Advancing Minority Gifted Identification: Final Results from a Randomized Trial of Nurturing for a Bright Tomorrow

Angel H. Harris
Duke University

Darryl V. Hill
Fulton County School System

Matthew A. Lenard
Wake County Public School System

Structured Abstract

Context

This paper will report final results from a randomized trial of a program designed to increase gifted identification among minority students. The results herein are preliminary. In 2014-15, the Wake County Public School System ("Wake County"), in partnership with Duke University, implemented Nurturing for a Bright Tomorrow ("Nurturing") in response to chronically-low gifted identification among Black and Hispanic students in two-thirds of the district's elementary schools. According to federal data, while 40% of minority students are enrolled in schools offering gifted education programs, only 28% are represented in these programs (Lhamon, 2015). In more than 40 states, minority students were underrepresented in gifted programs (Yoon & Gentry, 2009). And in various studies at the school, district, and state levels, gaps in representation persist (Carman & Taylor, 2009; Lewis, DeCamp-Fritson, Ramage, McFarland, & Archwamety, 2007; McBee, 2010; Naglieri & Ford, 2003; Olszewski-Kubilius & Lee, 2011). Despite the existence of these gaps, we know very little about the causal impacts of programs, policies, or interventions designed to narrow them (Gubbins, Callahan, & Renzulli, 2014).

Purpose and Research Questions

The purpose of Nurturing is to train teachers in grades K-2 to develop the skills and expectations required to help children attain gifted identification by grade 3. A large body of evidence supports the belief that variations in teacher disposition toward students can significantly influence outcomes (Anderson-Clark, Green, & Henley, 2008; Dee, 2004, 2005; Grissom & Redding, 2016; Love & Kruger, 2005; McKown & Weinstein, 2008; Van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010). To test whether Nurturing has a causal impact on reducing gaps in identification by race/ethnicity, we ask three research questions:

1. Did Nurturing raise scores on a test that identifies gifted students?
2. Did Nurturing increase the odds at which students are identified as gifted?
3. Did Nurturing increase the school-level counts of gifted students?

Setting

The setting for Nurturing is Wake County, the largest district in North Carolina and the 15th largest in the nation. North Carolina's White-Black and White-Hispanic gaps of 10% each represent the third largest in the nation (USDOE, 2016). At the time of Nurturing's launch, the disparities in Wake County were more severe, with comparable identification gaps roughly two to three times higher than the state's. Thus, Wake County provided an ideal setting in which to launch a school-level experiment designed to reduce these gaps.

Participants

To identify our analytic sample of schools, we sorted all Wake County elementary schools on rates of gifted identification. We invited schools below the median rate to participate in the random assignment process. Nearly two-thirds opted in, which provided our analytic sample of 32 schools. Table 1 shows balance between the treatment and control groups on a variety of pre-treatment characteristics, including prior achievement and a host of student-level characteristics (Table 1).

Intervention

Nurturing was implemented in fall 2014 with kindergarten students who test for gifted identification in fall 2017. Nurturing is designed to influence teacher dispositions through a curricular approach with three components: Thinking Skills & Key Concepts (Parks & Black, 1997), Habits of Mind (Costa & Kallick, 2005), and Task Rotations (Silver, Jackson, & Moirao, 2011). Taken together, these approaches in early elementary school classrooms provide teachers with a framework to differentiate instruction, teach advanced vocabulary and speaking skills, and build sustainable approaches to problem solving. The business-as-usual condition at the 16 control schools includes unstructured use of U-STARS~PLUS (Coleman & Job, 2014) and Primary Education Thinking Skills (PETS) (Nichols, 1997).

Research Design

Our outcome of interest is the Naglieri Nonverbal Achievement Test ("Naglieri"). We answer each of our three questions noted above using a different operationalization of the Naglieri. First, to measure impacts on standardized scale scores, we fit a multilevel random effects OLS regression model. The intent-to-treat estimation represents the impact of the exogenous offer of Nurturing to the 16 treatment schools. We control for a host of covariates, prior achievement measures, and include randomized twin-pair and cohort-by-grade fixed effects. Second, to measure the odds of being identified as gifted, we fit a multilevel random effects logistic regression model where the outcome is a binary variable indicating whether students scored at or above the Naglieri gifted threshold. Third, to measure the impact on school-level counts, we fit a negative binomial regression model to account for overdispersion. We use various small-sample adjustments in order to deal with outliers, including dropping schools outside a specified Cook's *D* statistic range as well as windsorizing the data.

Data Collection and Analysis

Our main outcome of interest, which we will present in the spring, is gifted identification, which occurs when students in grade 3 reach specified thresholds on the CogAT and/or Iowa tests. For this submission, our outcome of interest is the Naglieri, administered in spring 2016 to all 1st grades and in spring 2017 to all 1st and 2nd grade students. The Naglieri is often used as a supplement to or substitute for the CogAT and/or Iowa tests in many settings.

Results

Table 1 shows balance between treatment and control groups. Figure 2 summarizes counts by race/ethnicity. Table 2 answers our first research question and shows that Nurturing students outperformed their control group counterparts by 0.12 to 0.21 standard deviations, depending on model and year. Table 3 answers our second research question and shows that the odds of being identified as gifted was significantly higher for Hispanic students in the pooled sample (OR = 3.1; $p < 0.05$). Table 4 answers our third research question and shows that across a range of model specifications, Nurturing caused an increase in gifted counts for all students and Hispanic students.

Conclusion

Wake County's collaborative RCT of *Nurturing* with Duke University comes at a time when school districts nationwide are under increased scrutiny for consistently low gifted identification rates among minority students. These results suggest that the program has demonstrated significant impacts on a key measure of gifted identification. We will present final results in spring 2018 for the first cohort that formally tests for gifted status.

References

Anderson-Clark, T. N., Green, R. J. & Henley, T. B. (2008). The relationship between first names and teacher expectations for achievement motivation. *Journal of Language and Social Psychology*, *27*(1), 94–99.

Carman, C. A. & Taylor, D. K. (2009). Socioeconomic status effects on using the Naglieri Nonverbal Ability Test (NNAT) to identify the gifted/talented. *Gifted Child Quarterly*.

Coleman, M. R. & Job, J. (2014). *U-STARS\~ PLUS science \& nonfiction connections*. Council For Exceptional Children.

Costa, A. L. & Kallick, B. (2005). Habits of mind.

Dee, T. S. (2004). Teachers, Race, and Student Achievement in a Randomized Experiment. *Review of Economics and Statistics*, *86*(1), 195–210.

Dee, T. S. (2005). A teacher like me: Does race, ethnicity, or gender matter? *The American Economic Review*, *95*(2), 158–165.

Grissom, J. A. & Redding, C. (2016). Discretion and Disproportionality. *AERA Open*, *2*(1), 2332858415622175.

Gubbins, E. J., Callahan, C. M. & Renzulli, J. S. (2014). Contributions to the Impact of the Javits Act by the National Research Center on the Gifted and the Talented. *Journal of Advanced Academics*, *25*(4), 422–444.

Lewis, J. D., DeCamp-Fritson, S. S., Ramage, J. C., McFarland, M. A. & Archwamety, T. (2007). Selecting for ethnically diverse children who may be gifted using Raven's standard progressive matrices and Naglieri nonverbal abilities test. *Multicultural Education*, *15*(1), 38.

Lhamon, C. E. (2015). Protecting Civil Rights, Advancing Equity. *U.S. Department of Education Office of Civil Rights*.

Love, A. & Kruger, A. C. (2005). Teacher beliefs and student achievement in urban schools serving African American students. *The Journal of Educational Research*, *99*(2), 87–98.

McBee, M. (2010). Examining the probability of identification for gifted programs for students in Georgia elementary schools: A multilevel path analysis study. *Gifted Child Quarterly*, *54*(4), 283–297.

McKown, C. & Weinstein, R. S. (2008). Teacher expectations, classroom context, and the achievement gap. *Journal of School Psychology*, *46*(3), 235–61. doi:10.1016/j.jsp.2007.05.001

Naglieri, J. A. & Ford, D. Y. (2003). Addressing underrepresentation of gifted minority children using the Naglieri Nonverbal Ability Test (NNAT). *Gifted Child Quarterly*, *47*(2), 155–160.

Nichols, J. (1997). *Primary Education Thinking Skills\# 3*.

Olszewski-Kubilius, P. & Lee, S.-Y. (2011). Gender and other group differences in performance on off-level tests: Changes in the 21st century. *Gifted Child Quarterly*, *55*(1), 54–73.

Parks, S. & Black, H. (1997). *Building thinking skills*. Critical Thinking Books \& Software.

Silver, H. F., Jackson, J. W. & Moirao, D. R. (2011). *Task rotation: Strategies for differentiating activities and assessments by learning style*. ASCD.

U.S. Department of Education, Office for Civil Rights, Civil Rights Data Collection: 2004, 2006, and 2011-12. (Table was prepared in January 2016.)

Van den Bergh, L., Denessen, E., Hornstra, L., Voeten, M. & Holland, R. W. (2010). The implicit prejudiced attitudes of teachers: Relations to teacher expectations and the ethnic achievement gap. *American Educational Research Journal*, *47*(2), 497–527.

Yoon, S. Y. & Gentry, M. (2009). Racial and ethnic representation in gifted programs: Current status of and implications for gifted Asian American students. *Gifted Child Quarterly*.

Table 1. *Comparison of Student Characteristics and Prior Achievement by Nurturing for a Bright Tomorrow Experimental Condition*

Student Characteristics	Control	Treatment	C – T	SE	p-value
Male	.511	.518	-.007	.008	.382
Asian	.036	.045	-.009	.156	.551
Black	.344	.330	.014	.059	.813
Hispanic	.223	.262	-.039	.038	.305
White	.358	.324	.034	.074	.655
Limited English Proficient	.141	.166	-.025	.030	.397
Students with Disabilities	.084	.085	.001	.009	.900
AIG: Reading & Math	.0002	.0001	.0001	.0002	.530
Prior Achievement					
Beginning-of-Year LNF Score	34.81	33.04	1.77	1.30	.174
Beginning-of-Year PSF Score	41.99	41.76	.230	1.87	.901
Beginning-of-Year ORF Score	68.16	67.08	1.08	3.87	.779
Observations	6,798	6,985			
Proportion	49.3	50.7			

* $p < .10$; ** $p < .05$; *** $p < .01$

Note: C – T: Control mean minus Treatment mean; SE: standard errors; DIBELS scores expressed as raw scores; student-level means calculated using mixed-effects regression with robust standard errors.

Figure 1. *Descriptive Gifted Counts*

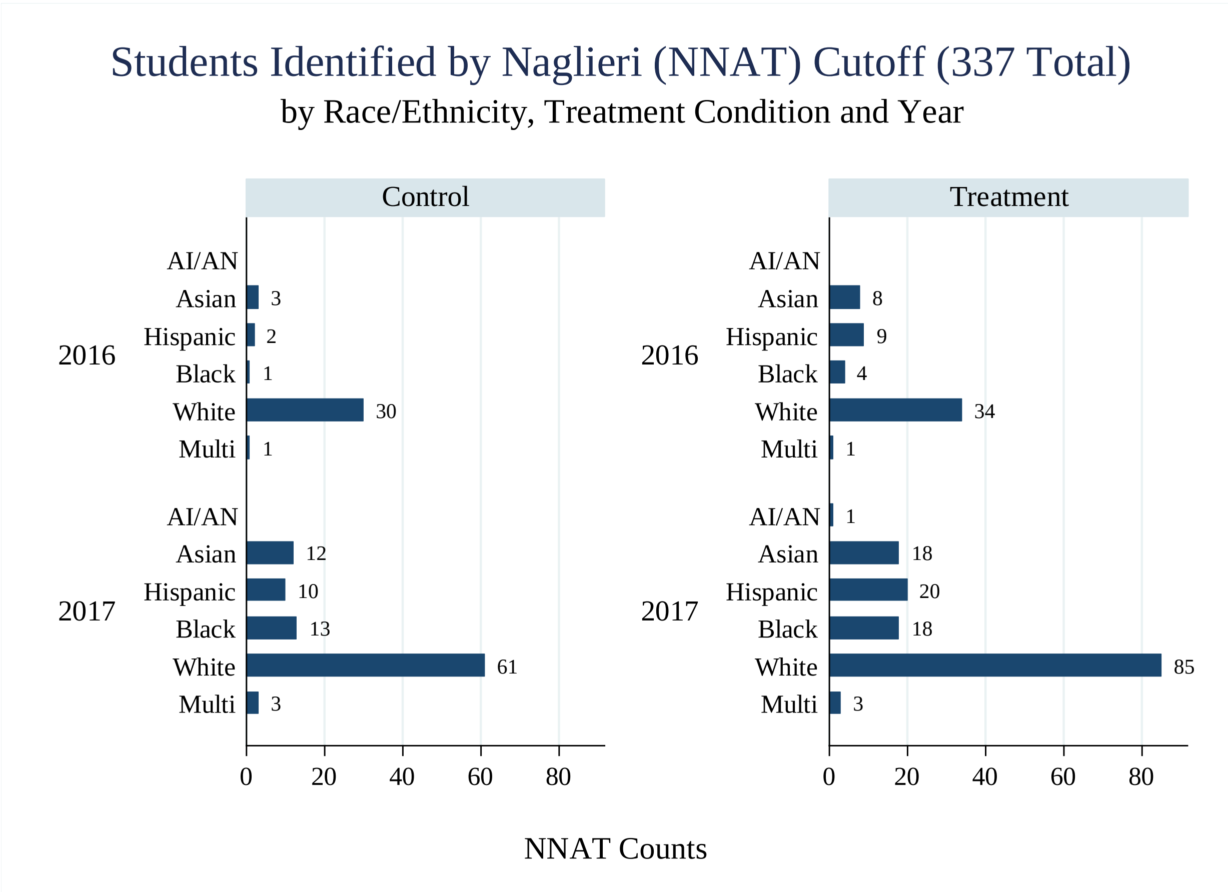

Table 2. *Impact of Nurturing for a Bright Tomorrow on Naglieri Scale Scores*

	2016 (1)	2017 (2)	Pooled (3)
Intent-to-Treat (ITT) Estimates			
Baseline ITT Estimates, All Students	0.065	0.102	0.092
	(0.186)	(0.077)	(0.082)
N	3490	6087	9577
Fully-Specified ITT Estimates, All Students	0.120*	0.194***	0.170***
	(0.012)	(0.000)	(0.000)
N	2518	4419	6937
Baseline ITT Estimates, Black Students	0.031	-0.003	0.012
	(0.134)	(0.012)	(0.006)
N	1154	1973	3127
Fully-Specified ITT Estimates, Black Students	0.141	0.171*	0.150**
	(0.134)	(0.012)	(0.006)
N	800	1357	2157
Baseline ITT Estimates, Hispanic Students	0.200**	0.206***	0.199***
	(0.001)	(0.000)	(0.000)
N	878	1544	2422
Fully-Specified ITT Estimates, Hispanic Students	0.142	0.134	0.138*
	(0.142)	(0.058)	(0.015)
N	656	1174	1830

Notes: This table reports intent-to-treat (ITT) impacts on the Naglieri Nonverbal Achievement Test. Annual and pooled estimates include students nested in 32 treatment and control schools. We generated these standardized coefficients using a two-level, random effects estimation. Baseline models control for prior achievement and matched-pair fixed effects. Fully specified models include the same covariates as well as student-level characteristics and relevant school-level characteristics (e.g., percent of students receiving free lunch, magnet status, calendar type, Title I). Since not all students in the early elementary grades have prior achievement outcomes, the sample size declines from the baseline to the fully-specified models.

* $p<0.05$ ** $p<0.01$ *** $p<0.001$

Table 3. *Impact of Nurturing for a Bright Tomorrow on Odds of Gifted Identification*

	2016 (1)	2017 (2)	Pooled (3)
Intent-to-Treat (ITT) Estimates			
Baseline ITT Estimates, All Students	1.620*	1.214	1.239
	(0.031)	(0.306)	(0.247)
-2LL	798.225	1933.015	2750.519
N	3228	6087	9577
Fully-Specified ITT Estimates, All Students	1.735	1.194	1.447
	(0.184)	(0.541)	(0.101)
-2LL	487.627	1287.566	1812.760
N	2325	4417	6934
Baseline ITT Estimates, Black Students	4.159	1.364	1.478
	(0.986)	(0.275)	(0.306)
-2LL	62.186	313.124	382.176
N	1154	1973	3127
Fully-Specified ITT Estimates, Black Students	3.386e+17	1.967	1.967
	(0.986)	(0.275)	(0.306)
-2LL	25.766	208.602	251.352
N	715	1357	2157
Baseline ITT Estimates, Hispanic Students	3.847	1.767	2.111
	(0.113)	(0.208)	(0.075)
-2LL	114.172	292.608	408.711
N	878	1544	2422
Fully-Specified ITT Estimates, Hispanic Students	34787.009	1.895	3.103*
	(0.110)	(0.210)	(0.021)
-2LL	50.692	194.496	272.246
N	656	1174	1830

Notes: This table reports intent-to-treat (ITT) impacts on the exponentiated odds of being identified as gifted based on Naglieri Nonverbal Achievement Test cut scores (130 in 2016 and 132 in 2017). Annual estimates include students nested in 32 treatment and control schools. We generated these coefficients using a two-level, random effects estimation. Baseline models control for prior achievement and matched-pair fixed effects. Fully specified models include the same covariates as well as student-level characteristics and relevant school-level characteristics (e.g., percent of students receiving free lunch, magnet status, calendar type, Title I). Matched-pair fixed effects were dropped for subgroups due to collinearity. -2LL is the test statistic for the log-likelihood ratio. Since not all students in the early elementary grades have prior achievement outcomes, the sample size declines from the baseline to the fully-specified models.

* p<0.05 ** p<0.01 *** p<0.001

Table 4. *Impact of Nurturing for a Bright Tomorrow on School-Level Gifted Counts*

Model 1: Impact All Students	1.791*
	(0.013)
N	32
Model 2: Impact for Black Students	2.685
	(0.349)
N	32
Model 3: Impact for Hispanic Students	3.934*
	(0.035)
N	32
Model 4: Impact for All Students, accounting for outliers	1.545*
	(0.042)
N	29
Model 5: Impact for All Students, with winsorized data	1.792*
	(0.010)
N	32

Notes: This table reports intent-to-treat (ITT) impacts on exponentiated school-level gifted identification counts. Due to small sample sizes and overdispersion, we use negative binomial regression to estimates impacts. Gifted counts were generated by collapsing by school level. Regressions include relevant school-level characteristics (e.g., percent of students receiving free lunch, magnet status, calendar type, Title I, prior achievement means). Model 1 includes all counts in all analytic sample schools. Models 2 and 3 include counts for Black and Hispanic students, respectively. Model 4 omits three schools with outlying Cook's D statistics. Model 5 winsorizes the data.
* $p<0.05$ ** $p<0.01$ *** $p<0.001$