SREE Spring 2017 Conference

Title:
"Advancing Minority Gifted Identification: Evidence from a Randomized Trial of Nurturing for a Bright Tomorrow"

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Abstract
This paper reports preliminary results from a randomized controlled trial (RCT) of a multi-component nurturing program designed to increase gifted identification among minority students. In 2014-15, the Wake County Public School System (WCPSS), 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. This under-representation mirrored national and state trends. According to the U.S. Department of Education's Office of Civil Rights, while 40% of Black and Hispanic students recently were enrolled in schools *offering* gifted education programs, only 28% ultimately enrolled (Lhamon, 2015). In more than 40 states, Black and Hispanic students were underrepresented in gifted and talented programs (Yoon & Gentry, 2009). And in various studies at the school, district, and state levels, racial and ethnic gaps in representation are reported at various magnitudes (Carman & Taylor, 2009; Lewis, DeCamp-Fritson, Ramage, McFarland, & Archwamety, 2007; McBee, 2010; Naglieri & Ford, 2003; Olszewski-Kubilius & Lee, 2011).

The purpose of *Nurturing* is to train K-2 teachers to develop the skills and expectations required to help children attain gifted status. A large body of evidence supports the belief that variations in teacher disposition toward students can significantly influence perceived or real student outcomes (Anderson-Clark, Green, & Henley, 2008; Dee, 2004, 2005; Grissom & Redding, 2016; Love & Kruger, 2005; McKown & Weinstein, 2008). *Nurturing* is designed to influence these dispositions through a comprehensive curricular approach that includes 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 three approaches provide teachers with a framework to differentiate instruction, teach advanced vocabulary and speaking skills, and build sustainable approaches to problem solving.

Two previous iterations of *Nurturing* were associated with improved achievement and gifted identification, but neither produced causal estimates (Watson & Darity, 2010). In this current iteration, we randomly assigned *Nurturing* to 16 elementary schools on the basis of gifted identification rates in math and reading. We first identified all elementary schools below the district rate of 4% and recruited 32 schools not previously exposed to *Nurturing* to join the full analytic sample. We then sorted schools on these rates and randomly assigned the program within pairs. Table 1 shows balance between the treatment and control groups on a variety of pre-treatment characteristics. The business-as-usual condition at the 16 control schools includes

U-STARS~PLUS (Coleman & Job, 2014) and Primary Education Thinking Skills (PETS) (Nichols, 1997).

Our main outcome of interest is the Naglieri Nonverbal Ability Test (NNAT2), administered to 1st graders in spring 2016 (who began *Nurturing* as kindergarten students in fall 2015). We use NNAT2 as an interim measure of gifted potential prior to formal identification in grade 3 (fall 2017). Studies of the NNAT suggest that the test strongly predicted gifted identification for diverse populations (Lidz & Macrine, 2001; Naglieri & Ford, 2003) and performed similarly to the CogAT6 achievement test (Giessman, Gambrell, & Stebbins, 2013).

Our sample consists of roughly 3,500 1st grade students who took NNAT2 in spring 2016. We examine the impact of *Nurturing* on the NNAT2 in three ways: (1) on the NNAT2 scale score (Tables 2-3), (2) on the odds of being classified as gifted by scoring two standard deviations (130) above the NNAT2 mean (100) (Table 4), and (3) on the school level counts of gifted students (Table 5). For (1), we use a two-level random effects model controlling for prior achievement and a various student-level characteristics. For (2), we use logistic regression to estimate the odds of being identified. Finally, for (3), we use Poisson and negative binomial regression models at the school-level ($N = 32$) to measure gifted counts at our unit of assignment. Due to the small sample size in our third set of outcomes, we fit separate models to account for extreme value influence on the basis of Cook's D statistic thresholds and by Winsorizing the data.

Results suggest that *Nurturing* had small-to-moderate positive impacts on NNAT2 scores, student-level identification, and school-level identification. Across a range of model specifications in Table 2, *Nurturing* impacts on NNAT2 scores ranged from 0.05σ to 0.10σ. Table 3 shows that neither Black nor Hispanic students outperformed their control group counterparts on NNAT2. Table 4 shows that the odds of being identified as gifted are higher for the treatment group than for the control group [1.9, 2.2]. Finally, we examined whether *Nurturing* increased the number of gifted students at the school-level (Table 5). The full Model (1) shows that treatment group schools had an incidence rate for counts that was expected to change by a factor of 4.1 ($p < .01$). This effect is potentially influenced by a single school at which 17 students met the 130 cutoff. Removing this and a second school on the basis of forming an outlying cluster ($D = [0.89, 0.95]$) resulted in similar rate ratios. The treatment group in the Winsorized sample had a rate ratio for counts expected to change by a factor of 2.3 ($p < .01$).

WCPSS's RCT of *Nurturing* with Duke University comes at a time when school districts nationwide are under increased scrutiny for low gifted identification rates among minority students. These interim results suggest that *Nurturing* is having a modest positive impact on key test outcome of gifted identification and large impacts on school-based counts. Despite our cautious optimism that *Nurturing* holds promise for all students attending schools that historically under-identify, the program does not yet appear to provide marginal benefits to Black and Hispanic students. These interim results, however, suggest that implementation is on the right track. We will present final results during the 2017-18 school year when the first cohort formally tests for gifted status.

Appendix – References and Tables

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.

Giessman, J. A., Gambrell, J. L. & Stebbins, M. S. (2013). Minority Performance on the Naglieri Nonverbal Ability Test, Versus the Cognitive Abilities Test, Form 6 One Gifted Program's Experience. *Gifted Child Quarterly*, *57*(2), 101–109.

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

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*.

Lidz, C. S. & Macrine, S. L. (2001). An Alternative Approach to the Identification of Gifted Culturally and Linguistically Diverse Learners The Contribution of Dynamic Assessment. *School Psychology International*, *22*(1), 74–96.

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.

Watson, M. & Darity, W. (2010). Project Bright Idea 2: Interest Development Early Abilities.

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. *Pre-Intervention Balance between Treatment and Control Groups*

Variable	**Treatment Group**	**Control Group**	**Difference (T - C)**	**p-value**
SWD	0.068	0.064	0.004	0.714
Male	0.526	0.513	0.013	0.370
LEP	0.135	0.115	0.020	0.444
American Indian/AK Native	0.005	0.003	0.002	0.283
Hispanic	0.270	0.216	0.054	0.122
Black	0.326	0.340	-0.014	0.822
Multiracial	0.028	0.032	-0.004	0.451
Native HI/Pacific Islander	0.003	0.001	0.002	0.136
Asian	0.039	0.042	-0.003	0.881
SES	0.087	0.072	0.015	0.201
Prior FSF Score	11.2	11.4	-0.226	0.828
Prior LNF Score	19.0	20.2	-1.186	0.372
N (schools)	16	16		
n (students)	2367	2326		

Note:

T-C: Treatment group mean minus control group mean.

FSF: DIBELS First Sound Fluency; LNF: DIBELS Letter Naming Fluency

Student-level means calculated using mixed-effects regression with robust standard errors.

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

Table 2. *Impact of Nurturing for a Bright Tomorrow on NNAT2 Scale Scores*

	(1)	(2)	(3)	(4)	(5)
Nurturing	0.050	0.068	0.100**	0.088*	0.064
	(0.101)	(0.049)	(0.042)	(0.050)	(0.047)
SWD		-0.366***	-0.366***	-0.358***	-0.335***
		(0.059)	(0.059)	(0.064)	(0.067)
Male		0.027	0.027	0.065**	0.070**
		(0.031)	(0.031)	(0.032)	(0.034)
LEP		-0.315***	-0.310***	-0.142**	-0.140**
		(0.053)	(0.053)	(0.057)	(0.062)
Am-Ind/AK		-0.200	-0.207	-0.084	-0.088
		(0.253)	(0.253)	(0.274)	(0.271)
Hispanic		-0.098*	-0.087	0.018	-0.009
		(0.052)	(0.053)	(0.055)	(0.059)
Black		-0.670***	-0.645***	-0.634***	-0.658***
		(0.044)	(0.045)	(0.047)	(0.050)
Multiracial		-0.226**	-0.219**	-0.223**	-0.265**
		(0.095)	(0.096)	(0.105)	(0.110)
HI/PI		0.160	0.152	0.969	0.855
		(0.521)	(0.521)	(0.855)	(0.847)
Asian		0.163**	0.170**	0.206**	0.166*
		(0.080)	(0.082)	(0.090)	(0.094)
SES		-0.322***	-0.309***	-0.199***	-0.170***
		(0.038)	(0.038)	(0.040)	(0.043)
FSF				0.014***	0.013***
				(0.002)	(0.002)
LNF				0.011***	0.010***
				(0.001)	(0.001)
Constant	-0.042	0.453***	1.345**	1.370*	1.248*
	(0.072)	(0.046)	(0.646)	(0.747)	(0.707)
School-Level Cov	N	N	Y	Y	Y
KIA	N	N	N	N	Y
Constant (μ)	0.268***	0.107***	0.057**	0.083***	0.065**
	(0.038)	(0.023)	(0.026)	(0.025)	(0.029)
Constant (ε)	0.963***	0.899***	0.899***	0.851***	0.840***
	(0.012)	(0.011)	(0.011)	(0.011)	(0.012)
Observations	3435	3435	3435	2868	2537

Notes: "LNF" is DIBELS Letter Naming Fluency. "FSF" is DIBELS First Sound Fluency. "KIA" is the Kindergarten Initial Assessment. "School-Level Cov" represents student-level covariates aggregated up to the school level. Standard errors in parentheses

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

Table 3. *Subgroup Impacts of Nurturing for a Bright Tomorrow on NNAT2 Scale Scores*

	(1) Black	(2) Hispanic	(3) Black Male	(4) Hispanic Male
Nurturing	0.011	0.111	-0.051	0.110
	(0.068)	(0.073)	(0.092)	(0.143)
SWD	-0.366***	-0.367***	-0.366***	-0.365***
	(0.059)	(0.059)	(0.059)	(0.059)
Male	0.027	0.028	0.000	0.000
	(0.031)	(0.031)	(.)	(.)
LEP	-0.310***	-0.306***	-0.314***	-0.313***
	(0.053)	(0.053)	(0.053)	(0.053)
Am-Ind/AK	-0.207	-0.204	-0.202	-0.201
	(0.253)	(0.253)	(0.253)	(0.253)
Hispanic	-0.086	0.000	-0.082	0.000
	(0.053)	(.)	(0.053)	(.)
Black	—	-0.643***	—	-0.645***
		(0.045)		(0.045)
Multiracial	-0.219**	-0.218**	-0.215**	-0.223**
	(0.096)	(0.096)	(0.096)	(0.096)
HI/PI	0.152	0.158	0.155	0.151
	(0.522)	(0.521)	(0.521)	(0.521)
Asian	0.170**	0.172**	0.172**	0.172**
	(0.082)	(0.082)	(0.082)	(0.082)
SES	-0.309***	-0.310***	-0.309***	-0.308***
	(0.038)	(0.038)	(0.038)	(0.038)
Constant	1.348**	1.400**	1.336**	1.406**
	(0.646)	(0.646)	(0.645)	(0.644)
School-Level Cov	Y	Y	Y	Y
Constant (μ)	0.057**	0.057**	0.056**	0.056**
	(0.026)	(0.026)	(0.026)	(0.026)
Constant (ε)	0.899***	0.899***	0.899***	0.898***
	(0.011)	(0.011)	(0.011)	(0.011)
Observations	3435	3435	3435	3435

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Table 4. *Impact of Nurturing for a Bright Tomorrow on Odds of Gifted Classification*

	(1)	(2)	(3)	(4)	(5)
Nurturing	1.377	1.575	2.192***	1.910*	1.556
	(0.465)	(0.438)	(0.628)	(0.642)	(0.481)
SWD		0.438	0.438	0.449	0.426
		(0.263)	(0.263)	(0.331)	(0.325)
Male		1.224	1.237	1.196	1.222
		(0.265)	(0.268)	(0.290)	(0.324)
LEP		0.865	0.858	0.923	1.127
		(0.367)	(0.369)	(0.526)	(0.676)
Am-Ind AK		1.000	1.000	1.000	1.000
		(.)	(.)	(.)	(.)
Hispanic		0.338***	0.349***	0.378**	0.329**
		(0.135)	(0.142)	(0.178)	(0.160)
Black		0.102***	0.114***	0.101***	0.104***
		(0.050)	(0.056)	(0.056)	(0.059)
Multiracial		0.382	0.378	0.427	0.205
		(0.280)	(0.278)	(0.321)	(0.214)
HI/PI		1.000	1.000	1.000	1.000
		(.)	(.)	(.)	(.)
Asian		1.443	1.425	1.350	1.424
		(0.534)	(0.552)	(0.646)	(0.709)
SES		0.530**	0.570*	0.721	0.787
		(0.152)	(0.169)	(0.240)	(0.287)
Prior Comp Score				1.026***	1.022**
				(0.008)	(0.010)
Prior FSF Score				0.998	1.008
				(0.018)	(0.020)
School-Level Cov	N	N	Y	Y	Y
KIA	N	N	N	N	Y
Constant (lnsig2u)	-0.811*	-1.784**	-4.629	-2.607	-12.562
	(0.489)	(0.757)	(8.392)	(1.668)	(31.715)
Neg2LL	838.223	762.885	752.136	596.549	505.335

Notes: Exponentiated coefficients; Standard errors in parentheses.
"Comp" is DIBELS Composite. "LNF" is DIBELS Letter Naming Fluency. "KIA" is the Kindergarten Initial Assessment. "School-Level Cov" represents student-level covariates aggregated up to the school level.
* $p < .10$, ** $p < .05$, *** $p < .01$

Table 5. *Impact of Nurturing on School-Level Gifted Counts (Incident Rate Ratios)*

	(1)	(2)	(3)	(4)
Nurturing	4.149***	5.699***	4.528***	2.325***
	(1.043)	(2.726)	(2.361)	(0.427)
Prior Comp Score	1.342	1.172	1.522*	0.947
	(0.428)	(0.344)	(0.371)	(0.097)
Prior FSF Score	0.877	1.184	0.397**	1.378**
	(0.349)	(0.554)	(0.156)	(0.213)
Prior LNF Score	0.982	1.027	1.284	1.043
	(0.191)	(0.175)	(0.278)	(0.111)
SWD	3.6e+10***	1.9e+12***	6603021.7*	45332821.9***
	(1.2e+11)	(1.2e+13)	(53739523.8)	(1.9e+08)
Male	0.119	0.030	1.251	0.002***
	(0.456)	(0.110)	(3.991)	(0.003)
LEP	1731878.6***	786619.3***	1.1e+08***	100.132***
	(8693398.4)	(4043357.6)	(4.947e+08)	(159.9)
Hispanic	0.000**	0.000*	0.031	0.001***
	(0.000)	(0.000)	(0.163)	(0.002)
Black	0.001***	0.000**	0.010	0.047***
	(0.002)	(0.001)	(0.034)	(0.043)
Multiracial	0.000***	0.000*	0.000***	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
HI/PI	0.000**	0.000**	0.000***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Asian	0.015*	0.000**	1.078	0.095
	(0.032)	(0.002)	(2.909)	(0.136)
SES	13599.1***	4656.9***	36827.6***	74.7***
	(46080.2)	(13397.2)	(116809.6)	(91.3)
KIA	Y	Y	Y	Y
Observations	32	30	30	32

Notes: Model (1) includes all schools. Model (2) drops 2 IQR outlier schools. Model (3) drops two Cooks *D* statistic outlier schools. Model (4) winsorizes extreme data points, such that values above the 95th percentile are replaced by the 95th percentile and values below the 5th percentile are replaced by the 5th percentile. Standard errors appear in parentheses.

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