School socioeconomic context is associated with student weight status

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Background: Childhood obesity is a significant public health problem

- Precipitous rise in prevalence across all sociodemographic groups

- Higher prevalence of obesity in:
  - African-American girls
  - Hispanic girls and boys
  - Low income girls and boys

Background: School context likely influences student weight status

- Students spend many hours in school
- A large percentage of their daily intake is consumed at school
- Schools provide physical activity opportunities and/or requirements that influence overall physical activity levels
- Influence of teachers/role models and peers

Background: Schools may contribute to racial/ethnic and/or socioeconomic disparities in weight status

- Schools have become increasingly segregated
- Differential availability of physical education
- Differential availability of vending machines and/or food and beverage advertising

Study Aims

- To determine if there are school level differences in Body Mass Index (BMI) beyond that due to higher or lower risk students clustering in schools
- To determine if there are school level characteristics that predict individual level weight status

National Longitudinal Study of Adolescent Health (Add Health)

- Nationally representative school-based study of adolescents in grades 7-12
- Schools were the primary sampling unit
- Sample: 17,007 adolescents in 132 schools

Model Variables

- Outcome: Body Mass Index

- Individual level variables
  - Race/ethnicity
  - Age
  - Household income
  - Maternal education level

- School level variables
  - Racial/ethnic makeup of the student body
  - Median household income of school

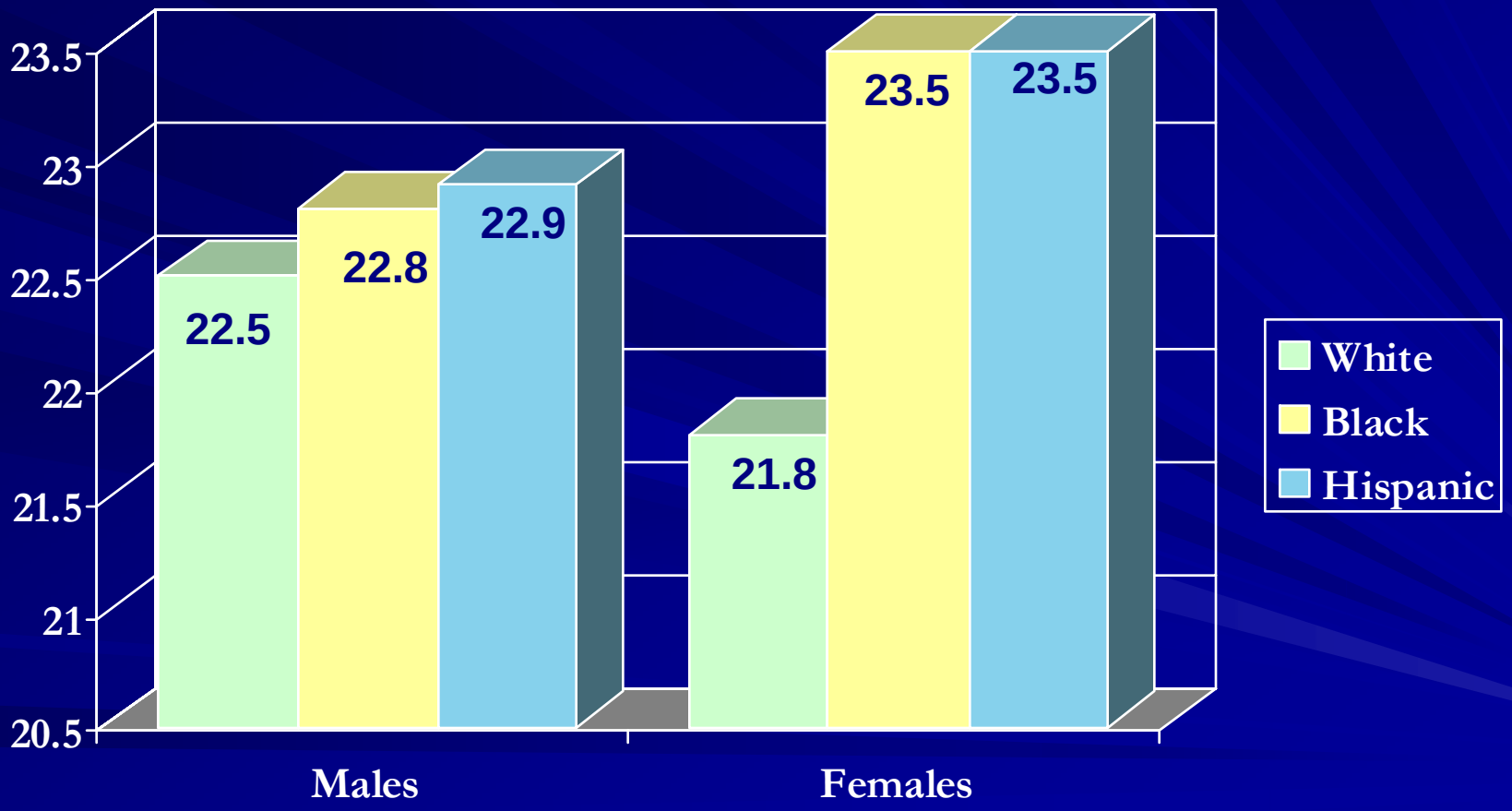
Statistical Analysis

- Cross-sectional analysis of Wave 1
- Gender-stratified, two-level random effects models
- School variance estimated before and after controlling for individual variables

Individual and school characteristics by race/ethnicity

	White	Black	Hispanic	p-value
Household income	$51,000	$30,000	$32,000	**<0.001**
Maternal Education				**<0.001**
No high school diploma	8%	13%	38%	
High school diploma +	92%	87%	62%	
% White Students				**<0.001**
1-66%	25%	80%	85%	
67-100%	75%	20%	15%	
Median Household Income of School	$45,000	$30,000	$32,500	**<0.001**

Body Mass Index by race/ethnicity



What factors are associated with adolescent females' BMI?

Two level random effects models clustered by school	+ Individual Factors (beta)	+ School Factors (beta)
INDIVIDUAL LEVEL VARIABLES:		
Ethnicity		
Black	**1.61***	**1.54***
Hispanic	**0.89***	**0.80***
Maternal Education	**-0.48***	**-0.41***
Household Income	**-0.043***	-0.027
SCHOOL LEVEL VARIABLES:		
% of students who are White		0.10
Median household income of school		**-0.37***

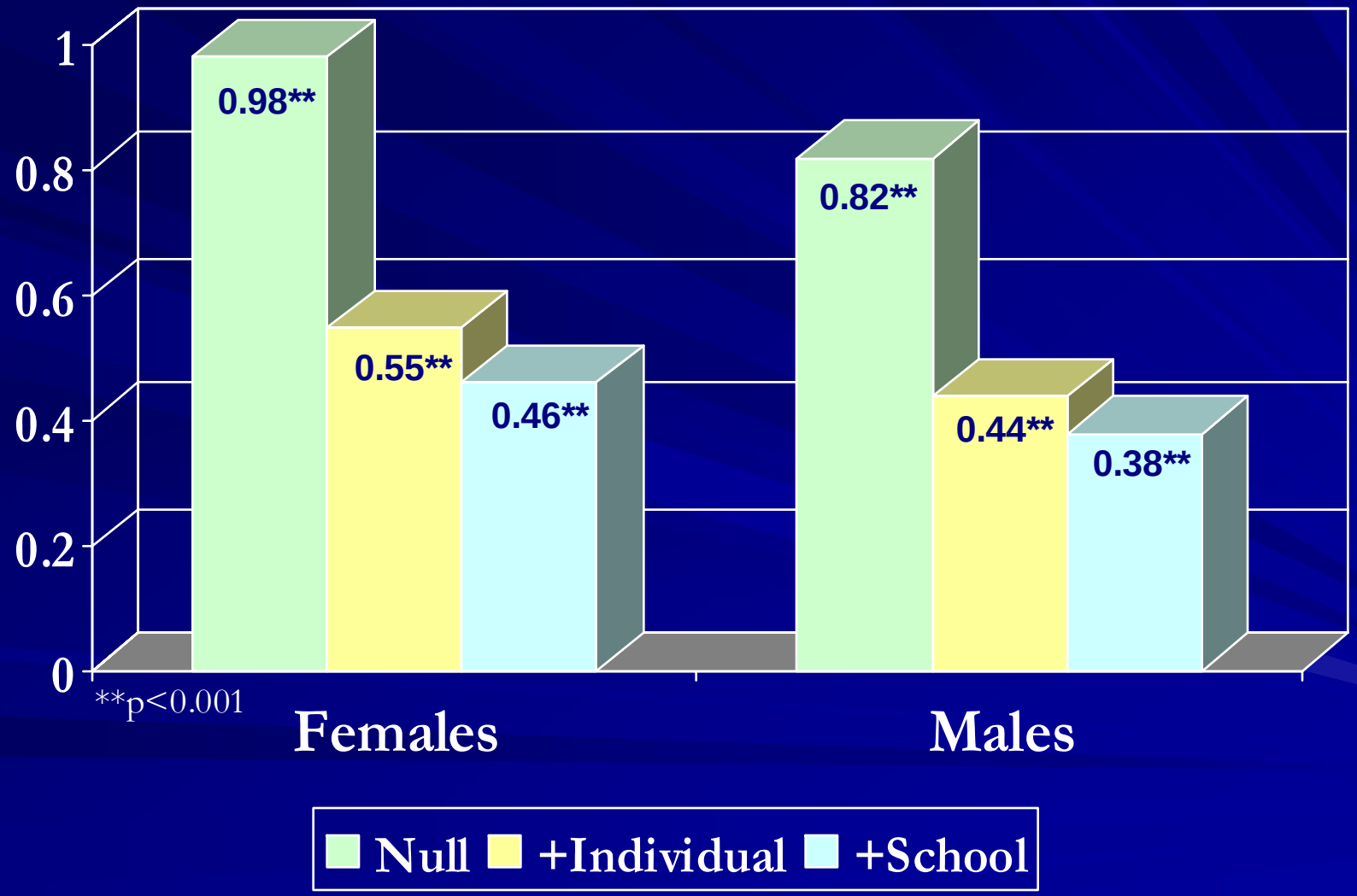
* $p<0.05$

What factors are associated with adolescent males' BMI?

Two level random effects models clustered by school	+ Individual Factors (beta)	+ School Factors (beta)
INDIVIDUAL LEVEL VARIABLES:		
Ethnicity		
Black	0.24	0.18
Hispanic	**0.67***	**0.62***
Maternal Education	-0.043	0.020
Household Income	-0.010	-0.0043
SCHOOL LEVEL VARIABLES:		
% of students who are White		0.11
Median household income of the school		**-0.29***

* $p<0.05$

Significant variation remains among school mean BMIs



Limitations

- Data collected in 1995
- Self-reported height and weight

Conclusions

- Individual students attending schools with lower median household incomes had on average higher BMIs
- Significant *between* school variation in BMI exists even after accounting for the types of students attending different schools

Public Health Implications

- Interventions at the school level may be able to reduce rates of obesity and may help to eliminate racial/ethnic and socioeconomic disparities in weight status