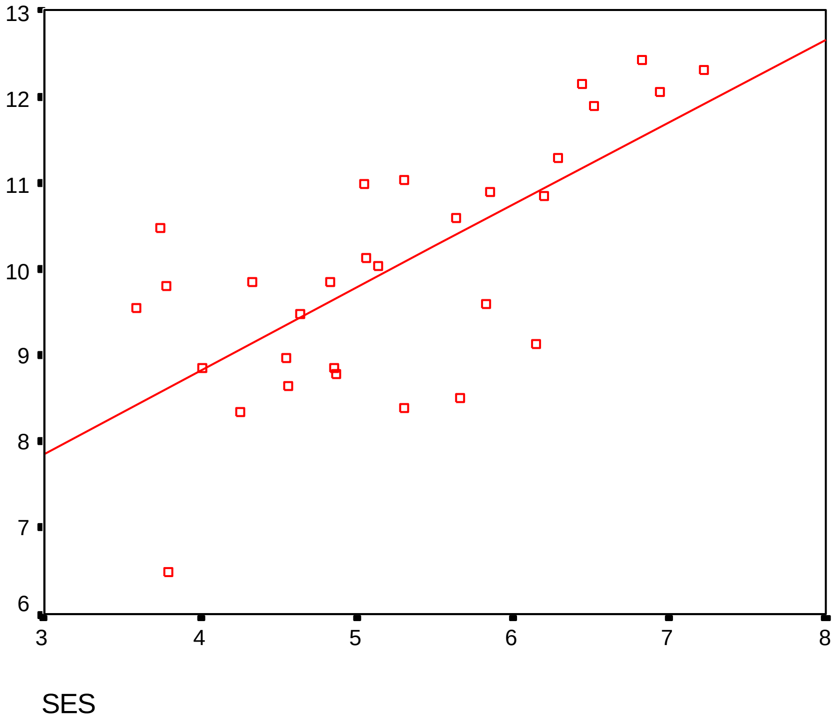
Conceptual Framework

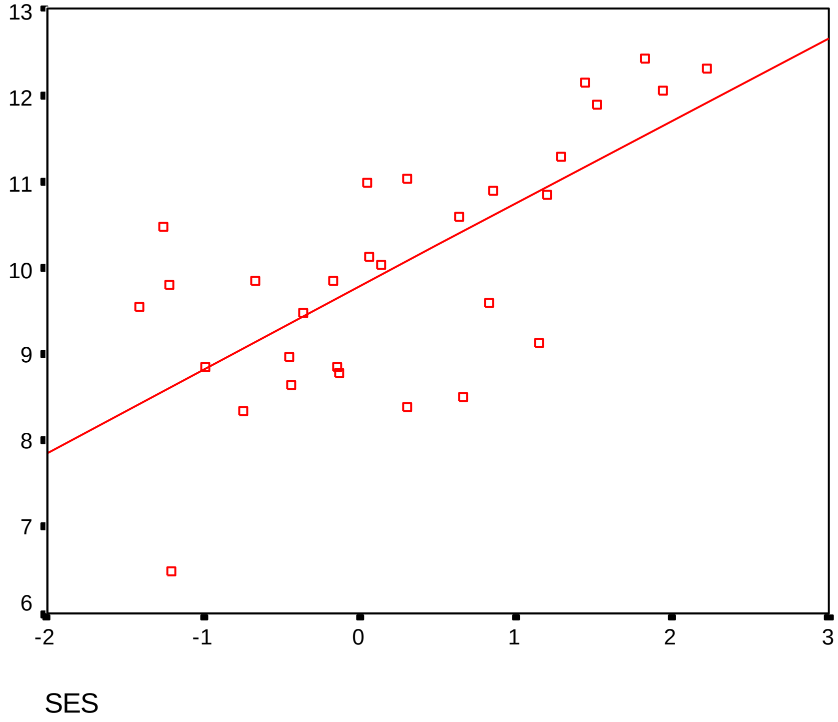
- A model for one school
- A model for two schools
- A model for *J* schools
- Incorporating level-2 predictors

Plot of Math Achievement As a Function of SES in One School



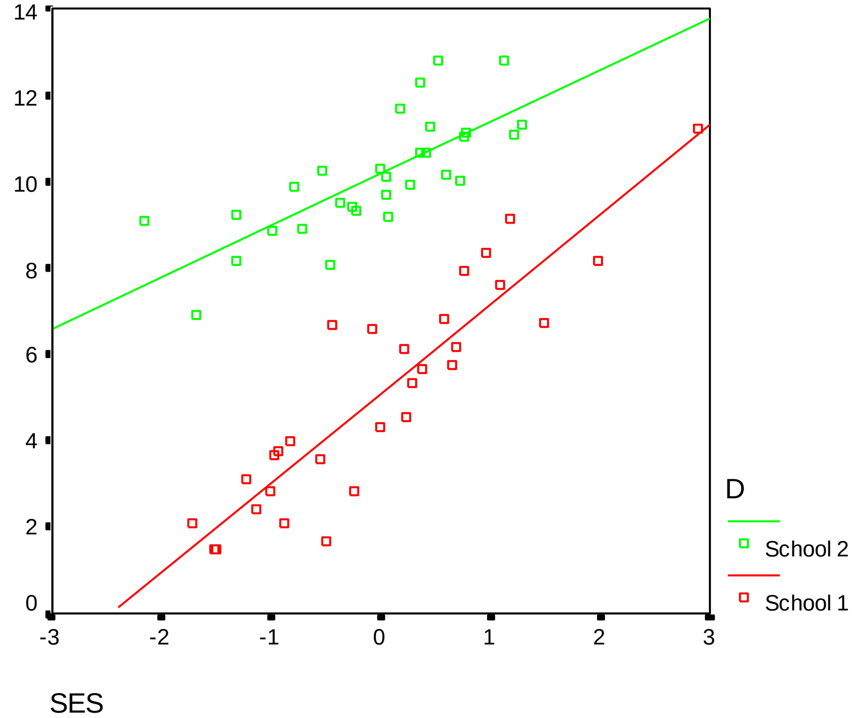
$$MATHACH_i = ß_0 + ß_1(SES_i) + r_i$$

Plot of MATHACH As a Function of (SES - mean SES) in One School



$$MATHACH_i = ß_0 + ß_1(SES_i\text{-}meanSES) + r_i$$

Plot of Math Achievement As a Function of SES in Two Schools



$$MATHACH_{i1} = ß_{01} + ß_{11}(SES_{i1} - meanSES_1) + r_{i1}$$

$$MATHACH_{i2} = ß_{02} + ß_{12}(SES_{i2} - meanSES_2) + r_{i2}$$

Study of SES-Achievement Relationship in J Schools

$$Y_{ij} = \beta_{0j} + \beta_{1j}(X_{ij} - \bar{X}_{\cdot j}) + r_{ij}$$

$$E(\beta_{0j}) = \gamma_0 \qquad Var(\beta_{0j}) = \tau_{00}$$

$$E(\beta_{1j}) = \gamma_1 \qquad Var(\beta_{1j}) = \tau_{11}$$

$$Cov(\beta_{0j}, \beta_{1j}) = \tau_{01}$$

Developing a Model to Predict β_{0j}, β_{1j}

Within each school

$$Y_{ij} = \beta_{0j} + \beta_{1j}(X_{ij} - \bar{X}_{.j}) + r_{ij}$$

Looking across all schools

$$\beta_{0j} = \gamma_{00} + \gamma_{01}W_j + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}W_j + u_{1j}$$

Combined model

$$\begin{aligned} Y_{ij} = {} & \gamma_{00} + \gamma_{01}W_j \\ & + \gamma_{10}(X_{ij} - \bar{X}_{.j}) \\ & + \gamma_{11}W_j * (X_{ij} - \bar{X}_{.j}) \\ & + u_{0j} + u_{1j}(X_{ij} - \bar{X}_{.j}) + r_{ij} \end{aligned}$$