

**CLASS-BASED DESEGREGATION PLANS:  
ARE THEY LIKELY TO IMPROVE STUDENT  
ACADEMIC ACHIEVEMENT?**

**1. Introduction**

Who I am

Title of my presentation

**Give out handouts**

Before I begin, please stop me if you have questions or if I'm talking too fast

Going to start by talking about how I got interested in the topic

- a. One of my tasks as a GA at Iowa was to learn US DOE CD-ROMs
- b. Noticed that, just as there are disparities between districts in terms of wealth, there are often vast disparities within districts

Show Des Moines, IA

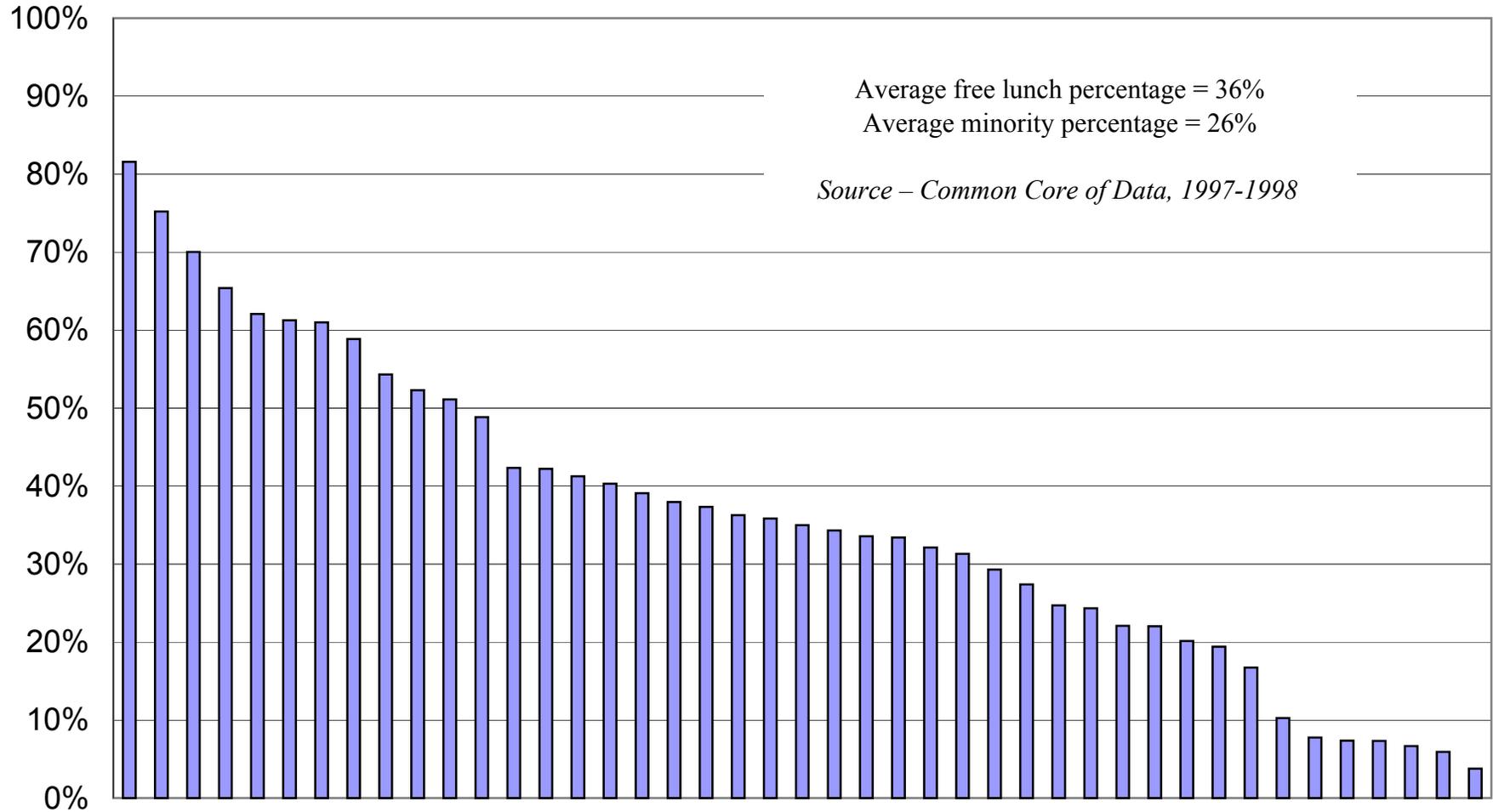
1997-98 CCD; elementary school = school with 3rd grade

Show Albany, NY

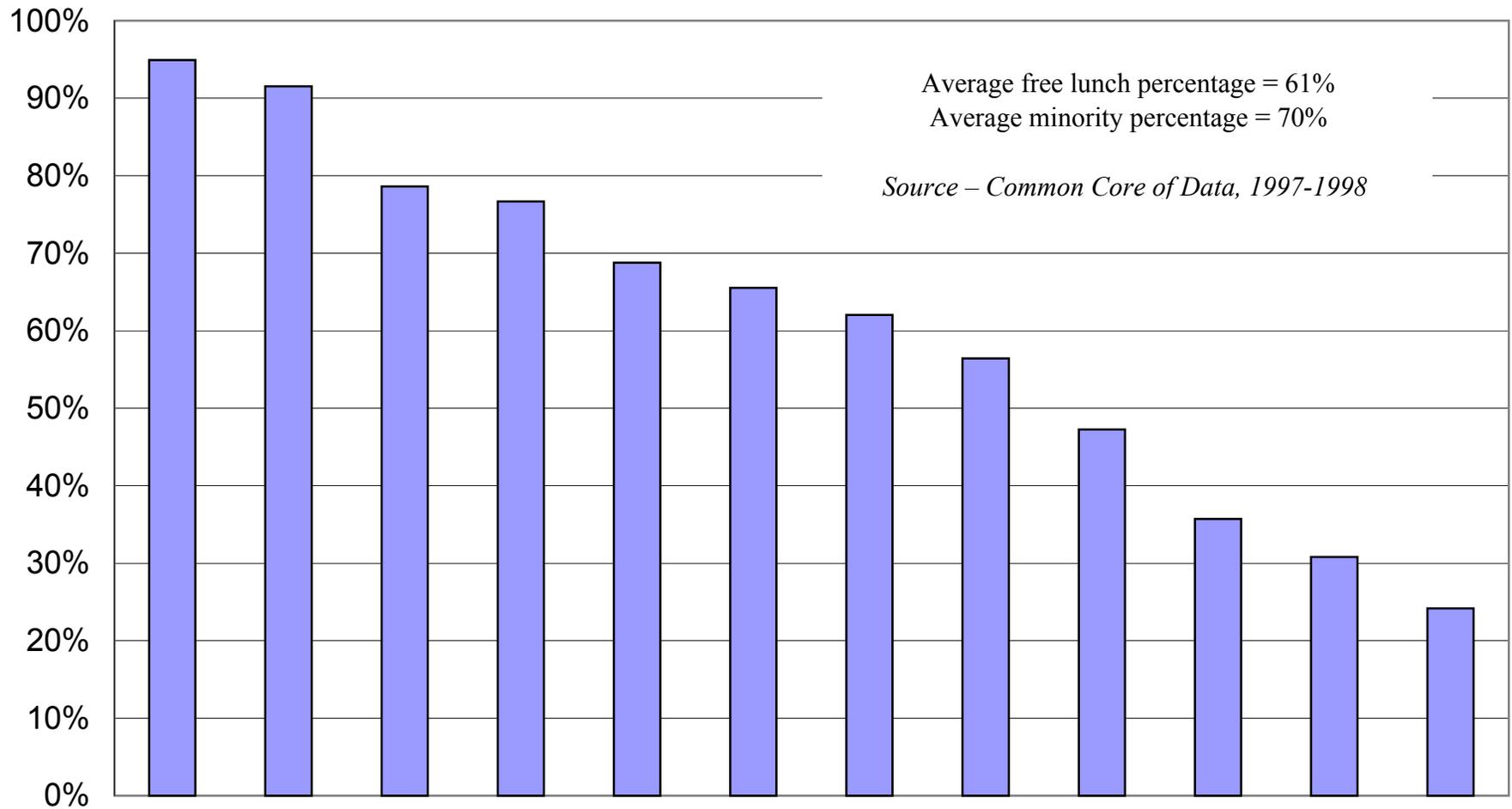
- c. In addition to the fact that the makeup of the kids in the schools on either end was different, it made sense to me that the educational experiences within those schools also probably were different

Wanted to see if I could ferret out an effect on achievement of school poverty concentration

# Free Lunch Percentages of Elementary Schools Des Moines, IA (N = 43)



## Free Lunch Percentages of Elementary Schools Albany, NY (N = 12)



At the same time I began to be interested in this, some things were happening in the legal arena that heightened the relevance of my study

- a. Race-based “affirmative action” student assignment plans were being invalidated all over the country

Boston Latin

San Francisco

- b. Even traditional desegregation plans, based on past discriminatory behavior, were being eliminated as courts declared districts “unitary”

Including Charlotte-Mecklenburg

- c. A few districts began to implement student assignment plans that incorporated social class rather than race

San Francisco, CA

Wake County, NC (Raleigh)

La Crosse, WI

- d. No research regarding what effects on achievement, if any, may be expected from such a shift (from race to social class)

## 2. Design and Methodology

Had what I thought was a good topic

One that combined my quantitative skills with my legal interests

One of the first challenges I had was to get the data

First thought I'd do study within a single district, but needed enough schools to have a continuum of poverty concentrations

Iowa was out

Approached several large metropolitan school districts in the Midwest

Rebuffed by all

Because of my familiarity with NELS (National Educational Longitudinal Study) of 1988, my advisor and I decided to go with that database

Had my data source, needed to decide on a methodology

Based on my literature review, knew I needed to try and find a statistical technique that could separate out the effects of individual- and school-level poverty

Decided on HLM (hierarchical linear modeling), a relatively new statistical technique especially designed to conduct “school effects” research

**See p. 21 for advantages of using HLM**

Newcomer to HLM - dissertation was an opportunity to teach myself

First HLM dissertation in College of Education at U. Iowa?

Had my data, had my mode of analysis, had to pick my variables and my sample

a. Selected NELS base year 8th-grade public school students without special needs (i.e. without IEPs)

b. Focused on demographic characteristics of students

Ones that could be chosen for purposes of student assignment

Social class (composite variable of family income, parental occupation, and parental education), race, sex, LEP status

c. At school level, looked for characteristics that reflected or related to student demographics

Somewhat limited by availability of data in NELS

Settled on school free lunch percentage, minority percentage, school size, and student-teacher ratio

Student-teacher ratio is closest I could come to class size

8th-grade minority percentage was best I had

Reasoned that it generally reflected percentage within school

Also took the NELS urbanicity variable and broke it out into urban and rural dummy variables (compared to default of suburban)

To avoid problem of collinearity

Outcome variables

Reading, mathematics, science, social studies

Social studies = aggregated history, citizenship, and geography score

Centered everything around grand mean

Could discuss in terms of standard deviations

Could use the more prevalent language associated with standard linear regression rather than effect sizes

Need to change this to effect sizes for publication

17,571 8th-graders in 783 schools

Weighted = 2,397,658 8th-graders in 22,340 schools

Tables 1, 2, and 3

Table 1. Descriptive Statistics for Student-Level Variables<sup>a</sup>

Variable	Unweighted (n = 17,571)		Weighted (N = 2,397,658)	
	n	%	N	%
<i>Sex</i>				
Male	8,684	49.4	1,199,262	50.0
Female	8,887	50.6	1,198,395	50.0
<i>Race</i>				
White or Asian-American	12,542	71.4	1,787,067	74.5
Not White or Asian-American	5,029	28.6	610,591	25.5
<i>English Proficiency</i>				
Limited	522	3.0	55,966	2.3
Not limited	17,049	97.0	2,341,692	97.7

<sup>a</sup> The differences in this table in the percentages between the unweighted and weighted samples occur because of the oversampling of certain school and student populations that is a central feature of the NELS survey.

Table 2. Descriptive Statistics for School-Level Variables<sup>a</sup>

Variable	Unweighted (n = 783)		Weighted (N = 22,340)	
	n	%	N	%
<i>Urbanicity</i>				
Urban	197	25.2	3,103	13.9
Rural	266	34.0	11,864	53.1
Suburban	320	40.9	7,374	33.0

<sup>a</sup> The differences in this table in the percentages between the unweighted and weighted samples occur because of the oversampling of certain school and student populations that is a central feature of the NELS survey.

Table 3. Frequency Statistics for School-Level Variables

Variable	Min	Max	Unweighted (n = 783)		Weighted (N = 22,340)	
			Mean	SD	Mean	SD
% Free lunch in school	0	100	27.7	24.0	27.8	24.1
% Minority in 8th grade	0	100	29.5	32.0	21.2	29.3
School size	6	3,940	720.9	399.3	490.1	317.1
Student-teacher ratio	6	34	17.2	4.2	16.1	4.5

### 3. Results

Three (four) steps in a HLM analysis

1. Unconditional model

Includes no control variables at either level

Equivalent to one-way ANOVA

Done to partition initial variance into within- and between-school components

~ 20% of variance lay between schools (at student level)

2. Student-level model

Ordinary linear regression model

Outcome variable, student achievement, varies by student-level characteristics

Higher student SES associated with  $\sim 1/3$  SD increase in achievement

Contrary to some studies that have found individual poverty does not matter

Student minority status =  $\sim 2/5$  SD decrease

Only accounted for  $\sim 17\%$  of total within-school variance

3. School-level model (optional)

Ordinary linear regression model

Outcome variable, student achievement, varies by school-level characteristics

Bryk & Raudenbush call these “means as outcomes” regression models, in which the means from each of many groups are outcomes to be predicted by group characteristics

School poverty and minority concentrations each accounted for ~ 1/7 to 1/5 SD decrease in individual student achievement

Only accounted for ~ 40% - 50% of total between-school variance

Association between demographic variables and achievement is stronger at school level of analysis rather than student-level, as expected from the literature review

4. Full HLM model

Explain formula on page 2 of handout

School-level variables added to the within-school (i.e., student-level) model

Outcome variable, student achievement, varies by both student- and school-level characteristics

Explain findings on page 3 of handout

Effects of student-level SES ( $\gamma_{10}$ ) stayed the same (red text)

Higher student SES associated with ~ 1/3 SD increase in achievement

Effects of student minority status ( $\gamma_{30}$ ) changed with inclusion of school-level variables

Formerly ~ 2/5 SD decrease, now ~ 1/3 SD decrease (red text)

Effects of student poverty status now roughly equal to those of student minority status

Effects of school poverty ( $\gamma_{01}$ ) and minority concentrations ( $\gamma_{02}$ ) on mean achievement were negative and small, but significant, with decreases ranging from -0.04 SD to -0.13 SD (blue text)

Effects of school poverty always the same or greater than those of minority concentration

School poverty concentration was the only variable that consistently impacted the student SES-achievement slope ( $\gamma_{11}$ ) (green text)

This slope represents social class differentiation within a school

Achievement gap between high-SES and low-SES students gets smaller as school free lunch percentage increases

An “equalizing effect”

Full model only reduced variance from within-school means by ~ 11% to ~ 22%

Full model did account for 62% - 72% of initial between-school variance

## Summary

1. Both individual- and school-level SES exerted significant effects on mean student achievement in all four academic subject areas, above and beyond the effects of other student- and school-level demographic characteristics
  
2. Low SES students tended to do worse academically than high SES students.
  - health factors (e.g., chronic hunger; lack of adequate clothing and housing; poor sanitary facilities at home; low birth weight; vision, hearing, dental, emotional, and behavioral problems; more likely to experience physical, sexual, and emotional abuse and neglect; poor health care)
  - neighborhood factors (e.g., lower concentrations and quality of educationally supportive institutions, such as churches, scout troops, sports leagues, community associations; higher concentrations of illegal economies and gang activity; less exposure to academically and economically successful role models)
  - parent factors (e.g., same values for children but decreased cultural capital (skill in dealing with schools, strategies for helping children, beliefs about role of family in education); less likely to participate in schools and to stay informed about children's progress; interact less with children in ways that prompt children's cognitive growth; higher levels of stress from negative life events; lack of academically-oriented resources)
  - other factors (e.g., poor students' lower educational aspirations; greater tendency to miss school; greater sense of academic futility)

3. Students in high poverty schools tended to do worse academically than those in lower poverty schools, regardless of their own SES.
  - peer factors (dearth of academically successful peer role models and lower level of educational and social capital appear to have a homogenizing, and debilitating, school-wide effect on student achievement)
  - school personnel factors (e.g., lower-qualified and more inexperienced teachers; greater teacher absenteeism; higher levels of out-of-field teaching; less-experienced and more-controlling administrators)
  - curricular and academic climate factors (e.g., paucity of rich classroom instruction (emphasis on “basic skills”); lower academic expectations; narrower scope of curricular offerings)
  - overall effect = high sense of student academic futility and low academic norms
  
4. The achievement gap between high SES and low SES students was smaller in higher poverty schools.

#### 4. So What?

What's the point of all of this? Why should anyone care about this study?

- a. My study was sort of timely because there exists little to no large-scale, non-descriptive research on academic effects of school poverty concentrations

**Show table from Anderson, Hollinger, and Conaty**

- b. HLM analysis complements what earlier research does exist and uses a new analytical technique that can really get to the effects of school poverty above and beyond those of individual poverty
- c. Perhaps I am deluding myself, but I believe that the findings themselves are important

High poverty levels in many of our nation's schools exert significant, negative effects on student achievement above and beyond individual and other school-level characteristics

These effects appear to be equal to or greater than effects of school-level minority percentages

Class-based approaches to improving low SES students' achievement may be more effective than or equal to race-based approaches?

Class-based approaches are likely to avoid the judicial antipathy that currently exists toward race-based approaches

Where to go from here?

- a. One mechanism for increasing the academic achievement of poor students and schools is to allocate greater resources, both financial and human, toward the problem

Also, improving school curricula and classroom instructional practices

To date, hasn't been overwhelmingly successful at improving low SES students' overall achievement

Prospects study of Title I - at best, keeping students from falling further behind (but not causing improvement)?

Also, may not get to issues of low teacher expectations and impoverished leadership

Given the overwhelming needs associated with high poverty schools, the solution may be for our states and school districts to simply have fewer of them

- b. Intra-district class-based student assignment plans (imposed (busing) or voluntary (e.g., magnet school preferences))

Would get same students as race-based plans in districts where correlation between race and SES was high

Would also get needy students who weren't racial / ethnic minorities

Would give poor students greater access to opportunities and networks of middle- (and upper-class?) society

Important! ( from desegregation research literature)

### Problems

Show Detroit, MI

Show Hartford, CT

- “Tipping point”

Increasing SES concentrations has an equalizing effect (i.e. reduces the achievement gap between low and high SES students), but at some point the achievement of high SES students' achievement becomes negatively impacted

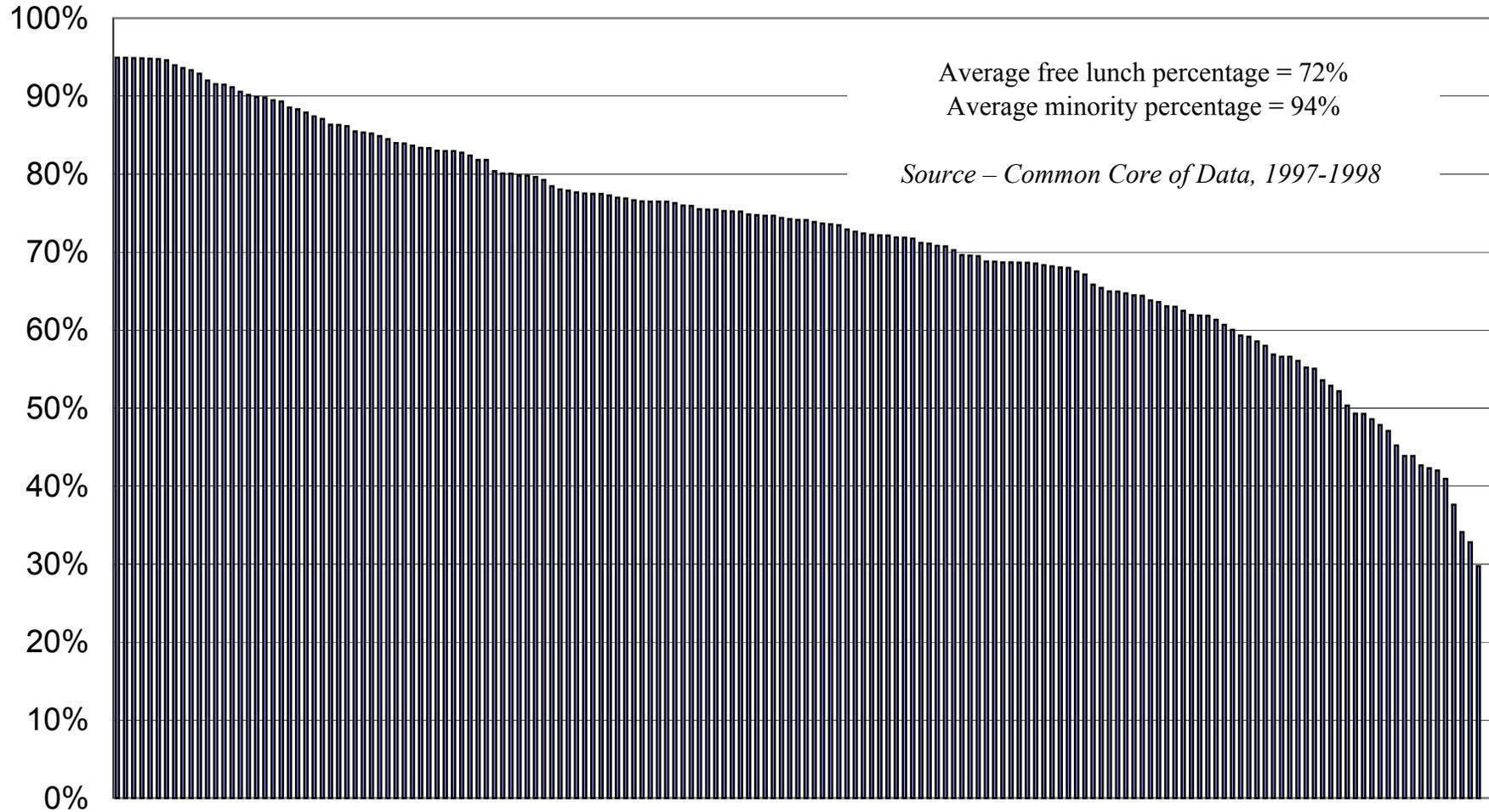
Thus school socioeconomic diversity may benefit low SES (and minority) students but at an academic cost for higher SES students

- Estrangement of higher SES parents

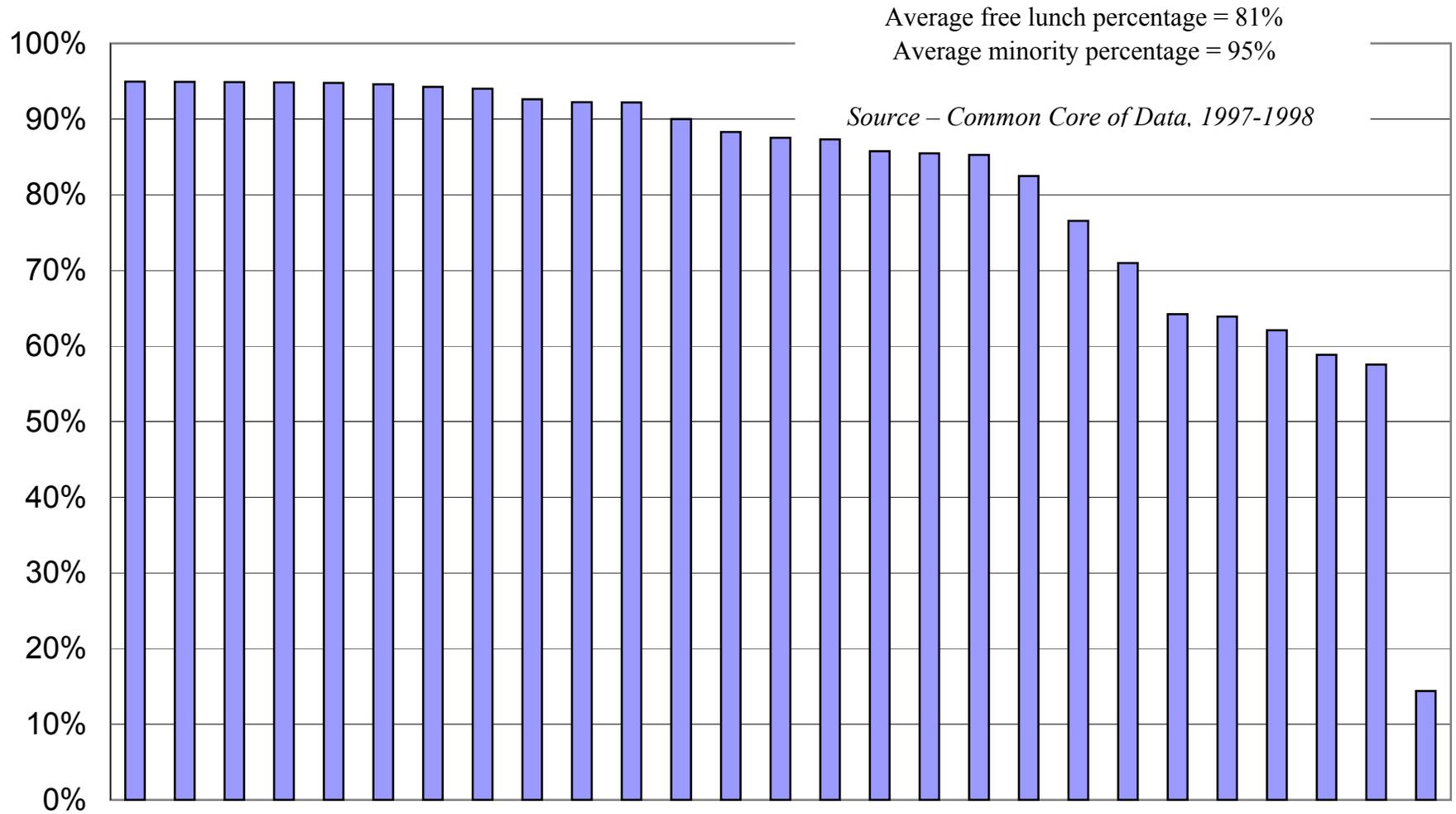
“The furor some Whites showed when informed that their children would have to go to school with minority children would be mild compared to the reaction of upper- and middle-income parents (of any race or ethnic background) when told that their children will have to go to school with poor children (of any race or ethnic background)” (Hodgkinson)

“Middle-class families, the bedrock of stable communities, will not tolerate high concentrations of poverty in their schools” (Orfield)

# Free Lunch Percentages of Elementary Schools Detroit, MI (N = 168)



# Free Lunch Percentages of Elementary Schools Hartford, CT (N = 27)



c. Inter-district class-based student assignment plans

For districts like Detroit and Hartford

Same benefits and drawbacks as intradistrict plans

- reduced poverty concentrations
- increased overall student achievement
- increased potential for social networking between poor students and more affluent peers
- increased alienation of higher SES parents

Recognition that central cities can no longer rely solely on their own internal efforts

Voluntary programs, such as interdistrict magnet schools, educational vouchers, or generalized school choice programs, affect relatively few students

Voluntary interdistrict plans unlikely

Difficult to get cooperation of surrounding districts

Court-mandated interdistrict plans unlikely

See Milliken v. Bradley

State-mandated interdistrict plans unlikely

Strong public opposition (desire to retain perceived benefits of neighborhood schools, concerns by suburban parents about children's exposure to troubled urban youth, existing social and political tensions between cities and suburbs)

Middle-class, predominantly White parents are likely to accept influxes of low SES inner-city students only if the numbers are "not overwhelming"

Public Agenda (White suburban Cleveland parent) - "How far am I willing to go (to accommodate inner-city students)?" Not real far" - sounds callous but people move to suburbs for a reason

## 5. Conclusion

Almost 1/4 of American children live in poverty - mostly rural or urban

This geographic and social isolation from upper and middle class segments of society allows the plight of disadvantaged children to generally be ignored

This study and others appear to confirm negative academic effect of attendance at schools with high poverty concentrations

Class-based student assignment policies may be a potential means of increasing low academic achievement of students in poverty

However, the evidence is not exactly clear that districts should “go directly to poverty and see about desegregating it” (Hodgkinson)

Potential solutions seem to suffer from severe limitations

In the end, complexities of the issue need to be recognized, variety of solutions need to be implemented, including getting to the root causes of societal poverty rather than addressing it after the fact, and continued work and research need to be done in this area if large-scale meaningful change for disadvantaged children is ever likely to occur

**Questions?**

## Future work

- Change to effect sizes
- Additional student-level characteristics (demographic and non-demographic)
- Additional school-level characteristics (demographic and non-demographic) (such as curriculum, teacher quality, administrative leadership, and school climate)
- What is the optimal distribution of poor and more affluent students?
- Research into equalizing effects of school SES on the student SES-achievement relationship. “Social equity is meaningless unless it is accompanied by high average achievement. Equalizing schools in which everyone does poorly is hardly effective” (Lee and Bryk).
- Pre- and post-assessments in districts which implement class-based student distribution measures

## Advantages of Using HLM

### 1. Choice of unit of analysis

- using HLM avoids aggregation bias (problem in which variables can take on different meanings, and have different effects, depending on level of aggregation)
- people used to have to make a choice between individual and organizational levels of analyses
- HLM conceptually and structurally recognizes the nested structure of data, which single-level models do not

### 2. Misestimation of standard errors

- in OLS regression, can't partition the part of error due to school factors and the part due to individual factors
  - existence of intra-class correlation (ICC) can make significance tests too liberal
- HLM analyses allow error variance to be partitioned into within- and between-school components

### 3. Heterogeneity of regression

- A phenomenon which occurs when relationships between students' characteristics and students' outcomes vary across schools
  - long viewed as a methodological nuisance in linear regression
- HLM assumes that contexts of individual schools differ and actually tries to model variability within schools and predict why

### 4. Ecological fallacy

- hard to take school-level data and infer to individuals

### 5. Poor / varying precision

and

### 6. Unbalanced designs with covariates at each level

- closeness of fit of data to regression line
- HLM automatically comes up with a WEIGHTED estimate for the slope that takes into account the precision of fit
  - fits lines for each school but also fits a line for the overall population of schools
  - "borrows strength" from overall group to create empirical Bayes estimates, which are composites of both individual- and group-regression lines
  - estimation process is simultaneous; doesn't occur one school at a time
  - weighting process will use more information from the overall mean line if poor precision at the individual school level
  - what if we had a family of 4 (or 2)? - hard to fit a regression line to so few data points - HLM can help with this