Effects of Full Day Kindergarten in Jeffco Schools

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Abstract

In Jeffco, high-poverty schools have district-supported full-day kindergarten resulting in few to no Free and Reduced Lunch eligible (FRL) students attending half-day kindergarten at high-poverty schools. A significant limitation of this study is the lack of a comparison group for a quasi-experimental design that can compare low-income students in half-day kindergarten in high- poverty schools. Aggregate analyses of Jeffco data show that students in full-day kindergarten do not outperform students in half-day kindergarten on third grade TCAP reading or fourth grade TCAP math. Descriptively, half-day kindergarteners outperform full-day kindergarteners for the general population and within the population of students who are FRL. Based on effect size measures; this difference is negligible for non-FRL students and small for FRL students. However, when attendance in kindergarten is factored into logistic regression models, students in full-day kindergarten have 1.4 times higher of odds of being proficient or advanced on third grade TCAP reading or fourth grade TCAP math than students in half-day kindergarten. Kindergarten students are not required to attend school by state compulsory education laws. Therefore, it is critical to consider attendance in addition to enrollment in full- versus half-day kindergarten.

A potential item on Jeffco's 2014-2015 budget is the extension of district-supported full-day kindergarten (FDK) to an additional 5 schools with 35% of students who are eligible for Free and Reduced Lunch (FRL). A key part of the discussion has been to identify research regarding the effectiveness of FDK nationally and within Jeffco Schools. This document provides a brief overview of existing literature as well as a preliminary look at the impact of FDK in Jeffco Schools. The selected outcomes are third grade reading TCAP and fourth grade math TCAP because these are the board identified goals that are most proximal to FDK. There may be many student effects as a result of FDK that cannot be adequately measured within the time frame or resources available. In light of these limitations, the next best source of information is to draw from existing research.

Existing Research about Full-Day Kindergarten

Evidence on the effects of full-day kindergarten (FDK) versus half-day kindergarten (HDK) consistently shows short-term benefits but no long-term impacts. Several studies (discussed in the following paragraphs) show that students benefit from FDK programs, though there is little evidence in the research showing long-term benefits to students.

◆ *Existing Research indicates that Short-term Effects of Full-Day Kindergarten are Positive.*

Research studies show immediate positive effects of FDK, especially for students from lower socioeconomic backgrounds (Nowak, Nichols, & Coutts, 2009; Plucker & Zapf, 2005). Positive effects from FDK include growth in reading and math test scores in early grades, increases in cognitive abilities, and easier transitions to first grade (Lee, Burkam, Ready, Honigman, & Meisels, 2006; Nowak et al.,2009; Plucker & Zapf, 2005; Wolgemuth, Cobb, Winokur, Leech, & Ellerby, 2006). When comparing beginning of year to end of year kindergarten assessments of literacy and math, Lee et al. (2006) write, "Children attending schools that offer full-day kindergarten evidence considerably greater academic learning compared to their academically and socially similar counterparts in half-day schools" (p. 199). Research has also shown that students spend more time engaged in meaningful learning and student-directed activities in FDK settings (Ackerman, Barnett, & Robin, 2005) and that FDK students are less likely to be retained in early elementary school than HDK students (Cannon, Jacknowitz, & Painter, 2011; Plucker & Zapf, 2005).

◆ *Existing Research indicates that Positive Effects of Full-Day Kindergarten Diminish over Time.*

Although studies show immediate academic benefit to FDK, most longitudinal studies show that positive effects on academic achievement diminish in each subsequent year and are no longer evident as early as third grade (Ackerman et al., 2005; Cannon, Jacknowitz, & Painter, 2006, 2011; Lee et al., 2006; Votruba-Drzal, Li-Grining, & Maldonado-Carreño, 2008; Wolgemuth et al., 2006). Wolgemuth et al. (2006) write, "FDK confers initial benefits on academic achievement but … these benefits diminish relatively rapidly" (p. 267). Others find similar results, stating their study finds a "benefit in the kindergarten year but no longer-term academic benefit" to enrollment in FDK (Cannon et al.,2011, p. 298). In other words, often by third grade, students who were in FDK and students who were in HDK perform similarly on standardized assessments.

◆ *Existing Research indicates that Quality of Kindergarten Instruction is Critical to Student Outcomes.*

Some researchers caution against using a single academic outcome to measure kindergarten program effectiveness. Lee et al. (2006) write, "full-day kindergarten should not be evaluated using even a single domain, such as cognitive growth; kindergarten clearly benefits children's development in many domains" (p. 199). An important element in determining long-range future academic success for students is the quality of the programs in which they are enrolled, not solely the length of the program each day. Clark (2001) writes, "It is important to remember that what children are doing during the kindergarten day is more important than the length of the school day" (p. 2). Instructional kindergarten programs can be effective in HDK or

FDK settings and many factors, in addition to time spent in school, contribute to student outcomes.

Jeffco Research about Full-Day Kindergarten

The longitudinal data set used for these analyses included students enrolled in Kindergarten in 2008-2009 using their fourth grade math TCAP data in 2012-2013 and Kindergarteners in 2009-2010 using their TCAP third grade reading in 2012-2013. A significant limitation is mobility; meaning that some students have not been continuously enrolled in Jeffco since Kindergarten and others were not in Jeffco in Kindergarten but have since enrolled in grades 1, 2, 3, or 4. It is unclear whether students who have not been continuously enrolled since Kindergarten differ in significant ways from those who were continuously enrolled.

♦ *A higher percentage of students in HDK than FDK are proficient or advanced on third grade TCAP reading and fourth grade TCAP math.*

Comparison of Students who are Percent Proficient or Advanced (P/A)

- Of Jeffco students who were in FDK, 80% were P/A on third grade TCAP reading compared to 87% of students in HDK (see Table 1).
- Of Jeffco students who were in FDK, 78% were P/A on fourth grade TCAP math, compared to 84% of students in HDK (see Table 1).
- Of students eligible for free and reduced lunch (FRL), 66% of FDK students were P/A on 3rd grade TCAP reading, compared to 76% of HDK students (see Table 2).
- Of students eligible for FRL, 60% of FDK students were P/A on fourth grade TCAP math, compared to 73% of HDK (see Table 2).

Table 1: Percent of Students Proficient or Advanced (P/A) in Full-Day versus Half-day Kindergarten

	Third Grade Reading TCAP 2012-2013 %(#)		**Fourth Grade Math TCAP 2012-2013 %(#)**	
	US/PP	**P/A**	**US/PP**	**P/A**
Half Day Kindergarten	13.4% (166)	86.6% (1077)	16.3% (269)	83.7% (1380)
Full Day Kindergarten	19.6% (620)	80.4% (2545)	22% (540)	78.1% (1912)

*US/PP is unsatisfactory or partially proficient on TCAP. P/A is proficient or advanced on TCAP.

It is important to notice that the total number of FRL students who are enrolled in half-day kindergarten is very low. None of those students are enrolled in schools that provide district supported FDK indicating systemic bias in that group of students.

Table 2: Percent of FRL Students Proficient or Advanced (P/A) in Full-Day or Half-day Kindergarten

		Third Grade Reading TCAP 2012-2013		Fourth Grade Math TCAP 2012-2013	
		US/PP	P/A	US/PP	P/A
Not FRL	Half Day Kindergarten	10.7% (107)	89.3% (895)	12.9% (162)	87.1% (1098)
	Full Day Kindergarten	12.6% (267)	87.4% (1849)	14.1% (243)	85.9% (1486)
FRL	Half Day Kindergarten	24.5% (59)	75.5% (182)	27.5% (107)	72.5% (282)
	Full Day Kindergarten	33.7% (353)	66.3% (696)	41.1% (293)	59.9% (426)

*US/PP is unsatisfactory or partially proficient on TCAP. P/A is proficient or advanced on TCAP.

- ***Students in HDK outperform students in FDK on third grade TCAP reading and fourth grade TCAP Math scaled scores.***

An effect size was calculated to determine if there was a meaningful difference between students who had half-day compared to full-day kindergarten on TCAP scale scores. Due to largely different sample sizes, Cohen's *d* using a pooled standard deviation was the appropriate effect size (see Table 3).

Table 3: Mean of Scale Scores for Students in Full-Day or Half-day Kindergarten

		TCAP 3rd Grade Reading Scale Score				TCAP 4th Grade Math Scale Score			
		Mean	SD	Count	Cohen's *d*	Mean	SD	Count	Cohen's *d*
Not FRL	Half Day Kindergarten	595	59	1002	-0.08	525	66	1260	-0.07
	Full Day Kindergarten	590	64	2116		521	65	1729	
FRL	Half Day Kindergarten	559	71	241	-0.31	486	66	389	-0.35
	Full Day Kindergarten	534	80	1049		463	67	723	

- For third grade TCAP reading, overall full-day kindergarten had a -.08 effect size compared to half-day kindergarten indicating no substantive effect of full-day kindergarten on third grade TCAP reading. For FRL students only, an effect size of full-day kindergarten on third grade TCAP reading was also found (ES=-.31).
- For fourth grade TCAP math, full-day kindergarten had a -.07 effect size compared to half-day kindergarten indicating a substantively no effect of full-day kindergarten on fourth grade TCAP math. For FRL students only, an effect size of full-day kindergarten on third grade TCAP reading was also found (ES=-.35).

- ***Controlling for FRL and total days attended, students in FDK have 1.4 higher odds of being proficient or advanced on third grade TCAP reading and fourth grade TCAP math.***

The probability of being proficient or advanced in third grade reading and fourth grade math was modeled using a binomial logistic regression. FRL eligibility and total days present were included as controls, in order to determine the probability of being proficient or advanced for students in full day (=1) compared to half-day (=0) kindergarten. Tables 4 and 5 display the parameter estimates for each model.

Table 4: Parameter Estimates for Predicting P/A on Third Grade Reading using Full-Day Kindergarten

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	FRL Binary(1)	1.189	.083	205.251	1	.000	3.284
	Days Present	.003	.003	1.099	1	.294	1.003
	Full Day(1)	.297	.099	9.096	1	.003	1.346
	Constant	.209	.478	.191	1	.662	1.232

a. Variable(s) entered on step 1: Full Day.

As is desired the Hosmer Lemeshow was not significant χ^2 =8.7, df=8, p=.423 and the overall model accuracy was 82.2%. The classification table indicates that the model is a better fit for predicting proficient or advanced status than partially proficient or unsatisfactory.

Table 4: Parameter Estimates for Predicting P/A on Fourth Grade Math using Full-Day Kindergarten

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	FRLBinary(1)	1.209	.084	206.507	1	.000	3.351
	Days Present	.016	.004	15.397	1	.000	1.017
	Full Day(1)	.301	.085	12.426	1	.000	1.351
	Constant	-2.245	.692	10.523	1	.001	.106

a. Variable(s) entered on step 1: Full Day.

As is desired the Hosmer Lemeshow was not significant χ^2 =7.72, df=8, p=.513 and the overall model accuracy was 80.2%. The classification table indicates that the model is a better fit for predicting proficient or advanced status than partially proficient or unsatisfactory.

- ***When school level effects are modeled using multi-level modeling techniques, the effect of FDK is no longer significant.***

In Jeffco, district-supported full day kindergarten is a school wide initiative; meaning that if schools met a threshold of 42% (in 08-09) or approximately 36% (in 09-10) of free and reduced lunch students, all students in that school received district-supported full-day kindergarten. In light of this fact, it is perhaps not surprising that the effect of FDK is no longer significant in a multi-level binomial regression model which accounts for the school level effect.

Summary

An exploratory approach was used to determine the impact of FDK proficiency in third grade reading and fourth grade math TCAP (identified Jeffco School Board goals for 2014-2015). Existing literature indicates that while short-term gains are realized these gains diminish over time. Jeffco analyses indicate that using descriptive statistics alone does not sufficiently portray the effect of FDK. Comparing proportions of proficient or advanced students and mean scale scores indicates that HDK students outperform FDK students. However, when total days present are controlled, FDK students have slightly higher odds of being proficient or advanced in third grade reading or fourth grade math. The impact of FDK is no longer significant when school level effects are modeled and this is likely due to the fact that FRL students are largely not enrolled in FDK except at schools with district supported FDK.

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