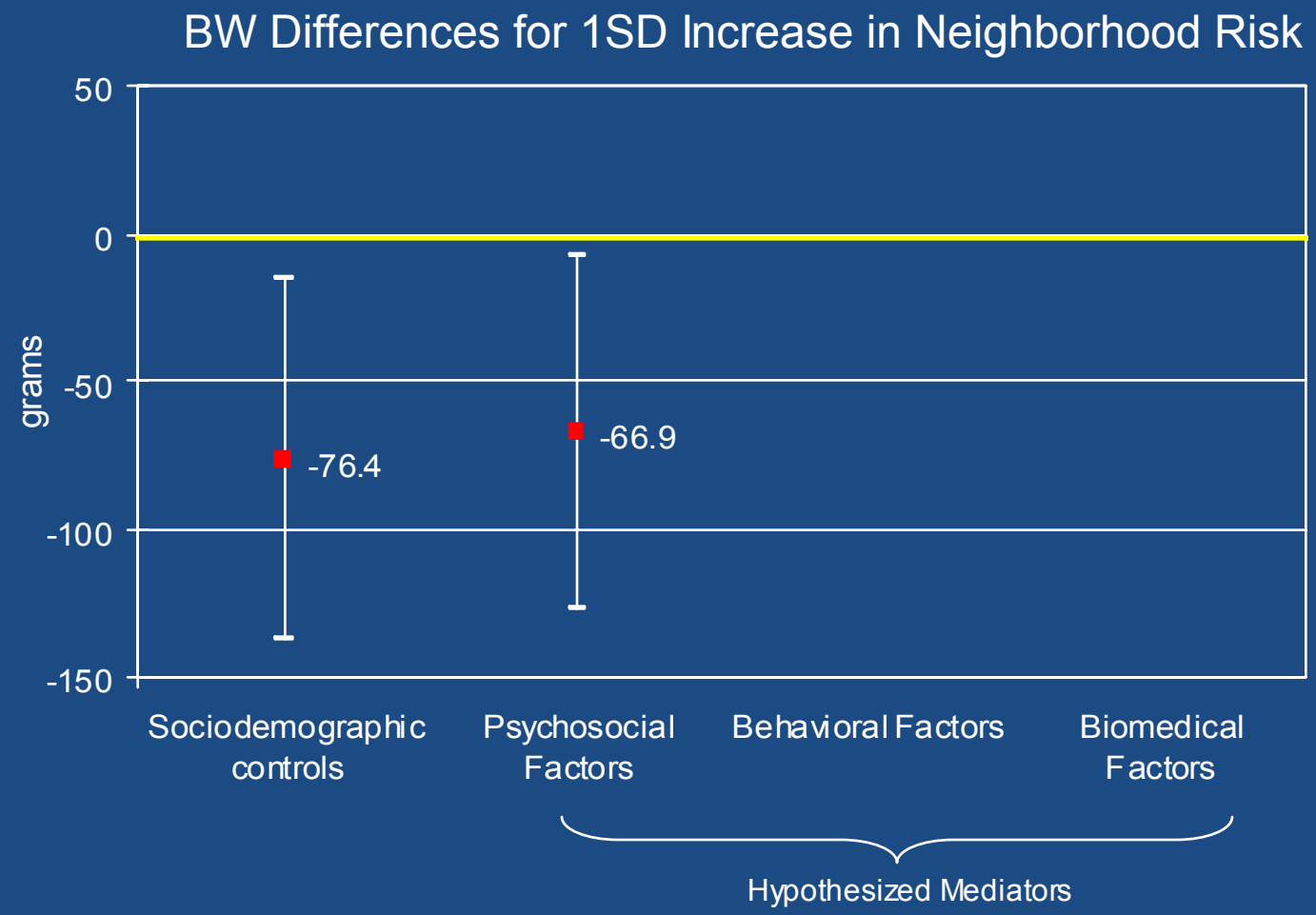


Multilevel Model Results



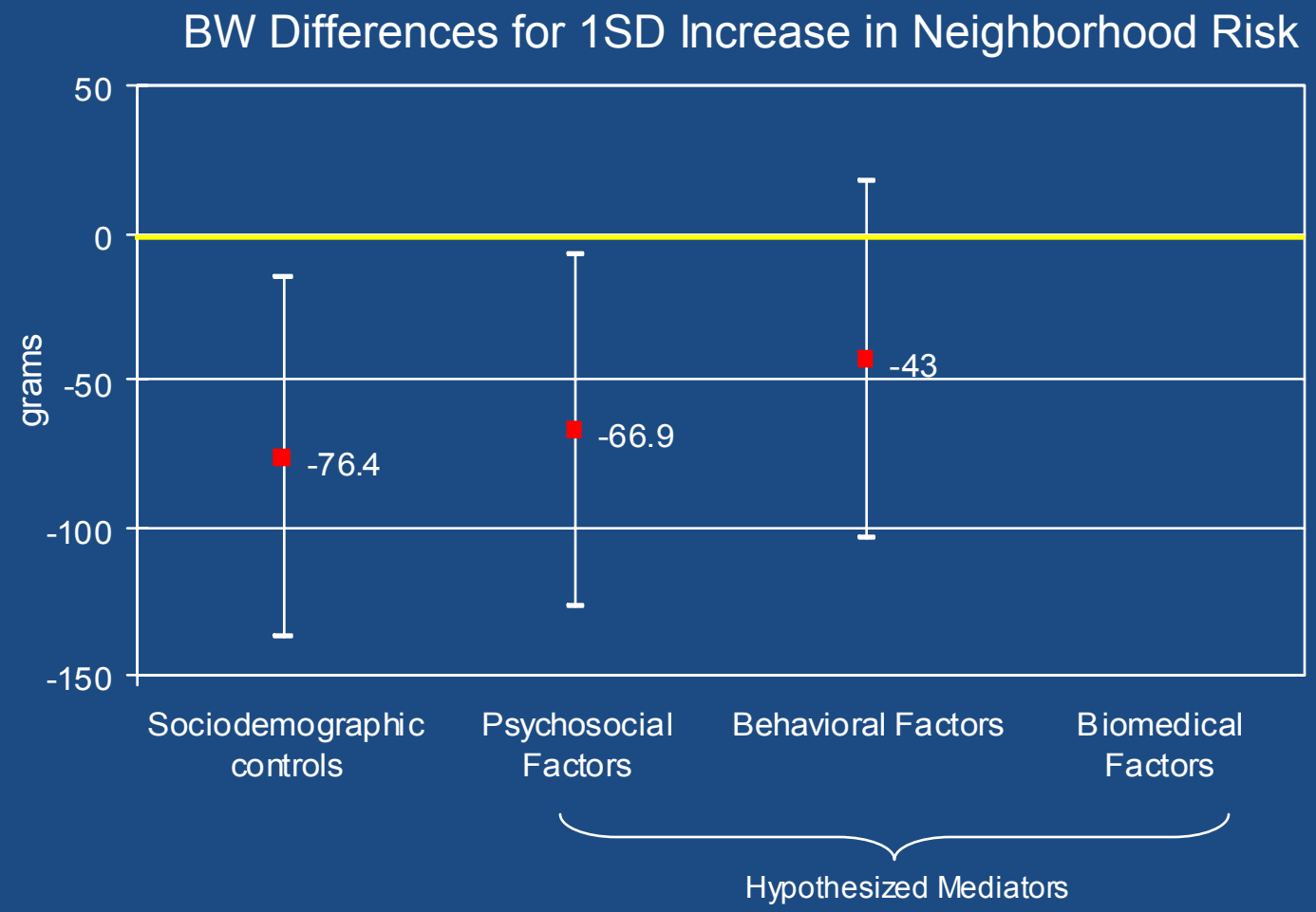
- ~300 gm difference between best and worst neighborhoods

Multilevel Model Results



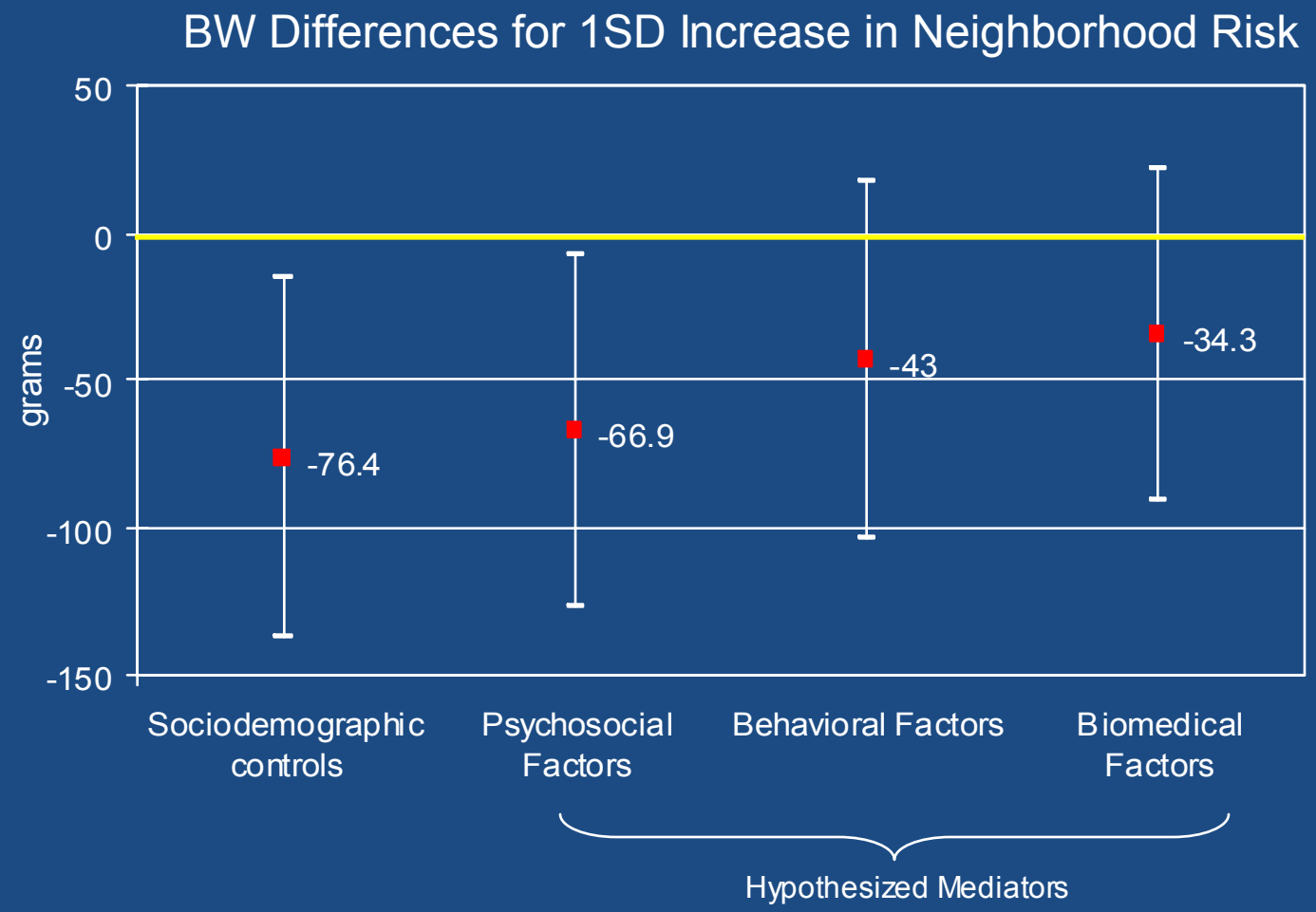
- Controlling for psychosocial factors explained only 10%

Multilevel Model Results



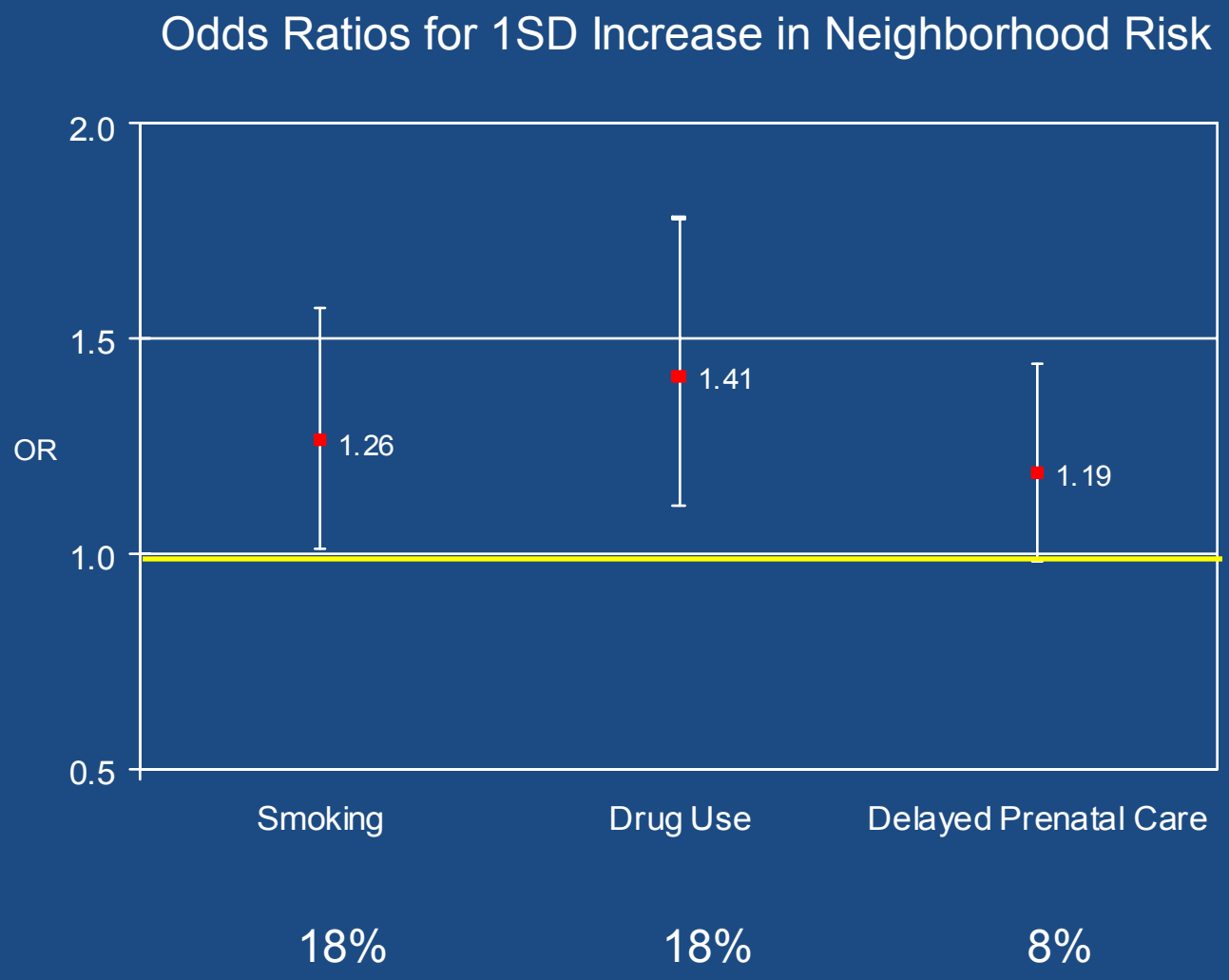
- Controlling for behavioral factors explained an additional 30%

Multilevel Model Results



- Added control for biomedical factors explained another 10%

Behavioral Mediators as Outcomes



Conclusions

- Support a significant neighborhood effect on birth weight independent of sociodemographic characteristics
  - Suggests that women were dually burdened by personal as well as neighborhood disadvantage
- Limited support for psychosocial pathways
  - Future studies should measure neighborhood disorder (litter, loitering, graffiti, vacant lots, noise, incivilities)
- Strong support for behavioral pathways
  - Neighborhoods may influence behaviors through social norms, collective efficacy, and access to goods and services (i.e. drugs, prenatal clinics)
- Neighborhood interventions should be considered

Strengths and Limitations

Strengths

- Psychosocial and Behavioral Factors
- Low income sample
- Sample selection at L&D

Limitations

- Cross-sectional data, causal inference
- Deficit model
- Small sample size

Future Research

- Observational studies that directly assess neighborhood features and psychosocial hazards
- Experimental designs are necessary to promote causal inference
  - Natural experiments, community interventions

Acknowledgements

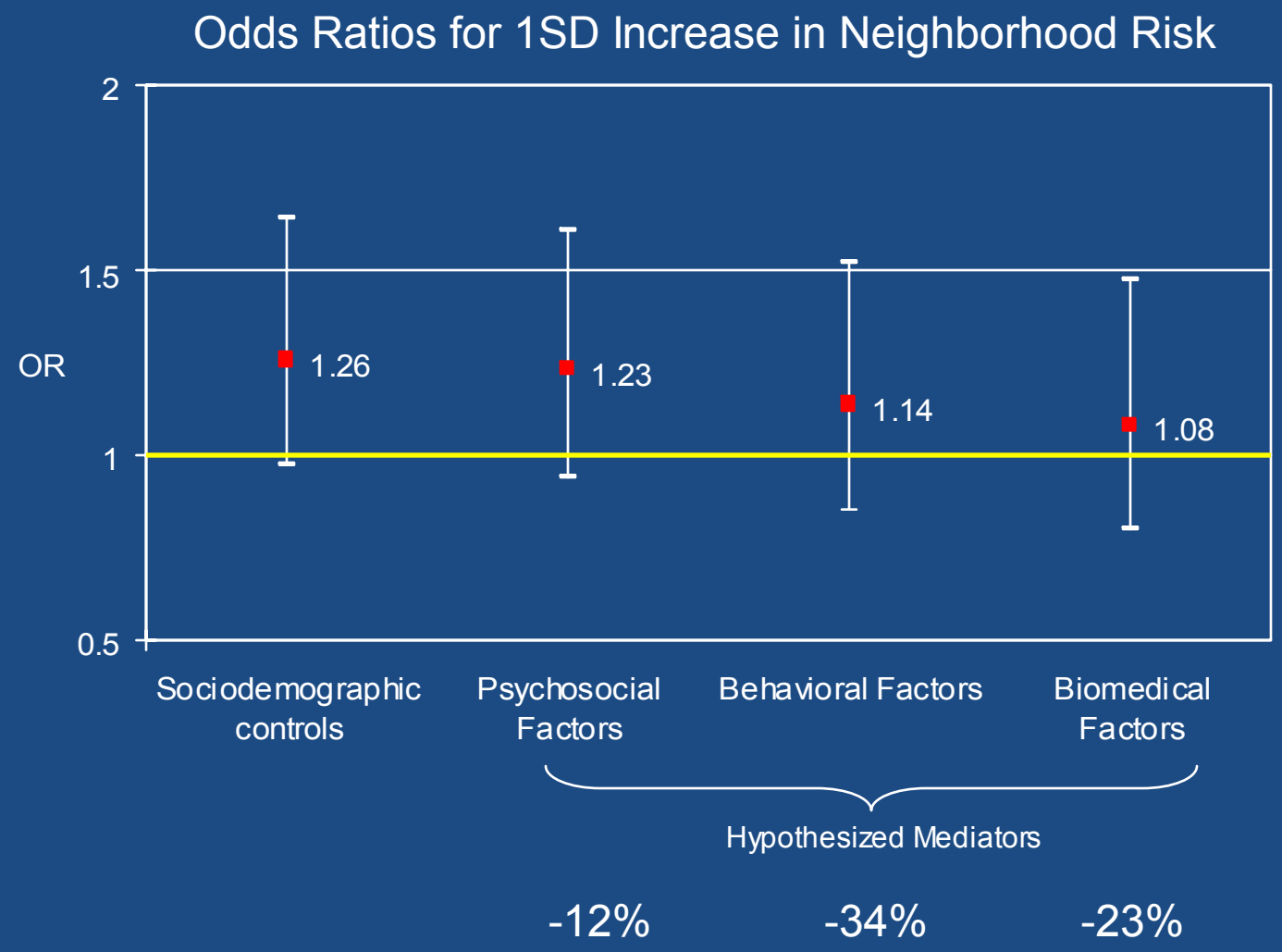
- National Institute on Drug Abuse

  R01 DA007621

  R03 DA020632

Extra Slides

LBW Multilevel Model Results



Influence of Personal Disadvantage

	Model 1	Model 2	Model 3	Model 4
Neighborhood Risk Index (1 SD)	-76.4*	-66.9*	-43.0	-34.3
Sociodemograpic Control Variables				
Maternal Age				
19-24	–	–	–	–
25-34	-114.9*	-50.8	98.8^	71.7
35+	-261.0†	-165.6^	54.8	65.4
Race				
Black v. other	-48.7	-18.3	15.8	82.4
Married or Living with Father of Baby	78.0	80.3	82.5	60.6
Education				
< High School	–	–	–	–
High School or GED	134.5*	98.7^	39.3	25.8
> High School	149.3^	94.6	9.5	-0.9
Enough Money for Necessities				
Half the time or less	-267.6‡	-70.6	-45.7	-14.4
More than half	-103.4^	8.1	-5.6	29.4
Almost always	–	–	–	–
Public Assistance				
Yes v. no	195.6*	205.9*	202.4*	158.1^
Home Ownership				
Yes v. no	64.5	70.5	76.3	84.7

Influence of Psychosocial Factors

	Model 1	Model 2	Model 3	Model 4
Psychosocial Factors				
Stress				
Little to none		--	--	--
Some		-112.8^	-61.1	-85.8
Mild		-237.8†	-158.7*	-160.4*
Moderate to Severe		-394.4‡	-234.3†	-267.2†
Pregnancy Locus of Control				
Some or no control		--	--	--
Moderate control		136.9*	112.1^	113.6*
Strong control		208.9†	159.6*	154.7*
Emotional Support				
Yes v. no		90.2^	69.9	37.7

Influence of Behavioral Factors

	Model 1	Model 2	Model 3	Model 4
Behavioral Factors				
Cigarettes/day				
0			--	--
1-9			-151.1*	-140.7*
10+			-290.7‡	-215.3†
Alcohol				
Never			--	--
1-4 days/month			-19.2	-50.1
1-2 days/week+			-120.7	-71.2
Hard Drug Use			-169.2*	-119.7^
Early Prenatal Care			103.4*	66.5

Influence of Biomedical Factors

	Model 1	Model 2	Model 3	Model 4
Biomedical Factors				
Hypertensive Disorders				-237.5†
Infection				-107.3
Pre-pregnancy weight				
<120				-207.9‡
120-159				--
160-199				172.0†
200+				265.6‡
Net Weight Gain				
<10				-150.2†
10-29				--
30-39				73.4
40+				208.5*

Money for Necessities

Family Resources Scale
Money for Necessities

Responses range from 1-5
1=Almost always
2=More than half the time
3=About half the time
4=Less than half the time
5=Almost never

#	Question
1	How often did you have enough money to buy food for 2 meals a day while you were pregnant?
2	How often did you have enough money to pay the rent or mortgage for your apartment or house?
3	How often did you have enough money to pay for other necessities such as heat for your home or to pay your electric bill?
4	How often did you have enough money to buy enough clothes for your family?
5	How often did you have enough heat for your house or apartment?
6	How often did you have enough money to pay your monthly bills?
7	How often did you have enough furniture for your home or apartment?

Cronbach alpha = 0.87

Stress Measure

Hassles Scale
Responses range from 1-4
1=No stress
2=Some stress
3=Moderate stress
4=Severe stress

#	*To what extent (was/were) [OPTION] a hassle for you during your pregnancy?*
1	Worries about food, shelter, health care, and transportation
2	Money worries like paying bills
3	Problems related to family
4	Having to move, either recently or in the future
5	A recent loss of a loved one
6	The pregnancy itself
7	Sexual, emotional or physical abuse
8	Problems with alcohol or drugs
9	Work problems
10	Problems with your friends
11	Feeling generally “overloaded”
12	Crime in your neighborhood

Cronbach alpha = 0.80

Pregnancy Locus of Control

Locus of Control
Responses range from 1-4
1=Strongly agree
2=Agree
3=Disagree
4=Strongly disagree

#	*How much do you agree or disagree that (READ STATEMENTS)?*
1	There was nothing I could do to make sure my child was born healthy
2	It was my job as a mother to make sure my child was born healthy
3	Bad luck could have kept my child from being born healthy
4	I could make very few choices about my child's health at birth
5	I could do many things to make sure my child was born healthy

Cronbach alpha = 0.72