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Studying Acceleration with National Datasets and Surveys: Some Suggestions, Some Results, and Our Experiences

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The Institute for Research and Policy on Acceleration (IRPA) was established in 2006 at The Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development at The University of Iowa through the support of the John Templeton Foundation. IRPA is unique in that its sole focus is the study of curricular acceleration for academically talented children. Academic acceleration is an educational intervention that moves high-ability students through an educational program at a rate faster or at an age younger than typical (Pressey, 1949). Acceleration helps match the level, complexity, and pace of the curriculum with students' intellectual abilities.

The founding of IRPA is a direct outcome of the success of the 2004 two-volume report by Nicholas Colangelo, Susan Assouline, and Miraca Gross. The report, entitled *A Nation Deceived: How Schools Hold Back America's Brightest Students* (2004), synthesizes the 50 years of robust and consistent research on academic acceleration. The recurring refrain from this research is that both grade-based (e.g., grade skipping) and content-based (e.g., Advanced Placement classes) acceleration are effective, though underused, interventions in academic and social-emotional domains for high-ability students. Although grade-accelerated students generally outperform their chronologically older classmates academically, both groups show approximately equal levels of social and emotional adjustment (see Assouline et al., 2003; Colangelo, Assouline, & Gross, 2004; Kulik & Kulik, 1992, 2004; Lipscomb, 2003; Sayler & Brookshire, 1993; Southern & Jones, 1991). Longer term, accelerants attain advanced degrees, produce scholarly works, and contribute professionally at rates well above societal baselines (Lubinski et al., 2001, 2006).

It is fair to say that extant research has answered many basic questions about acceleration. At the most fundamental level, we know that acceleration is an effective intervention for high-ability students, particularly when the decision is carefully considered and supported by the school. At the same time, there are nuances to the research and unanswered questions about the factors that moderate success with the different forms of acceleration. Additionally, with the increase in public awareness of acceleration, changes in attitudes and policies need to be monitored. We report on two lines of research—secondary analyses of existing national datasets and nationally distributed surveys—that we hope will add to the existing knowledge of acceleration.

Secondary Analyses of Existing Datasets

We recently have begun using datasets from the National Center for Education Statistics (NCES) to investigate questions about the predictors and outcomes of acceleration. These datasets, specifically NELS and ELS, are a valuable resource because they provide information on representative national samples of students, some of whom have been academically accelerated and many who have not been accelerated. Many of the existing studies of acceleration (and giftedness, generally) fail to include an appropriate comparison group such as non-accelerated students of similar ability or achievement. Consequently, it is difficult to attribute the positive outcomes to acceleration per se rather than to other characteristics of the students (such as general ability). The relatively large number of accelerated and similar-ability unaccelerated students in the NCES datasets helps resolve this situation. Furthermore, the cross-sectional design used in many studies fails to provide information on how accelerated students perform over time. Students in the NCES datasets are followed for many years, and so the long-term consequences of accelerative decisions made in grade school can be assessed at high school and beyond. (Regional talent searches also gather longitudinal data, often with much larger samples which allow greater confidence in the statistical analyses that are performed. However, one cannot easily make inferences about the population of students beyond those who participated in the talent search.)

Others also have recognized the potential in using large datasets in studies of high-ability students. Konstantopoulos, Modi, and Hedges (2001) used NELS:88 to describe the characteristics of gifted students; Renzulli and Park (2002) studied gifted high school dropouts with NELS:88; Wyner, Bridgeland, and Diiulio (2007) used NELS:88 and ECLS-K to identify the achievement trap in which high-achieving, lower-income students lose ground to high-achieving, higher-income students; and Robinson, Lanzi, Weinberg, Ramey, and Ramey (2002) have looked at longitudinal achievement data from high-achieving students enrolled in Head Start. Sayler and Brookshire (1993; Sayler, 1996) have used NELS:88 to examine the social and emotional outcomes of acceleration for 8th graders.

Methodological and Analytical Issues in Conducting Acceleration Research with National Datasets

NCES used a two-stage sample selection process to obtain a nationally representative sample of students. First, a stratified random sample of schools was drawn, and then a stratified random sample of students from within each school. This two-stage method requires that analyses account for the complex survey design and multilevel nature of the data.

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Identification of accelerated students. Following Sayler and Brookshire (1993), we indicated that students had been accelerated if their parents reported (on the parent questionnaire) that their child had been grade skipped and if they were at least two years younger than the normal age for students in that grade, or if they were one year younger than normal but were born on or after January 1st of the appropriate year. We did not include students who were one year younger than normal at the beginning of the school year and who had a birthday between September and December of that year because the district might have had a late cut-off birth date for admission. These students would be young for their grade but still within the district-recommended ages.

The NELS and ELS data sets used in this study contain 23,341 and 11,344 students, respectively, from the public and restricted-use data who were systematically sampled to be representative of the nation. However, even with samples of this size, only 336 students (1.4%) were accelerated in the NELS data and 100 students (0.6%) in the ELS data.

So that we could compare accelerated students with similar-ability students who were not accelerated, we used a composite of students' mathematics and reading test scores at the time of the first data collection (8th grade in NELS and 10th grade in ELS) as a control for achievement, Note that this is not a measure of student ability at the time of the skip. Accelerated students in these analyses are compared to their post-skip classmates who have achievement scores with a similar mean and variance in 8th or 10th grade.

Analysis issues. A common procedure in this type of research is to compare the means of accelerated and non-accelerated cohorts (e.g., Sayler & Brookshire, 1993). Though informative, these comparisons typically use only a fraction of the data and provide too little control for confounding variables. Logistic regression is also preferable to a means comparison when the assumption of normality is violated (Press & Wilson, 1978). Therefore, in addition to a means comparison using a cohort of similar-achievement students, we used logistic regression so that the entire sample of students was included in the analyses. The binary dependent variable (whether a student was accelerated or not) is then regressed on all of the independent variables simultaneously. We included a variable for academic achievement as a key control.

A rule of thumb in logistic regression is that the number of positive outcomes (i.e., accelerated students) must be larger than the number of independent variables. Our design met this criterion. However, results can be biased when the percentage of the sample that experiences a positive outcome (in our case, grade-acceleration) is very small. Thus, we used recommended procedures in Stata (King & Zeng, 2001) to account for rare events data in logistic regression. Our results did not differ substantively from the results using traditional logistic regression, likely due in part to the large overall sample sizes (N=23,341 for NELS, and N=11,344 for ELS). Although our results from traditional (i.e., non-rare events) logistic regression do not differ from rare-event regression, we caution that the rarity of acceleration needs to be a consideration for those using national datasets. The issue is particularly vexed when samples are small and the weights for some cases are very large. When this happens, fixing the upper and lower weights at some less extreme value can be helpful.

We conducted two sets of analyses on these data. The first examined which students were most likely to be accelerated and the second examined some of the outcomes of acceleration. For the first set of analyses, we compared 275 accelerants in the NELS:88 data with 275 students who showed similar levels of achievement in reading and mathematics on 55 variables. We divided the variables into seven categories: descriptive characteristics (e.g., sex and ethnicity), psychosocial characteristics (e.g., self-confidence, self-reliance), socioeconomic status (e.g., family income above median, father is a professional), home environment (e.g., parents check homework and limit TV watching), school characteristics (e.g., public, large, percent minority), community characteristics (e.g., urban, rural, south, west), and academic activities at school (e.g., taking advanced math, warning about a grade).

Table 1 shows selected results. Asian-American and Black students were more likely to be accelerated and White students less likely to be accelerated than non-accelerated students with similar levels of achievement. Accelerated students reported less self-reliance, were more likely to expect to finish college and get a graduate education, were much less likely to cut class, and less likely to participate in religious activities. Mothers of accelerants were more likely to have graduated from college and fathers more likely to have professional occupations.

In terms of home environment, accelerants were more likely to have a study room, access to a computer, and to have parents who limited their TV watching and checked their homework. However, the largest effect of the home environment variables was for immigrant status. Children of immigrants were more than twice as likely as children of non-immigrant parents to have been accelerated.

Among school characteristics, children in Catholic and other private religious schools were more likely to have been accelerated while those in public schools less likely to have been accelerated than similar-achieving peers.

Region of the country and community characteristics also mattered. Children in the Northeast and those who attended suburban schools were more likely to have been accelerated.

Accelerated students were more likely to report being in the highest math group, to have participated in a gifted and talented program, and were less likely to have received a warning about grades. All other indices of problem behaviors were also less frequent among accelerants although not statistically significant.

We next controlled for other variables that might be expected to moderate some of these effects. For example, might the effects due to ethnicity be explained by SES? Might effects for region of the country be explained by urbanicity? We did this first by introducing a second control variable using the data set with 275 accelerants and 275 students of similar achievement. We then used the entire NELS data set and controlled for multiple variables simultaneously. Introducing the second control variable (recall that achievement was already controlled) produced only modest changes in the observed odds ratios. Controlling for several variables simultaneously using the full data set sometimes resulted in

larger changes. For example, using the full data set and multiple logistic regression, we found that girls were more likely than boys to be accelerated. This effect, though in the same direction, was not significant in the analyses of the smaller data set.

The second set of analyses examined the outcomes of acceleration. When comparing students who had been grade-accelerated to older, similar-achievement, non-accelerated students in 1992 (the NELS:88 sample), grade-accelerated students were more likely to have been in a gifted and talented program during high school and have improved their achievement test scores more between 8th and 12th grade. Grade-accelerated students were also more likely to score higher on 12th grade exams than non-accelerated peers, even without controlling for 8th grade achievement. The smaller ELS data set gave only marginally significant results.

We have also investigated the effects of the timing of acceleration in elementary school, both the characteristics of students most likely to be accelerated earlier or later in elementary school, and the academic performance of early versus late accelerants in high school. However, sample sizes in these analyses become perilously small and so generalization is difficult. Small samples can also exacerbate the effects of applying the customary case weights. Up-weighting particular cases by a factor of 10 or more has little effect when the full data set is used but can distort results when cell sizes are small.

Survey Research from IRPA

In addition to secondary analyses of the NCES datasets, IRPA has been engaged in survey research over the past year. The importance of survey research is that it is an efficient way to assess changes in attitudes, practices, and policies. Our Nation Deceived survey, conducted in fall 2007, examined the impact of the report three years after its publication. We found that 99 percent of the 3,868 U.S. respondents who completed the survey believed the report will have a positive influence on gifted education in the long-run, 85 percent indicated the report has had a positive impact on their attitudes toward acceleration, and 77 percent said that the report has had a positive impact on the field of gifted education. Fifty-one percent of those responding believe that the report has had a positive impact on the field of education in general, and 25 percent believe that the report has had a positive impact on training provided in colleges of education. Fourteen percent of respondents said they believe that acceleration policies have been written or revised as a result of *A Nation Deceived* (cf., recent policies from Ohio, Minnesota, and Georgia) Acceleration policies and personal attitudes are perennial roadblocks in the implementation of acceleration practices. Whittling away at some of the resistance is a large step forward in bringing acceleration into the general education community.

The purpose of a second IRPA survey, our Acceleration Survey, also conducted in fall 2007, was to provide recent descriptive information on attitudes and practices of acceleration from various constituencies (i.e., administrators, classroom teachers, and gifted and talented teachers/coordinators, parents, gifted education researchers). We were interested in the attitudes these groups hold and the beliefs they ascribe to others with whom they interact when making decisions about acceleration (e.g., other teachers, school counselors, parents). We also collected information on the acceleration decision-making process. These results are used to write policy templates and to develop materials (e.g., how-to guides for acceleration) for use by parents, teachers, and administrators.

Our Acceleration Survey reveals several key findings regarding attitudes and practices of acceleration. First, although survey respondents self-reported a positive attitude about acceleration, the respondents felt that others' attitudes were not as favorable. This belief could affect the respondent's willingness to discuss or propose acceleration with others (for example, a parent may be unwilling to propose acceleration if she feels that the teacher will not welcome the discussion). Second, approximately one-third of schools did not have a written acceleration policy, a complementary result to the Nation Deceived survey result indicating that some states have recently developed policies. Unfortunately, absence of a formal policy might invite practices that discourage acceleration. Third, most schools did not include a school counselor as part of the acceleration decision-making process. A school counselor can have an instrumental role in helping an accelerated student learn, if necessary, study skills, strategies for organizing school work, approaches for handling academically challenging work, and methods for adjusting into a new social climate with older students.

The primary limitation of this survey research is that respondents voluntarily chose to complete the surveys. Most of the respondents had a vested interest in acceleration: parents of gifted children, teachers of the gifted, and gifted education researchers and advocates. Therefore, it is not surprising that their attitudes toward acceleration were generally positive. A randomly selected set of respondents would support more dependable generalizations about attitudes toward academic acceleration. Nonetheless, our survey research indicates that much work remains to be done in assessing and changing attitudes, policies, and procedures about acceleration.

Grant Support for Acceleration Research

A Nation Deceived was successful in making acceleration a topic of national conversation. IRPA is working to make sure that acceleration remains part of these discussions by encouraging new research and assisting in the dissemination of existing research on acceleration. In 2007, IRPA awarded nine research grants on acceleration. The topics of the funded work (and the lead researchers) include selection of high school students for Advanced Placement (AP) classes (Phil Ackerman), recruitment and retention of minority students into AP classes (Holly Hertberg-Davis), acceleration of minority students (Seon-Young Lee), reasons for attrition (Elizabeth Connell) and success (Michael Sayler) in early entrance programs, acceleration practices in Canada (Lannie Kanevsky), teacher and administrator attitudes toward acceleration and the creation of professional development module on acceleration (Del Siegle), reflections of profoundly gifted students 20 years later from participants in the Study for Mathematically Precocious Youth (Rose Mary Webb), and a meta-analytic update on the research published since *A Nation Deceived* (Karen Rogers). Abstracts from the 2007

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recipients are available at www.accelerationinstitute.org. Recipients of the 2008 IRPA grants will be announced in April.

Conclusions

Through its research, policy, and advocacy efforts, IRPA hopes to maintain interest in academic acceleration, to support research on acceleration, and to become a resource for anyone (parents, teachers, administrators, researchers, etc.) who has questions about acceleration. Also, IRPA will act as a consultant to state departments of education and school districts that are considering writing (or revising) policy on acceleration.

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Table 1. Percentages of background factors between accelerators and non-accelerators with similar achievement test scores in Grade 8 (N=550)

Explanatory Variables	Percent accelerated group (N=275)	Percent non-accelerated comparison group[a] (N=275)	Odds ratio
Descriptive characteristics:			
Female	55.64	51.27	1.19
Asian	17.45	6.18	3.21**
Hispanic	13.09	13.45	0.97
Black	15.27	5.82	2.92**
White	54.18	74.55	0.40**
Psychosocial characteristics:			
Self-esteem	92.00	91.27	1.10
Self-reliance	72.73	80.00	0.67*
Plan to finish college	81.82	72.73	1.69*
Plan to continue education past college	45.09	32.36	1.72**
Expecting a professional job at age 30	53.09	45.45	1.36†
Cuts class less than once a week	3.27	8.36	0.37*
Participates in sports outside school	34.55	31.64	1.14
Participates in religious activities	28.73	38.91	0.63*
Socioeconomic status:			
Family income above median	49.82	47.27	1.12
Mother graduated from college	38.55	28.00	1.61**
Father graduated from college	43.27	38.18	1.24
Father is a professional	23.64	15.64	1.67*
Mother employed outside of home	92.00	90.91	1.15
Home environment:			
Study room	47.27	38.91	1.41*
Owning computer	59.64	47.27	1.65**
Limiting TV watching	53.82	40.36	1.72**
Checking homework	76.00	68.36	1.47*
Mother's expectation on going to college	77.45	72.73	1.29
Immigrant (From a main home language)	38.18	22.18	2.17**
Student is only child	12.36	8.36	1.55
School characteristics:			
Public school	58.91	73.09	0.53**
Private school	10.18	12.36	0.80
Catholic school	17.45	9.45	2.03**
Private, other religious school	13.45	5.09	2.90**
Large school (1,000 and above students)	17.09	12.36	1.46
Percent minority (20% and below)	53.09	59.64	0.77
Percent free lunch (10% and below)	49.45	44.36	1.23
Community characteristics:			
Urban	34.55	32.73	1.08
Suburban	54.55	37.82	1.97**
Rural	10.91	29.45	0.29**
Northeast	35.64	22.91	1.86**
Central	16.73	22.91	0.68†
South	24.73	37.09	0.56**
West	22.91	17.09	1.44†

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(Table 1 – cont.)

Explanatory Variables	Percent accelerated group (N=275)	Percent non-accelerated comparison group[a] (N=275)	Odds ratio
Academic activities at school:			
The highest ability group for math	50.55	40.00	1.53*
The highest ability group for science	30.18	24.00	1.37
The highest ability group for English	34.18	30.91	1.16
Taking advanced/accelerated math	54.18	46.91	1.34†
Taking advanced/accelerated science	34.55	28.73	1.31
Taking advanced/accelerated English	41.45	37.09	1.20
Taking regular math	45.82	53.09	0.75†
Taking algebra	57.09	48.73	1.40*
Enrolling talented/gifted program	32.36	24.73	1.46*
Sent to the office by misbehaving	21.45	26.91	0.74
Sent to the office by bad school work	6.18	9.45	0.63
Warning about attendance	7.64	8.36	0.91
Warning about a grade	19.64	33.82	0.48**
Warning about behavior	15.64	19.27	0.78
Warning about a physical fight	16.36	22.18	0.69†
Felt bored at school	40.00	46.18	0.78

† p <.10; * p < .05; ** p < .01

[a] group controlling for academic achievement (reading and math)