Sociodemographic predictors of early postnatal growth

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Introduction

- Infant growth varies across socioeconomic factors, serving as an indicator of environmental influence in early life with long term health consequences.
- Evidence identifies sociodemographic gradients in growth with a focus on the first year and beyond, but estimates are sparse for growth before 6 months.

Hypothesis We expect that socioeconomic position (SEP) will be inversely associated with weight gain and positively associated with length growth.

Aim

- Examine sociodemographic predictors of infant weight, length and weight-for-length (WFL) growth from zero to five months in an infancy cohort from Chile.

Sample

Santiago Longitudinal Study (SLS)

- Began as a randomized preventive trial for iron deficiency anemia.
- 1,657 infants completed trial between 1991-1996 from low- to middle-income neighborhoods in Santiago, Chile.
- Participants are from admixed Latino families and included 1,412 individuals with anthropometric measures for at least two time points.

Methods

Growth outcomes: weight (kg), length (cm), and weight-for-length (WFL) (g/cm)

Predictors: Maternal age, maternal education, and a socioeconomic index (Graffar Index) in which higher values indicates lower position.

- Removed covariates using the least absolute shrinkage and selection operator (LASSO).

Methods, cont...

Analysis, step 1

- Assessed growth from birth to five months using the SuperImposition by Translation and Rotation (SITAR) approach.

Model: $log(outcome)_{it} = \alpha_i + h\left(\frac{t-\beta_i}{exp(-\gamma_i)}\right)$

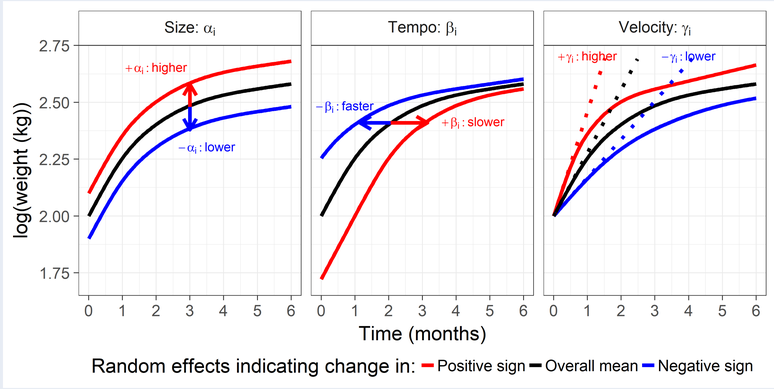

Figure: **Type of change in random effects (α, β, γ) relative to the sample mean trajectory in weight growth curve trajectories following a shape invariant model (SIM).**

⇒ A positive value for the following SITAR growth parameters represents:

Size **(α_i):** A shift of the growth curve upwards.

Tempo **(β_i):** A shift of the growth curve to the right and a growth curve starting later than the average.

Velocity **(γ_i):** A steeper growth curve and change in outcome over a one-unit change in time.

Analysis, step 2

- Ran simple linear regression models with:
  - Up to three SITAR growth parameters serve as outcomes.
  - Three sociodemographic predictors are covariates, including maternal age, maternal education and a socioeconomic position index (Graffar Index).
- Set of sample models for Graffar index predictor and weight growth parameters

$$\text{Weight} \begin{cases} \text{size}_i & = \beta_{graffar} \cdot graffar_i + \epsilon_i \\ \text{tempo}_i & = \beta_{graffar} \cdot graffar_i + \epsilon_i \\ \text{velocity}_i & = \beta_{graffar} \cdot graffar_i + \epsilon_i \end{cases}$$

Results

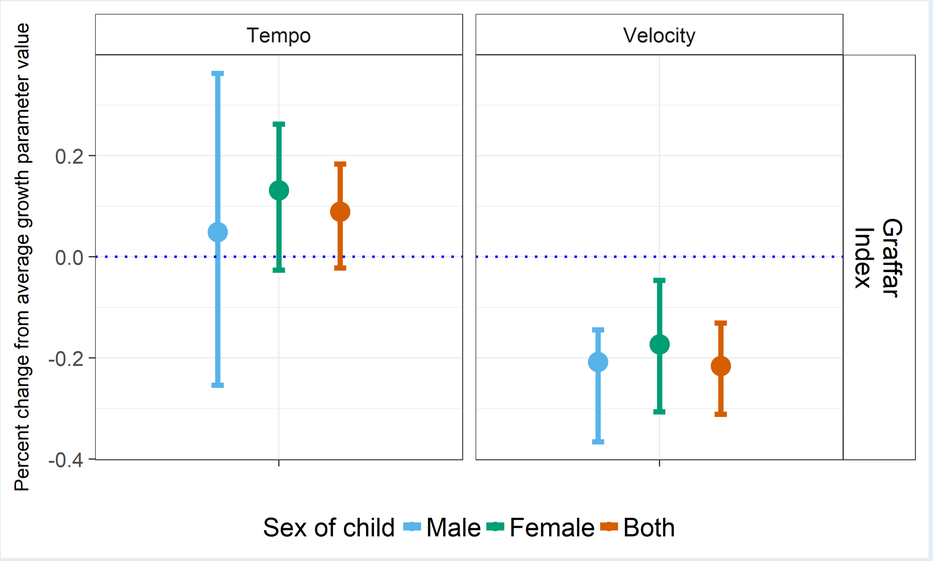

Figure: **Association between SEP and early infant length growth parameters**

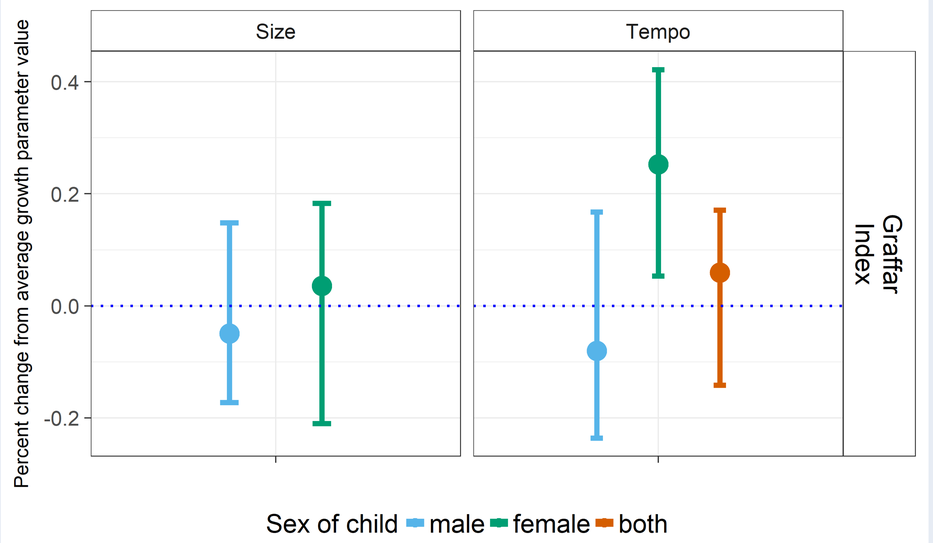

Figure: **Association between SEP and early infant WFL growth parameters**

- Lower SEP associated with
  - Slower linear (length) growth as demonstrated through the *velocity* growth parameter.
  - Later WFL growth timing as demonstrated through the *tempo* growth parameter.

Summary

- As with previous studies, we found an association between lower SEP and slower length (linear) growth. No evidence to support an association with weight.
- Early infant growth is associated with socioeconomic factors in the first five months of growth.

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