Modeling Growth for NCLB Subgroups: Effects of Time-Varying Disability Classification

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NCAASE National Center on Assessment and Accountability for Special Education
Advancing research on growth measures, models, and policies for improved practice

Introduction

- Many students move within and out of disability classification over time.
- These changes in student classification lead to modeling choices for the representation of SWD status as time-invariant covariates (TICs) or time-variant covariates (TVC).
- **Purpose:** examine different approaches to modeling the time-varying nature of disability classification and describe how different models can lead to different substantive findings and interpretations.

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Research Questions

1) For students across Grades 3 through 8, what is the reclassification rate between *disability* and *without disability*, and between disability categories?
2) How do different specifications of disability classification as time-invariant and time-varying covariates affect the estimated growth trajectories for students with disabilities?
3) Which of the four proposed models best fits the data?

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Method

- Repeated Outcome Measures: Standardized state mathematics test scores
- Sample
  - 28,967 students in Grades 3-8 from 20008 to 2013
- SWD classifications as categorical indicators
  1) SLD: Specific Learning Disability
  2) CD: Communication Disorder
  3) ED: Emotional Disturbance
  4) OHI: Other Health Impairments
  5) ASD: Autism Spectrum Disorder
  6) All Other disabilities
     - Intellectual Disability, Hearing Impairment, Visual Impairment, Deaf-Blindness, Orthopedic Impairment, and Traumatic Brain Injury

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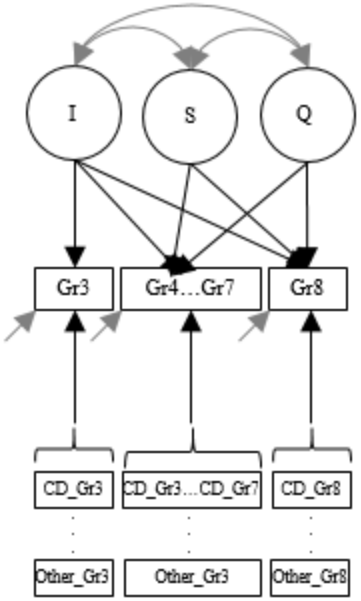
Analyses

- Comparison Models
  - Time-variant covariates (TVC)
    1) **Model 1: each repeated measure regressed on the corresponding grade level SWD covariates**
    2) **Model 2: TVC coefficients vary randomly between students such that a random effect for each SWD category is estimated for each student.**
  - Time-invariant covariates (TIC)
    3) Model 3: growth trajectory factors (intercept, linear and quadratic slopes) regressed only on the initial Grade 3 SWD covariates
    4) Model 4: growth trajectory factors regressed on the SWD covariates for all grades

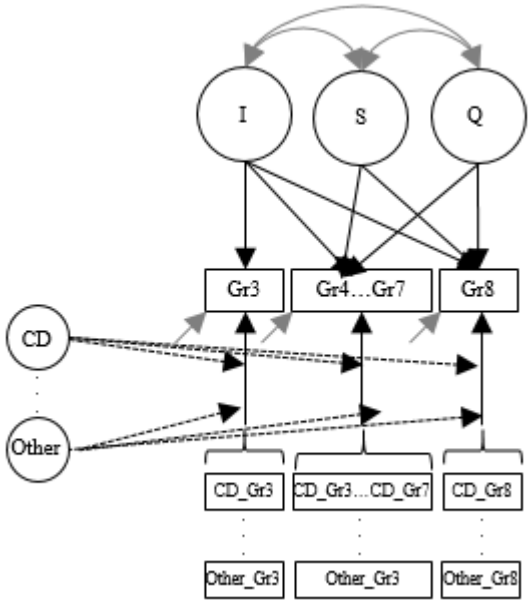
TVC

*For simplicity, not all SWD categories are represented, nor are all repeated outcome measures.

Model 1



Model 2



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TIC

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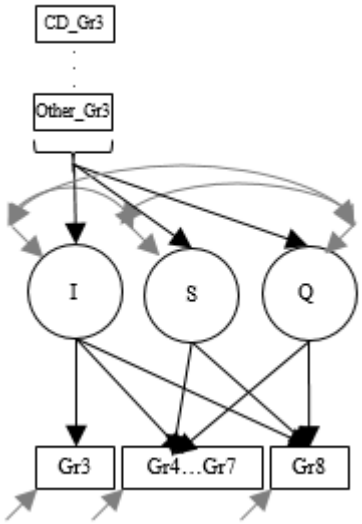
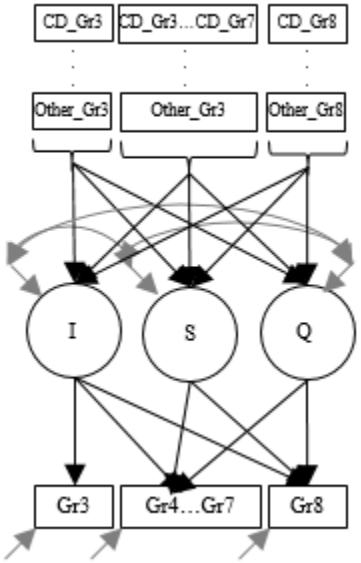
Model 3

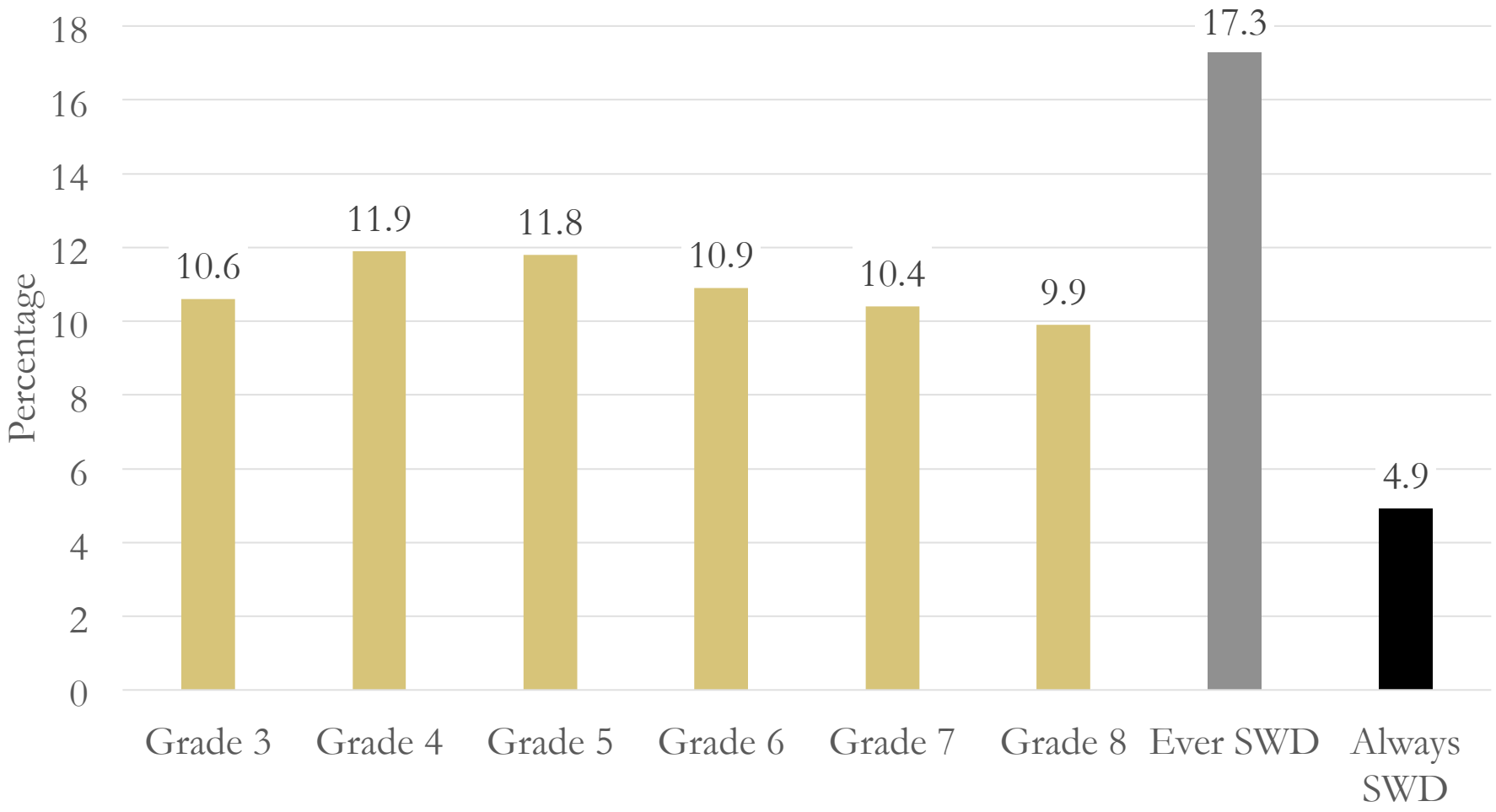


Model 4



Results

RQ1: What is the reclassification rate between *disability* and *without disability*?



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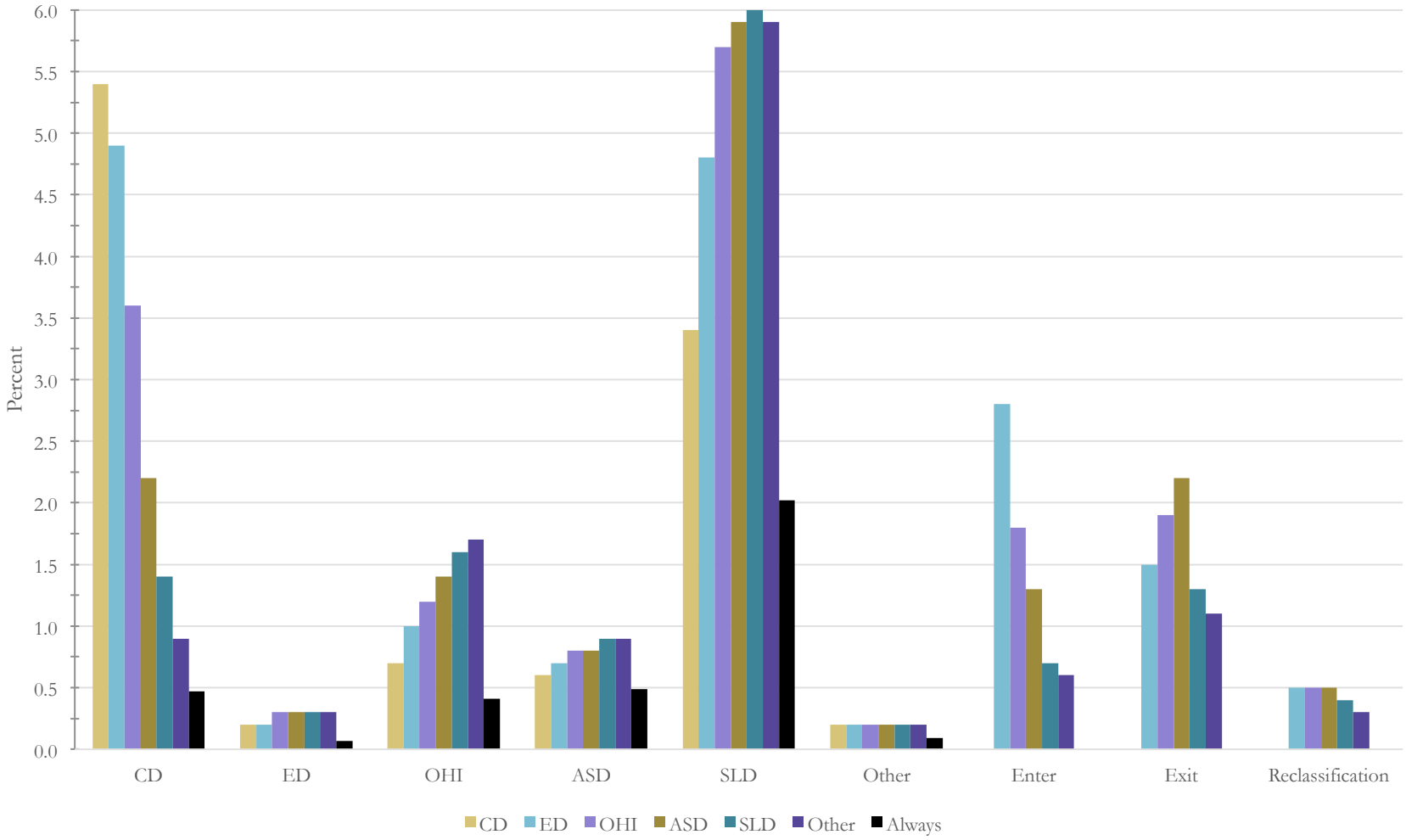
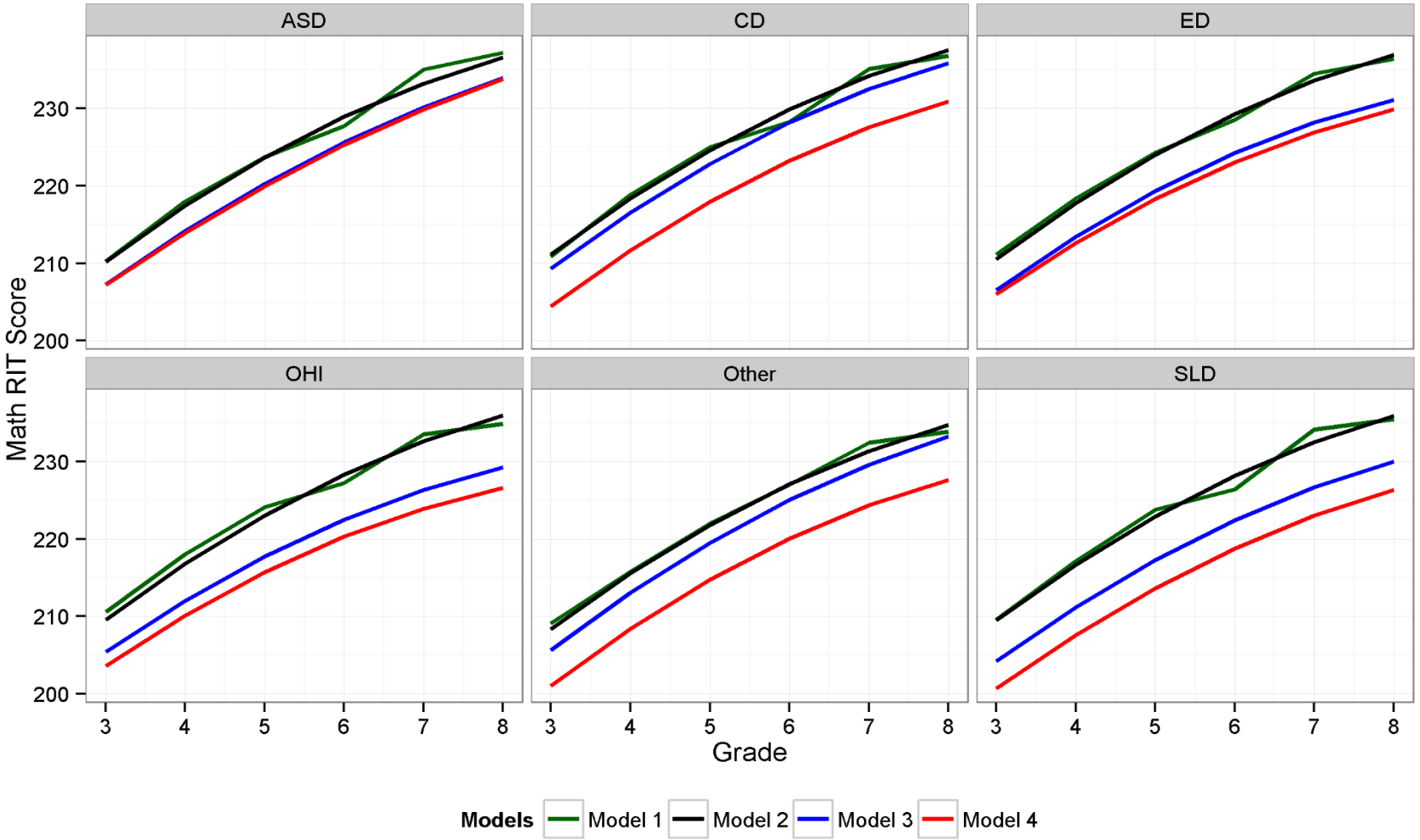


Results

RQ2: How do different specifications of SWD classification as TVC and TIC affect the estimated growth trajectories?



Results

RQ3: Which of the four proposed models best fits the data?

Fit Indices	Unconditional Model	Model 1	Model 2	Model 3	Model 4
AIC	1127153.50	1125752.16	1126468.28	1125825.13	1123031.72
BIC	1127277.61	1126174.13	1126691.68	1126098.17	1124049.41
ABIC	1127229.94	1126012.05	1126605.87	1125993.30	1123658.51
RMSEA 90% CI	.107 – .113	.034 – .036	--	.067 – .070	.034 – .036
CFI	.97	.95	--	.97	.97
TLI	.96	.94	--	.95	.95
SRMR	.33	.07	--	.18	.06
R^2					
Endogenous variables	Unconditional Model	Model 1	Model 2	Model 3	Model 4
Intercept	--	--	--	0.044	0.132
Linear slope	--	--	--	0.002	0.014
Quadratic slope	--	--	--	0.001	0.010
Math Grade 3	.76	.76	--	.76	.76
Math Grade 4	.76	.75	--	.76	.76
Math Grade 5	.80	.80	--	.80	.80
Math Grade 6	.79	.79	--	.79	.79
Math Grade 7	.83	.83	--	.83	.83
Math Grade 8	.85	.84	--	.85	.85

Note: For Model 2, the variance of the repeated measures varied with disability classification which precludes the calculation of standardized coefficients and chi-square and related fit statistics.

Discussion

- Movement of students within and out of disability classification over time.
- TIC preferred over TVC models due to small proportion of reclassified students.
- Limited generalizability.
- TVC models for different populations or TVC.
- Different approaches to analyzing differences between groups; e.g., effect sizes.