Latent Structure of Pathways Combining Multiple Trajectories to Adulthood: Reconciling Racial Majority and Second-Generation Advantages*

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Abstract

Racial disparities in child developments and transitions to adulthood have focused on black-white gaps and more recently other racial minority disparities. At the same time, an immigrant paradox summarizes the advantage of the mostly non-white second generation. Much empirical work on either side of the story examines a single developmental domain. Yet, a child's pathway to adulthood reflects the interdependence of multiple developmental domains and the underlying structure of these individual pathways reflects the common shapes of multiple trajectories. This paper seeks to uncover this latent structure of pathways and understand how racial majority and second generation advantage play out in shaping this structure. Using latent class analysis of multiple trajectories with distal outcomes based on data from the National Longitudinal Study of Adolescent Health, this study uncovers how racial minority or second generation youths are sorted into the underlying structure of pathways differently from white or third-generation youth.

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Extended Abstract

Introduction

Racial disparities in child developmental outcomes and transitions to adulthood have focused on black-white gaps (Jenks and Philips 1998) and more recently other racial minorities (Massey et al. 2003). At the same time, an immigrant paradox summarizes the seemingly contradictory advantage of the mostly non-white second generation. Explanations such as immigrant optimism (Kao and Tienda 1995), consonance between parental and child expectations (Hao and Bonstead-Bruns 1998), and second generation advantage (Kasinitz et al. 2008) suggest the important role of both foreign-born parents and their children. Much empirical work on either the racial or the second-generation side of the story examines a single developmental domain, e.g., academic, behavior, or health. Yet, a child's pathway to adulthood reflects the interdependence of multiple developmental domains and the underlying structure of these individual pathways reflects the common shapes of multiple trajectories. This paper seeks to uncover this latent structure of pathways and understand how racial majority and second generation advantage play out in shaping this structure.

Background

Under the life course framework (Elder 1998), adolescent developmental processes are shaped by social structure of race, nationality, and social class. In particular, developmental trajectories (the sequencing and durations of domain-specific developmental states) combined to form distinctive pathways to adulthood. Our study extends the literatures on adolescent population. Past research has found that childhood emotional and behavioral problems diminish the probability of graduating from high school and attending college (McLeod and Kaiser 2004). Our study extends this line of research by focusing on the underlying structure of pathways combining academic, behavioral, and mental health trajectories as well as including major young-adult outcomes including educational attainment, labor force attachment, and psychological well-being. Past research has also provided insights into the unique developmental processes of immigrant adolescents (Crosnoe 2005; Georgiades et al. 2007). Building on these insights, this study uncovers how racial minorities and second generation youths are sorted into the underlying structure of pathways, differently from white or third-generation youth.

Data and Methods

Data and Sample. This study analyzes data from the National Longitudinal Study of Adolescent Health (Add Health). The four waves of Add Health data over the period of 13 years (1995-2008) provide longitudinal data on the academic, behavioral and psychological well-being of a large nationally representative sample of adolescents aged 13-17 in 1995, including those in Mexican, Cuban, Chinese, and Filipino immigrant families. Our analytic sample of 10,870 individuals were aged 14-16 in the 9th grade, followed through the high school years (including dropouts) and on until Wave IV in 2007-2008 when young adult outcomes were collected.

Measurement. To construct measurement suitable for adolescents with diverse racial and immigrant backgrounds, we use variables from the transcript study Adolescent Health and Academic Achievement (AHAA) to construct objective, uninterrupted profiles of academic progress. We use the AHAA-provided math and science sequential courses earned credits rather than culturally-sensitive standardized tests. The annual earned credits are transformed to

cumulated earned credits to measure academic growth, as well as to smooth individual growth curves using individual-specific information. For the behavioral domain, we focus on school engagement, measured by the proportion of courses passed for an individual in an academic year. This captures the baseline of school engagement, better than self-reported hours on homework, which could be contaminated by students' levels of knowledge on the subject. For the mental health domain, we construct a culturally-equivalent depression scale (Perreira et al. 2005) using 5 items from the Center for Epidemiologic Studies Depression Scale. We measure successful young adulthood at ages 25-29 using educational attainment, stable labor force attachment, and general psychological well-being. To capture the most significant aspects of family context, we measure family structure and parental and child expectations. We also control for the school sector, type, attendance rate, and college admission rate of the high school where the respondents attended the 9th grade.

Analytic strategies. The analysis entails a special type of latent class analysis of longitudinal data with distal outcomes (Muthen and Shedden 1999). The finite mixture modeling proposed in that paper has the capacity to (1) identify the latent classes of each trajectory while allowing for associations among latent class variables for all trajectories under estimation, and (2) simultaneously identify the impact of these related latent class variables on distal outcomes.

Preliminary Results

From our preliminary analysis, we show (1) descriptive patterns of academic and behavioral trajectories by race and second generation status, (2) separate estimates of latent classes for academic and behavioral trajectories, and (3) joint estimates of latent class variables for academic and behavioral trajectories. We will continue on with adding the mental health trajectory and move to the final simultaneous modeling that relates the latent structure of pathways (correlated latent class variables for the three trajectories) with young adult outcomes.

Descriptive trajectories. Figure 1 presents the aggregate patters of academic growth and school engagement trajectories by race and generation status. Subplot (a) exhibits moderate racial gaps in cumulated earned credits for high school math and science courses. White students started off slightly higher than all racial minorities. But by Grade 12 white students were bypassed by Asian students. The growth curves for black and Hispanic students parallel that for white students, with Hispanic student earning least credits on math and sciences. The generation gap in earned credits in math and science is smaller. Second generation students started off somewhat lower than third generation students but they surpassed the third generation students in Grade 12.

Racial gaps in school engagement, measured by proportion of all courses taken in an academic year that were passed, are large. Even at the initial 9th grade, Asian students on average passed 95% of courses taken, which is higher than white students at 94%, and much higher than black and Hispanic students at 89% or lower courses. Over time, all students increasingly failed more courses given the progressively harder courses in higher grades. However, the rates differ among racial groups: white students regressed the most whereas Hispanic students slightly slowed down the regression after 10th grade. An interesting pattern can be observed in subplot (d). At 9th-10th grades, generation status does not make much difference. Second generation students, however, fared much better than third generation students in 11th and 12th grades, leading to a significant gap of school engagement at 12th grade.

Separate latent class analysis. The estimates are trial estimates using fewer covariates because the optimization algorithm takes considerably long computing time. We present selected

estimates from a trial run of separate latent class analysis in Table 1. The model estimation produces three types of output: (1) the effects of race, generation, and other covariates on the initial state and linear slope of the trajectory; (2) the differential intercepts by the latent classes in the initial state and linear slope; (3) the effects of race, generation, and other covariates on the latent class; and (4) (omitted from the table) the random effects captured by variance and covariance of the initial states and linear slopes among individuals. We imposed two latent classes for each trajectory. Three quarters of students belong to a higher academic growth track whereas the rest one quarter are in the lower academic growth track. We reverse coded school engagement to school disengagement and treated it as a continuous variable censored at the bottom (0). Also two latent classes were imposed on school disengagement. The estimation identifies that 21% were in a relatively disengaging group while 79% in a relatively engaging group.

Joint latent class analysis. The separate analysis in Table 1 assumes that the two trajectories are independent but life course theory tells us that domains are interdependent. The joint analysis of the academic growth and school engagement trajectories is a step forward to relax the unrealistic assumption. Here we treat school engagement as a binary variable. Table 2 shows that, indeed, the two latent classes are significantly correlated with each other.

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Table 1. Latent Classes of Academic Growth and School Engagement in High School: Separate Analysis

Variable	Academic Growth		School Disengagement	
Initial State				
Black	-.019	**	.173	**
Hispanic	.002		.132	**
Asian	.029	**	-.013	
2nd generation	.016	*	-.075	**
Class 1 intercept	1.929	**	.815	**
Class 2 intercept	.733	**	.280	**
Linear Slope				
Black	.011		-.017	**
Hispanic	-.010		-.003	
Asian	.112	**	.020	
2nd generation	.111	**	-.012	
Class 1 intercept	.851	**	.217	**
Class 2 intercept	.571	**	.082	**
Class 1 (ref. Class 2)				
Black	-.671	**	.314	**
Hispanic	-.901	**	.209	
Asian	-.870	**	.139	
2nd generation	-.233	**	-.004	
Intercept	-.235		-.666	*
Class 1 prop.	0.75		,21	
Class 2 prop.	0.25		.79	
n	10,870		10,870	

Data sources: Add Health, AHAA.

Note: School disengagement is obtained from 1-engagement. It is a continuous variable censored at the bottom 0. The models control for gender and parental education. All random effects (variance of initial state and linear slope as well as their covariance for each trajectory are all significant.

Table 2. Latent Classes of Academic Growth and School Engagement in High School: Joint Analysis

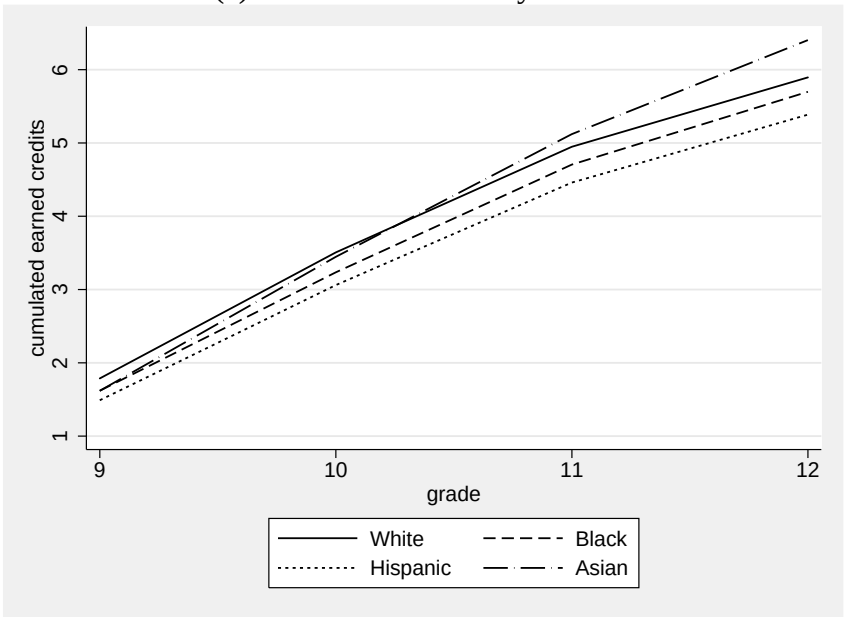
Variable	Academic Growth		School Engagement	
Initial State				
Black	-.144	**	-1.534	**
Hispanic	-.234	**	-.722	**
Asian	-.215	**	-.146	
Class 1,1 intercept	1.069	**	-6.464	**
Class 1,2 intercept	-3.040	**	1.623	**
Class 2,1 intercept	1.566	**	-4.186	**
Class 2,2 intercept	1.649	**	.000	
Linear Slope				
Black	.006		.145	**
Hispanic	.012	*	-.051	
Asian	.016	**	-.287	**
Class 1,1 intercept	.204	**	-.288	**
Class 1,2 intercept	-.049		1.898	**
Class 2,1 intercept	1.247	**	-.050	
Class 2,2 intercept	1.896	**	-.431	*
Class 1 (ref. Class 2)				
Black	.157	**	.453	**
Hispanic	.100	**	.209	*
Asian	-.731	**	-.114	
Intercept	4.114	**	.812	**
Class 1 prop.	.46		.34	
Class 2 prop.	.54		.66	
Threshold	-3.090	**	-3.090	**
Credit Class1				
Engag Class1	-1.501	**		
n	10,870		10,870	

Data sources: Add Health, AHAA.

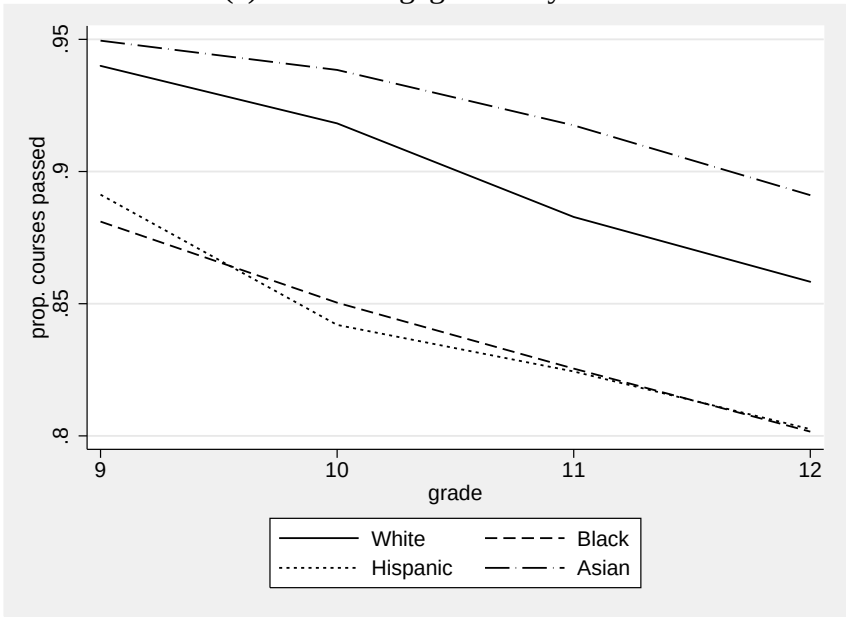
Note: School engagement is a binary variable (1=engaged 0=disengaged). The model controls for gender and parental education. All random effects including variance of initial state and linear slope as well as their covariance for two trajectories are all significant.

Figure 1. Academic Growth and School Engagement Trajectories by Race and Generation: Add Health

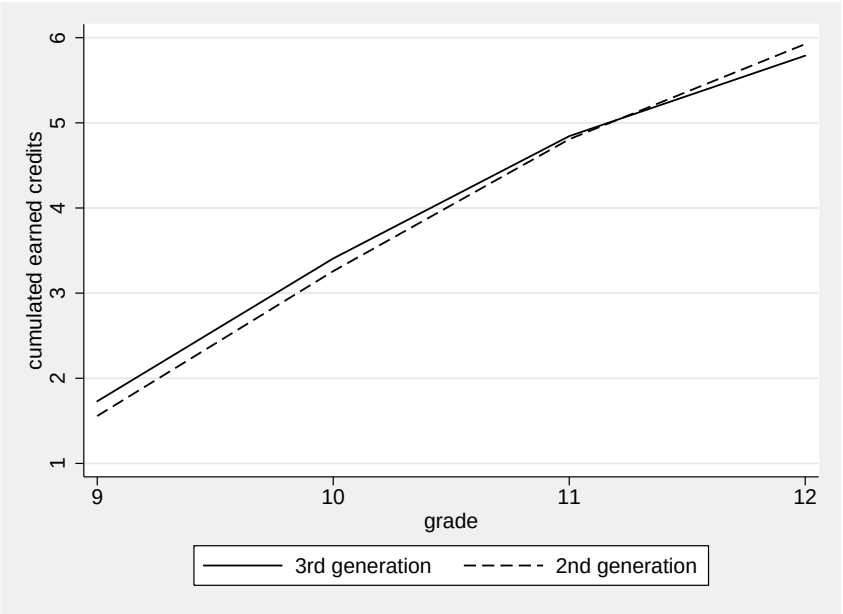
(a) Academic Growth by Race



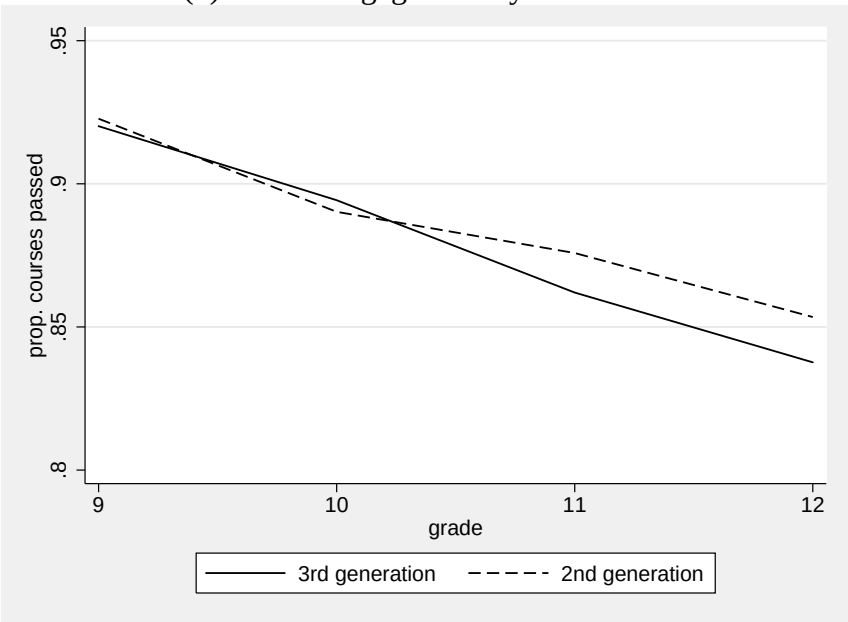
(c) School Engagement by Race



(b) Academic Growth by Generation



(d) School Engagement by Generation



Data source: Add Health, AHAA.