

WHO GETS HELD BACK? AN ANALYSIS OF GRADE RETENTION USING STRATIFIED FRAILTY MODELS

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Introduction

Grade retention, where a student is asked to repeat a grade instead of being promoted, is a common practice in United States (US) schools. While retained students show some positive effects in the year immediately after retention, these effects diminish when a child is exposed to a new curriculum (Roderick & Nagaoka, 2005; Wu et al., 2008b, 2010). Grade retention is important because while it is purported to be a form of remediation (Bowman, 2005), retained children are more likely to drop out of school (Bowers, 2010; McMillen, 1997) and less likely to enroll in college if they do complete high school (Ou & Reynolds, 2010), thus increasing the risk of reduced lifetime earnings and poverty (Bowman, 2005). Some of the individual-level mechanisms linked to grade retention include race/ethnicity, poverty, gender, month of birth, teacher experience and biases, and the culture of schools (Hong & Raudenbush, 2005; Hong & Yu, 2007; Kaushal & Nepomnyaschy, 2009; McCoy & Reynolds, 1999; Reynolds, 1992; Wu et al., 2010)

Race/ethnicity and socioeconomic status are strong predictors throughout the research literature on grade retention; what is less well known is how the risk of grade retention is different across racial/ethnic groups and if structural-level variables play a role. This research uses a theoretical model from the health and mortality literature that is used to explain racial/ethnic

differences in mortality and morbidity outcomes (Hummer, 1996), and we adapt it for use in educational outcomes, specifically grade retention.

Hummer’s (1996) model lays out a series of primary pathways and intervening factors to explain how a person’s race leads to differences in outcomes. The primary pathways include institutional forms of racism, such as segregation, racial/socioeconomic stratification, and minority group behaviors. The intervening factors are the results of the primary pathways. Figure 1 shows the adaption of Hummer’s (1996) model for use in this research.

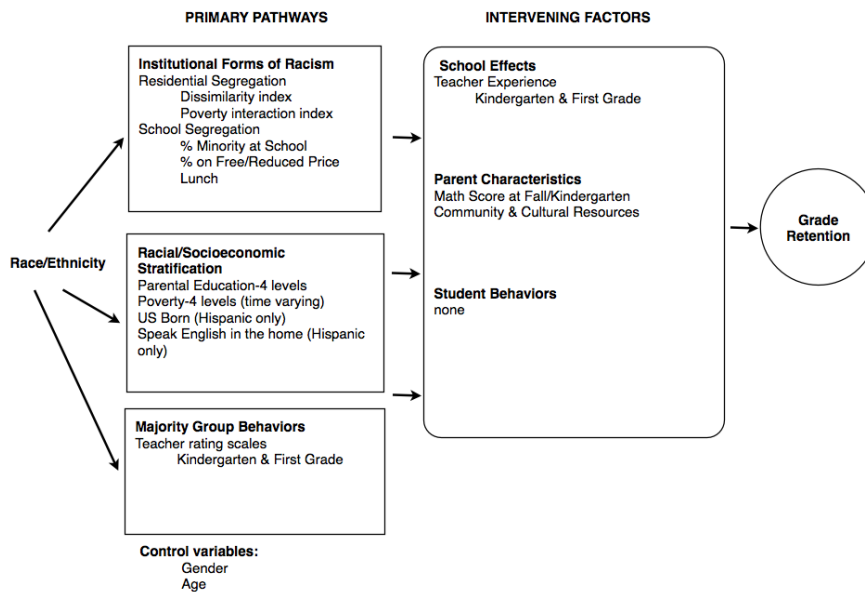


Figure 1 Adaptation of Hummer’s (1996) mode for Disparities in Education Outcomes

Data and Methods

Two data sets were used in this research. The primary data for this study came from the Early Childhood Longitudinal Study, Kindergarten Class of 1998 – 99 restricted use data set (ECLS-K). The ECLS-K data were augmented with two county-level segregation indices constructed from the 2000 U.S. Census of Population and Housing, Summary File 3. These

indices are the dissimilarity index for whites and non-whites and the interaction index (the inverse of the isolation index) for poor versus non-poor people. The final initial sample contained approximately 13,400 students. The outcome variable was whether or not the child had been retained at any grade. Survival analysis methods were used in the data analysis and a person-period data set was composed. Because the ECLS-K did not collect data each year, intervals were constructed to encompass the available data points: 1) between kindergarten and first grade; 2) between first and third grade; 3) between third and fifth grade; and 4) between fifth and eighth grade. Variables at the individual and school level that fit the theoretical model were selected for analysis using PROC GLIMMIX in SAS statistical software. The analysis was conducted for the entire sample, and then for the stratified models by race/ethnicity. Results are available in Table 1.

Results

When comparing the results from the full sample, the result that appears most meaningful is that when poverty, segregation, and parent education are accounted for in the model, whites are now the *most* likely to be retained in grade, and schools with 18 – 45% minority children are more likely to hold students back. Higher dissimilarity is associated with a lower risk of retention, and less economic segregation, as measured by the interaction index, appears to reduce the risk of retention.

To answer the question: Who gets held back? The stratified models provide more detailed information by race/ethnicity. While they are comprised of different samples and thus cannot be directly compared, the risks are different across the models. For white children, the risk of retention is highest for a boy who was born in the late spring or summer, who lives in poverty, and has lower math achievement in the fall of kindergarten. The school the boy attends is in a county where there is less racial segregation according to the dissimilarity index for whites and

non-whites. A black child is more at risk if he has an inexperienced teacher than if he lives in poverty. His age and his parent's education do not add to his risk of retention. His risk is greater if he is in a school with a large percentage of poor or near-poor students, and he attends a school in a county where there is little interaction between poor and non-poor people. A Hispanic child who has been held back has a different set of risks. For this child, his biggest risk is living in poverty. All other variables do not significantly contribute to his risk of being retained.

This research confirmed prior studies that females are less likely to be retained, and this is consistent across racial/ethnic groups. This research makes a contribution by taking into account residential segregation and the racial/ethnic composition of the school. In the full model, integration appeared to increase the risk of grade retention. The findings indicate that poor children may be more susceptible to retention in schools with a wider racial and socioeconomic mix of students. To reduce retention rates, schools may need to provide additional resources to these at-risk students to help them keep up with their better-off peers.

Table 1 Estimates and Standard Errors Based on Shared Frailty Models for Grade Retention, Early Childhood Longitudinal Study – Kindergarten Cohort

	All Students N~13,400	White Students N~7,200	Black Students N~2,050	Hispanic Students N~2,500
Kindergarten	-47.33 (12.77)***	-101.16 (21.00)***	-38.22 (28.45)	19.86 (30.87)
First Grade	-48.17 (12.77)***	-102.00 (21.00)***	-38.99 (28.45)	18.93 (30.87)
Third Grade	-47.93 (12.77)***	-101.80 (21.00)***	-38.63 (28.45)	19.06 (30.87)
Fifth Grade	-48.47 (12.77)***	-102.35 (21.01)***	-39.11 (28.45)	18.33 (30.87)
Eighth Grade	-50.32 (12.77) ***	-103.88 (21.01)***	-41.62 (28.48)	16.57 (30.88)
INDIVIDUAL LEVEL PREDICTORS				
Control variables	Estimates	Estimates	Estimates	Estimates
Month of Birth	.04 (.01)***	0.09(.02)***	.03 (.02)	-.01 (.03)
Female Gender (ref=male)	-.63 (.08)***	-.71 (.13)***	-.61 (.18)**	-.50 (.19)***
Black	-.22 (.15)*			
Hispanic	-.49(.15)***			
Asian	-.95 (.25)***			
Other	-.36 (.22)*			
Primary Pathways <i>Racial/Socioeconomic Stratification</i>				
Poverty (time-varying)	.13 (.06)*	.10 (.10)^	.09 (.12)	.57 (.14)*
<i>Parent Education</i> (ref=Undergraduate degree or more)		REF	REF	REF
Parents with less than High School	.22 (.17)	.58 (.31)^	.73 (.46)	-.27 (.41)
Parents with High School or GED	.06 (.14)	-.10 (.21)	.57 (.42)	-.52 (.39)
Parents with some college	.06 (.13)	-.14 (.18)	.78 (.42)	-.73 (.40)^
Child born in the US (Hispanic only)				-.11 (.33)
Speak English in the home at Kindergarten (Hispanic only)				.46 (.27)^
<i>Majority group behaviors</i>				
Teacher rating of student in Kindergarten	-.19(.02)***	-.21 (.03)***	-.21 (.04)***	-.16 (.05)***
Teacher rating of student in First Grade	-.18(.02)***	-.17 (.03)***	-.17 (.04)***	-.29 (.05)***
Intervening Factors <i>Teacher Experience</i>				
Inexperienced teacher in Kindergarten (ref=Teacher has 4 + years experience)	.48 (.10)***	.04 (.18)	.46 (.21)*	.20 (.22)
Inexperienced teacher in First Grade (ref=Teacher has 4+ years experience)	-.08 (.09)	-.17 (.16)	.01 (.20)	.11 (.21)
<i>Parent Involvement</i>				
Math score at fall Kindergarten	-.08 (.01)***	-.06 (.01)***	-.04 (.02)**	-.07 (.01)***
Cultural/community resources	.03 (.03)	.02 (.05)	-.01(.08)	.11 (.09)
SCHOOL LEVEL PREDICTORS <i>Institutional Forms of Racism</i>				
% on Free or Reduced Price Lunch	.01 (.002)***	.01 (.004)*	.01 (.004)*	.005 (.004)
Dissimilarity (whites/non-whites)	-.32 (.09)**	-.32 (.14)*	-.02(.19)	-.05 (.23)
Interaction between poor and non-poor	-.33 (.07)***	-.27 (.15)^	-.53 (.18)**	-.06 (.19)
% Minority at the School				
< 5% Minority	-.09 (.27)	1.72 (.85)*	1.56 (1.0)	-1.08 (1.18)
5% – < 18% Minority	.11 (.27)	1.59 (.86)^	.67 (.64)	-.28 (.65)
18% – < 45% Minority	.45 (.23)*	1.94 (.85)*	.72 (.40)	.24 (.45)
45% – < 83% Minority	-.02 (.21)	1.81 (.86)*	.25 (.34)	-.37 (.38)
≥ 83% Minority	REF	REF	REF	REF
AIC	6,026.10	3.92 SE .55	2.43/.49	3.58 /.62
Estimates/SE	5.02/.51	2,676.25	1,282.13	1,273.81

^ p ≤ .10 * p ≤ .05 ** p ≤ .01 *** p ≤ .001