

# HLM

Hierarchical Linear Modeling

Contextual Effects

# Lesson Six Plan

- I. Four Research Questions
- II Contextual Effects
- III Type A and Type B Schools Effects

## Four Research Questions

Nearly all research on school effectiveness has been directed at answering four principal questions:

- To what extent do schools vary in their outcomes?
- To what extent do outcomes vary for pupils of differing status?
- What school policies and practices improve levels of schooling outcomes?
- What school policies and practices reduce inequalities in outcomes between high- and low-status groups?

The first two questions concern *quality* and *equity*; the last two concern their causes. The same set of questions can be asked of other organizational units, such as the school district or classroom.

## Contextual Effects

Model  $Y_{ij} = \beta_{0j} + \beta_1 X_{ij} + \epsilon_{ij}$  (1)

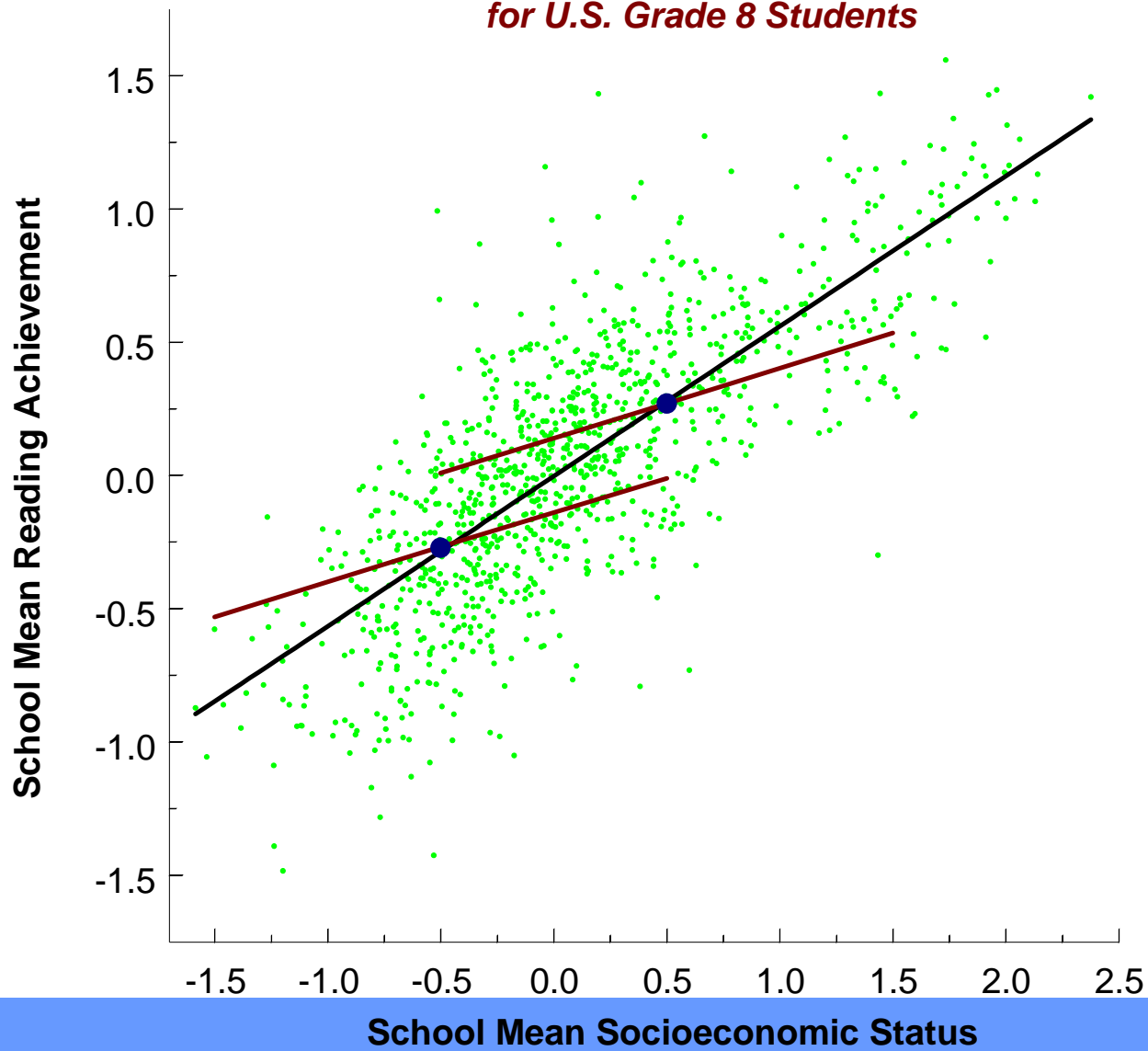
$$\beta_{0j} = \gamma_{00}^* + \gamma_{01}^* X_j + U_{0j}$$
 (2)

Substituting (2) into (1):

$$Y_{ij} = \gamma_{00}^* + \gamma_{01}^* X_j + \beta_1 X_{ij} + U_{0j} + \epsilon_{ij}$$

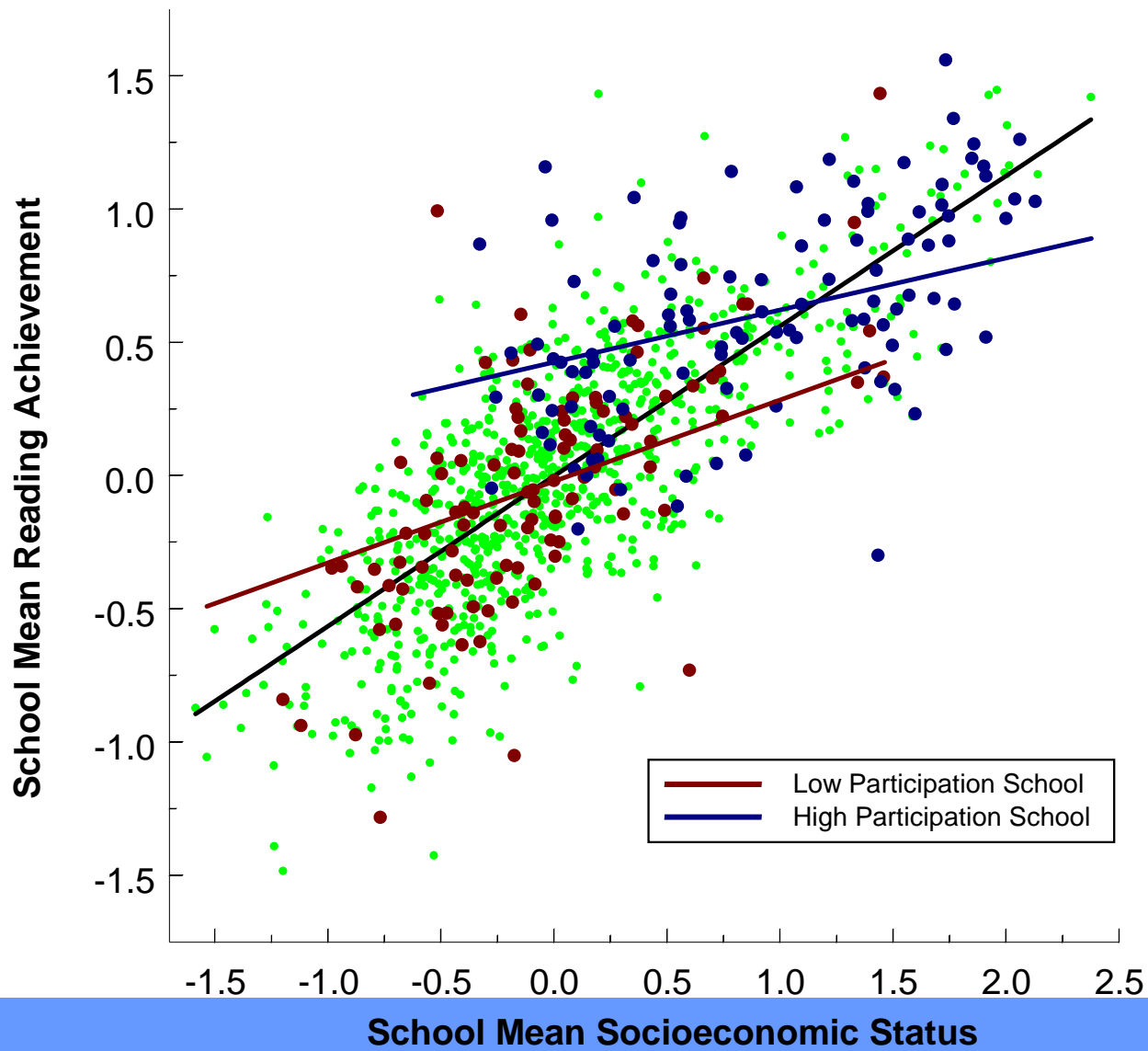
grand mean    contextual effect    effect of SES    school-level residual    pupil-level residual

**Figure 2.**  
***School Mean Reading Achievement versus Socioeconomic Status  
for U.S. Grade 8 Students***



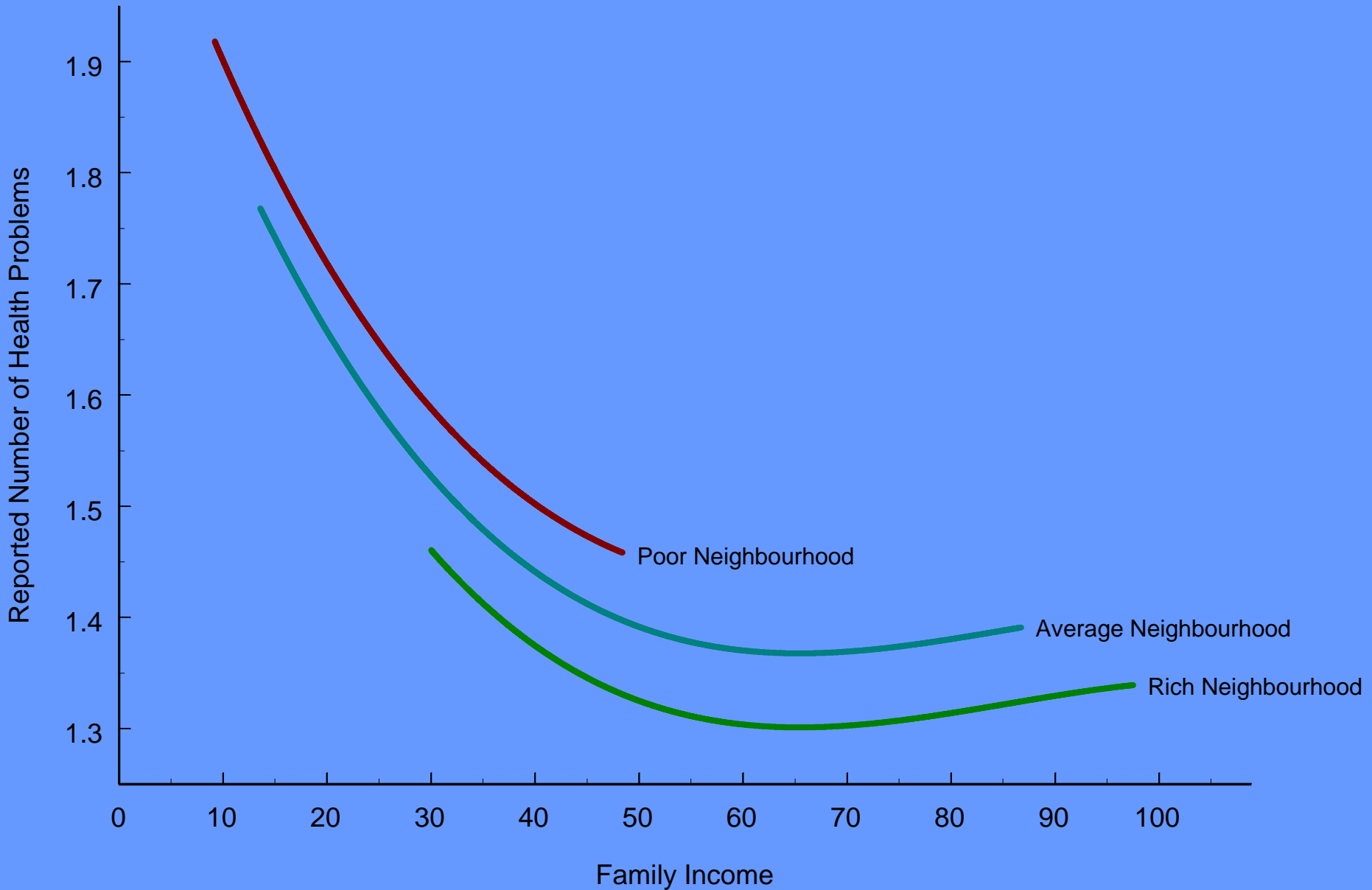
**Figure 3.**

***The Effects of Parental Involvement on School Mean Reading Achievement***



# Contextual Effects of Neighbourhood Income on Health Problems

Ontario Health Study



# A MODEL FOR STUDYING SCHOOL EFFECTS

The estimation of school effects can be based on a model describing the influences that affect a pupil's outcome score:

**Pupil's outcome score =**

**the average score for all pupils in the schooling system**

(e.g., the school district, community, province, country)

**+ the effects of pupil background**

(e.g., ability upon entering school, SES, sex, race)

- + **the effects of school characteristics**  
(e.g., class size, per-pupil expenditures, staff characteristics)
- + **the effects of school composition**  
(e.g., average SES of school, racial or ethnic composition)
- + **the effects of school policies and practices**  
(e.g., methods of instruction, organizational structures)
- + **the effects of social and economic factors**  
(e.g., local rates of employment)
- + **any unmeasured effects unique to the child's school**  
(including errors due to sampling)
- + **any unmeasured effects unique to the child**  
(including errors of measurement due to unreliable tests).