

# The Effects of Gender and Socioeconomic Status on Math Achievement from Kindergarten through Fifth Grade

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## Introduction

SES is positively related to math achievement in Kindergarten through fifth grade. The effects of gender on math achievement differ across studies. Some studies show no gender differences in math achievement, while some indicate that boys have higher scores, and others indicate that girls have higher scores. Very few studies have examined differences in math achievement over time.

## Objective

To measure the change in math ability between Kindergarten and fifth grade and how this change differs by SES and by gender.

## Method

- Data were derived from the Early Childhood Longitudinal Study – Kindergarten Cohort (ECLS-K) conducted by the National Center of Education Statistics (NCES).
- The ECLS-K utilizes multistage probability sampling to obtain a nationally representative sample upon use of sampling weights.
- Children (N= 8,498) completed a math test in the spring of K, 1<sup>st</sup>, 3<sup>rd</sup>, and 5<sup>th</sup> grade.
- Parents provided information about gender and SES. A continuous variable for SES was created by NCES through a logarithm of mother's education, father's education, mother's prestige of occupation score, father's prestige of occupation score and household income.
- The data was fit to latent growth curve model with each of the 4 math scores loaded onto an intercept, slope and quadratic function with SES, gender, and the interaction between SES and gender as predictors of each (Figure 1).

## Results

- The model in Figure 1 provided a good fit to the data:  $\chi^2(5)=60.502, p<.01; CFI=.994; TLI=.980; RMSEA = .035; SRMR=.015$
- Growth in math from Kindergarten through fifth grade was quadratic (Figure 2), and is predicted by the following equations:

$$\begin{aligned} \bullet \text{Kindergarten Math} &= 3.283 + .555(\text{SES}) \\ \bullet \text{Slope} &= 2.461 + .246(\text{SES}) + .164(\text{Gender}) \\ \bullet \text{Quadratic} &= -.181 - .026(\text{SES}) - .019(\text{Gender}) \\ &\quad - .014 (\text{SES} * \text{Gender}) \end{aligned}$$

\*(female = 0, male = 1)

- The intercept was positively correlated with the slope, and the quadratic effect is negatively correlated with both the intercept and slope.
- SES and gender accounted for 17.9% of the variance in math in Kindergarten 13.4% in the rate of growth, and 9.3% in the slowing of the growth rate.

## Conclusions

- Higher SES is associated with increased math scores, and an increased rate of growth in math, and a decreased slowing of the growth rate (quadratic).
- There is no significant effect of gender in Kindergarten but boys have a slightly higher rate of growth in math through elementary school.
- There is no interaction between SES and gender on math in Kindergarten. SES has a slightly higher effect for girls on the slowing of the growth rate through fifth grade.
- Students who begin school at a higher rate have a higher rate of growth, and a lower slowing of that growth. A faster rate of growth (slope) is associated with less of a decrease (quadratic) in the rate of growth.

## Figures

Figure 1: Unstandardized estimates of the effects of SES, gender, and the SES by gender interaction on growth in math from Kindergarten through fifth grade

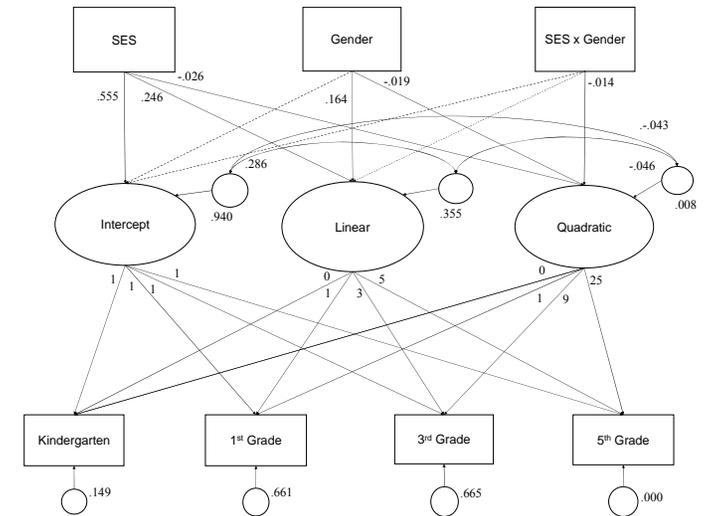
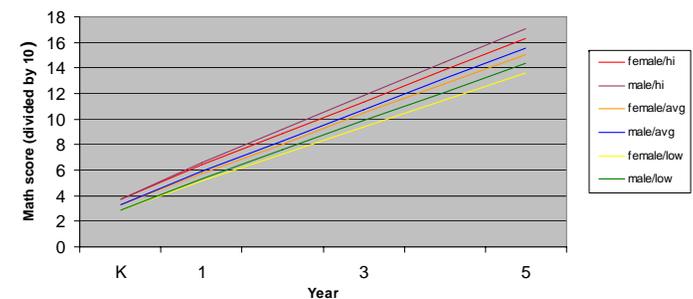


Figure 2: Growth models for females and males at the mean of SES, one standard deviation above the mean, and on standard deviation below the mean



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