



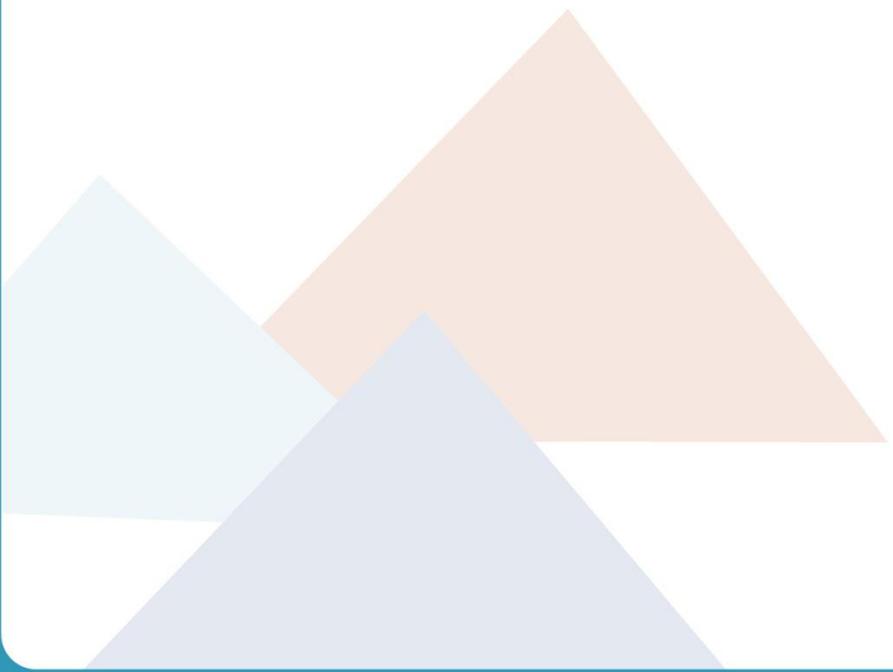
**BREAKFAST IN THE CLASSROOM:
STUDENT OUTCOME STUDY
PRELIMINARY FINDINGS**

Report Submitted to:
Denver Public Schools

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THE *BREAKFAST IN THE CLASSROOM* PROGRAM STUDENT OUTCOME STUDY

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THE BREAKFAST IN THE CLASSROOM PROGRAM STUDENT OUTCOME STUDY

EXECUTIVE SUMMARY

The Breakfast in the Classroom Program within Denver Public Schools

Within the Denver Public School system, the *Breakfast in the Classroom* Program (DPS-BIC) has been in place since 2007, growing from eight initial schools to a current total of 83 schools.

Passage of the *Breakfast after the Bell Nutrition Program* by the Colorado Legislature in May 2013 has led to further program growth. Starting in the 2014-15 school year, Colorado schools where 80 percent or more of students are eligible for the Federal free and reduced lunch (FRL) program must provide universal free after-the-bell breakfast programs. In the upcoming year (2015-16), this requirement will expand to include schools where 70 percent or more of students are FRL eligible.

Purpose of this Report

As detailed in this report, researchers have demonstrated the substantial benefits of breakfast programs in terms of improving student attendance, behavior, student health and academic performance.

To assess the impact of the DPS *Breakfast in the Classroom* program on student behavior and academic outcomes, student records were obtained from the Denver Public Schools Department of Assessment, Research and Evaluation (ARE) for three school years: 2011-12, 2012-13 and 2013-14. Student level data were compiled for elementary grade students related to attendance, chronic absences, excessive tardiness, behavior episodes and academic outcomes as measured through the DRA (Developmental Reading Assessment score).

This study focused on elementary grade students for several reasons. We assumed that the impact of the breakfast program on student attendance, behavior and academics would be most clearly evidenced during these early grades. In addition, testing protocols were in transition during the study years for students in higher grade levels. Hence, we focused on the DRA assessment for which student testing remained constant during 2011-12, 2012-13 and 2013-14.

Findings

Student profiles were created for students within four non-overlapping groups:

- BIC-2: students who attended a non-BIC school during the first study year, but attended a BIC school during the second and third study years
- Comparison 2: students who never attended a school that offered BIC during the three study years matched to BIC-2 students
- BIC-3: students who attended a BIC school during all three study years and
- Comparison 3: students who never attended a school that offered BIC during the three study years matched to BIC-3 students.

Year to year variations were found among the students enrolled in schools participating in the *Breakfast in the Classroom* program. Students in the BIC-2 cohort (i.e., those who participated only in the second and third study years) were found to be relatively more disadvantaged in comparison with the BIC-3 (or three year BIC student participants). To assure that the comparison groups were representative for each of these groups, separate comparison groups of non-BIC participating students were drawn to match the characteristics of both the BIC-2 and the BIC-3 student groups.

Highlights of the evaluation results can be briefly summarized:

- Results show that the *Breakfast in the Classroom* program has had a positive impact on the overall proportion of elementary grade students with chronic absences in any school year among the students in the BIC-2 group as compared to their Comparison group. Similar differences were not observed for students in the BIC-3 schools.
- Among students who were recorded as having an IEP in any year, differences were observed in chronic absence rates for both BIC-2 and BIC-3 students as compared to the Comparison-2 and Comparison-3 student groups.
- The *Breakfast in the Classroom* program was also found to have a significant impact on excessive tardiness for the BIC-2 students who had lower rates than students in their Comparison Group. Similar differences were not observed for students in the BIC-3 schools.
- Participation in the *Breakfast in the Classroom* program was also found to positively influence rates of office referrals. Students in both the BIC-2 and the BIC-3 groups were found to have significantly lower office referral rates compared to their respective comparison groups. These differences were found to be statistically significant even when the analysis was restricted to exclude African-American and IEP students who traditionally have higher rates of office referrals.
- Analyses of differences between the BIC-2 and BIC-3 groups and their respective comparison groups showed no difference in DRA scores which are used to measure proficiency in reading among students in the elementary grades (K-3).

These results affirm findings from the peer-reviewed literature regarding the positive impact of breakfast programs in the areas of chronic absences, excessive tardiness and office referrals, particularly for the BIC-2 students who were found to be enrolled in relatively more disadvantaged schools. Among the BIC-3 students, significant differences relative to their Comparison-3 student groups were found only for office referral rates. No differences between the BIC-2 and BIC 3 groups and their respective Comparison groups could be found related to academic performance as measured through reading proficiency.

THE BREAKFAST IN THE CLASSROOM PROGRAM

STUDENT OUTCOME STUDY

Background

Eating a healthy breakfast is an important way to start the day, particularly for school-aged children.¹ Yet, an average of one out of five students across the country skip breakfast because they don't feel hungry, they don't have time or there is limited food in their households.² Schools that offer breakfast in the classroom address these barriers and enable all students to start the day with breakfast. Breakfast programs are particularly important for students from lower income families who are more likely to struggle with food insecurity, food insufficiency and nutritional deficits.³

Research Findings

Attendance and Tardiness

Breakfast programs have been found to significantly improve attendance while reducing tardiness in Minnesota,⁴ Massachusetts,⁵ New York,⁶ Pennsylvania and Maryland.⁷ These results have been found both for inner city school districts,⁸ as well as rural primary schools.⁹

Behavior

Children who are hungry are more likely to be hyperactive and to demonstrate behavioral and attention problems.¹⁰ One national study has shown that children experiencing hunger are more likely to be suspended and to have difficulty getting along with their peers.¹¹ Providing breakfast has been shown to be associated with lower rates of disciplinary office referrals.¹²

Student Health

Minnesota school officials have observed that instituting a universal free breakfast program resulted in significant decreases in stomachaches and headaches, complaints known to be associated with hunger.¹³

Student Academic Performance: Impacts on Alertness and Memory

When a universal free School Breakfast Program was implemented at six Minnesota pilot schools, researchers found better concentration and patterns of alertness among children who were fed.¹⁴ Similar results have been observed with both elementary grade students¹⁵ as well as high school students.¹⁶ By contrast, students who have not eaten breakfast have been found to be less able to differentiate among visual images, show increased errors, and have slower memory recall.¹⁷

Student Academic Performance: Academic Outcomes

Studies have shown that eating breakfast can help math,¹⁸ reading and standardized test scores.¹⁹ Academic improvements increase the longer schools participate in a breakfast program with math scores increasing 25 percent higher than would otherwise be expected. Reading and science scores show similar improvements.²⁰ In other studies, improvements in academic performance have been found among inner city students²¹ and among lower performing students who were eligible for the USDA Free and Reduced Lunch Program.²²

Methods

To evaluate the impact of the *Breakfast on the Classroom* program on student attendance, behavior and academic results, student records were obtained from the Denver Public Schools Department of Assessment, Research and Evaluation (ARE) for three school years: 2011-12, 2012-13 and 2013-14. Student level data were compiled for elementary grade students related to attendance, chronic absences, tardiness, behavior episodes and academic outcomes as measured through the DRA (Developmental Reading Assessment score). Students who attended schools with a School Performance Rating that was either higher or lower than average were excluded from the analysis (i.e, school ratings that were either “distinguished” or “accredited on probation.”)

This study focused on elementary grade students for several reasons. We assumed that the impact of the breakfast program on student attendance, behavior and academics would be most evident during these early grades. In addition, testing protocols were in transition during the study years for students in higher grade levels. Hence, we focused on the DRA assessment for which student testing remained constant during 2011-12, 2012-13 and 2013-14.

Students were separated into four (4) non-overlapping groups:

- BIC-2: students who attended a non-BIC school during the first study year, but attended a BIC school during the second and third study years
- Comparison 2: students who never attended a school that offered BIC during the three study years matched to BIC-2 students
- BIC-3: students who attended a BIC school during all three study years and
- Comparison 3: students who never attended a school that offered BIC during the three study years matched to BIC-3 students.

Each cohort (i.e., K-2, 1-3, 2-4) of students was matched at a group level (treatment vs comparison) based on gender, English language learner status, and DRA reading proficiency level during the first study year. Matching was done separately for the BIC-2 and BIC-3 groups because students in these groups differed substantially from each other. Each student also received the indicator score for the school they attended with the three scores averaged to create a youth’s score for the youth’s learning environment over the three study years. Higher school indicator scores reflect a higher concentration of poverty and other factors (i.e., ELL) that would create a more challenging learning environment. The mean indicator score for the BIC-2 schools was 54.80 while the score for the BIC-3 schools was 50.46.

In general, comparison groups were extremely well matched to treatment groups. BIC-2 and Comparison 2 groups differed significantly on only two characteristics, Individual Education Plan (IEP) status and school disadvantage score. Comparison 2 students were significantly more likely to have an indication of an IEP in one or more years than BIC-2 students. Comparison 2 students also attended schools with less disadvantaged learning environments (52.32 vs 54.80), $F(1, 2,510) = 401.37, p < .01$. BIC-3 students only differed from those in the Comparison 3 group on one background characteristic, race/ethnicity. BIC-3 students were more likely to be identified as Black or Other race relative to the comparison students.

Table 1. Demographic Characteristics of Students Receiving BIC Services for 3 Years and Matched Comparison Group

Demographic Characteristics	BIC-2		Comparison 2		BIC-3		Comparison 3		Significance Test
	N	%	N	%	%	%	N	%	
Gender									
Male	620	49.4	611	48.7	502	51.1	497	50.9	BIC-2: $\chi^2(1, 2,511) = 0.12, n.s.$ BIC-3: $\chi^2(1, 1,960) = 0.01, n.s.$
Female	636	50.2	644	51.3	481	48.9	480	49.1	
Total	1,256	100.0	1,255	100.0	983	100.0	977	100.0	
Grade in first Study Year									
K	385	30.7	385	30.7	327	33.3	321	32.9	BIC-2: $\chi^2(2, 2,511) = 0.00, n.s.$ BIC-3: $\chi^2(2, 1,960) = 0.04, n.s.$
1 st	460	36.6	460	36.7	346	35.2	346	35.4	
2 nd	410	32.7	410	32.7	310	31.5	310	31.7	
Total	1,256	100.0	1,255	100.0	983	100.0	977	100.0	
Ethnicity									
Black (not Hispanic)	102	8.1	112	8.9	96	9.8	125	12.8	BIC-2: $\chi^2(3, 2,511) = 4.86, n.s.$ BIC-3: $\chi^2(3, 1,960) = 9.05, p < .03.$
Hispanic	1,059	84.3	1,059	84.4	752	76.5	739	75.6	
White (not Hispanic)	60	4.8	41	3.3	61	6.2	64	6.6	
Other ¹	35	2.8	43	3.4	74	7.5	49	5.0	
Total	1,256	100.0	1,255	100.0	983	100.0	977	100.0	
Free and Reduced Lunch Status (FRL)²									
FRL	1,205	95.9	1,192	95.0	878	89.3	871	89.2	BIC-2: $\chi^2(1, 2,511) = 1.33, n.s.$ BIC-3: $\chi^2(1, 1,960) = 0.01, n.s.$
Non-FRL	51	4.1	63	5.0	105	10.7	106	10.8	
Total	1,256	100.0	1,255	100.0	983	100.0	977	100.0	
Language Proficiency									
N/A – English only speakers	276	22.0	287	22.9	372	37.8	386	39.5	BIC-2: $\chi^2(1, 2,511) = 0.29, n.s.$ BIC-3: $\chi^2(1, 1,960) = 0.57, n.s.$
ELL in one or more years	980	78.0	968	77.1	611	62.2	591	60.5	
Total	1,256	100.0	1,255	100.0	983	100.0	977	100.0	
IEP									
No IEP	1,125	89.6	1,080	86.1	886	90.1	855	87.5	BIC-2: $\chi^2(1, 2,511) = 7.25, p < .01.$ BIC-3: $\chi^2(2, 4,474) = 3.39, n.s.$
IEP in one or more years	131	10.4	175	13.9	97	9.9	122	12.5	
Total	1,256	100.0	1,255	100.0	983	100.0	977	100.0	

¹ Other includes Native American or Alaskan Native, Asian, Native Hawaiian or Pacific Islander and Two or More Races.

² Data reflect status for third year of the study only.

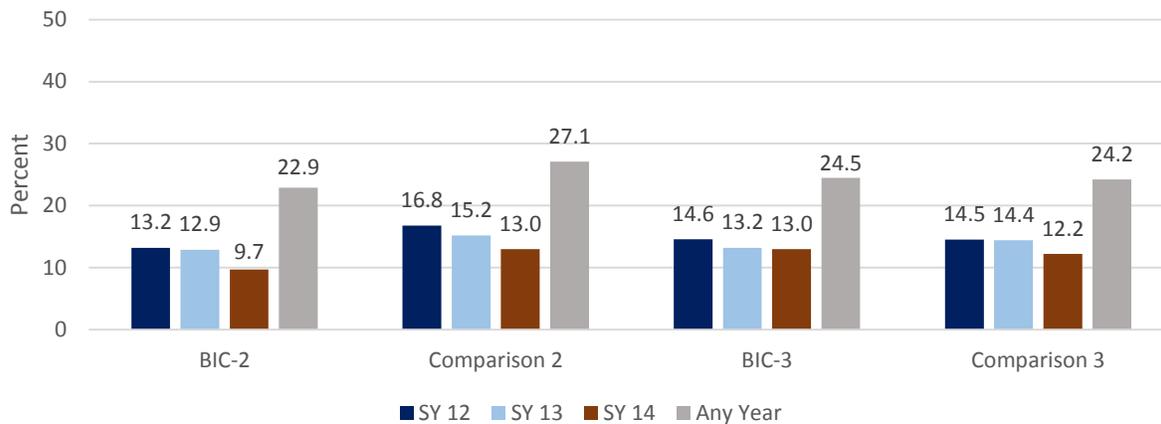
RESULTS

CHRONIC ABSENCES

Breakfast programs have been shown to have a positive effect on attendance. Analyses of the *Breakfast in the Classroom* results confirm this positive relationship for the students in the BIC-2 schools. As shown in Figure 1, students enrolled in BIC-2 schools have significantly lower rates of chronic absences in all years combined and for the 2011-12 and 13-14 school years compared with students in the Comparison-2 schools³. Similar differences were not observed for the BIC-3 students whose rates of chronic absence parallel those for the Comparison-3 students.

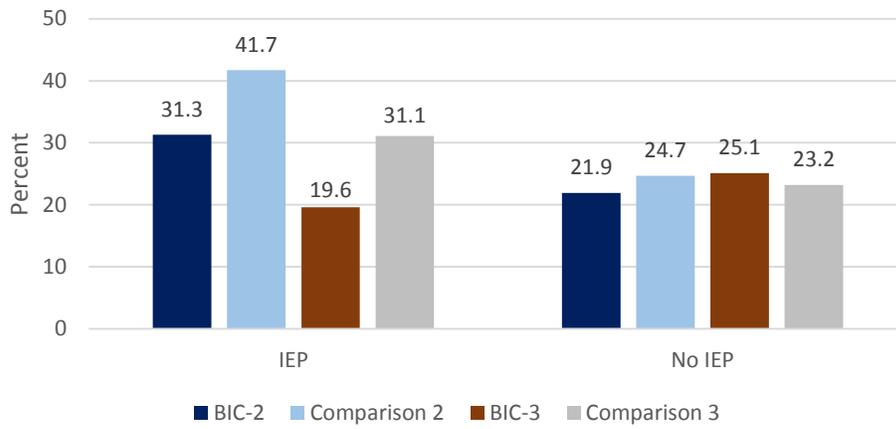
When the analysis separated students with an IEP from those without an IEP, differences approached significance for both the BIC-2 and BIC-3 students. The overall rate of chronic absences for the BIC-2 students with an IEP (31.3%) was 25 percent lower than the chronic absence rate for the Comparison 2 students with an IEP (41.7%). Similarly, the chronic absence rate for the IEP students in BIC-3 (19.6%) was 37 percent lower than the comparable rate for the IEP students in the Comparison 3 group (31.1%). (See Figure 2.)

Figure 1. Percent of youth chronically absent in SY12, SY13, SY14, or in any of the three study years



³ SY 12: $\chi^2(1, 2,511) = 6.36, p < .01$; SY 14: $\chi^2(1, 2,511) = 6.69, p < .01$; Any Year: $\chi^2(1, 2,511) = 6.09, p < .02$.

Figure 2. Percent of youth chronically absent in in any of the three study years by presence of an IEP in any year⁴



EXCESSIVE TARDINESS

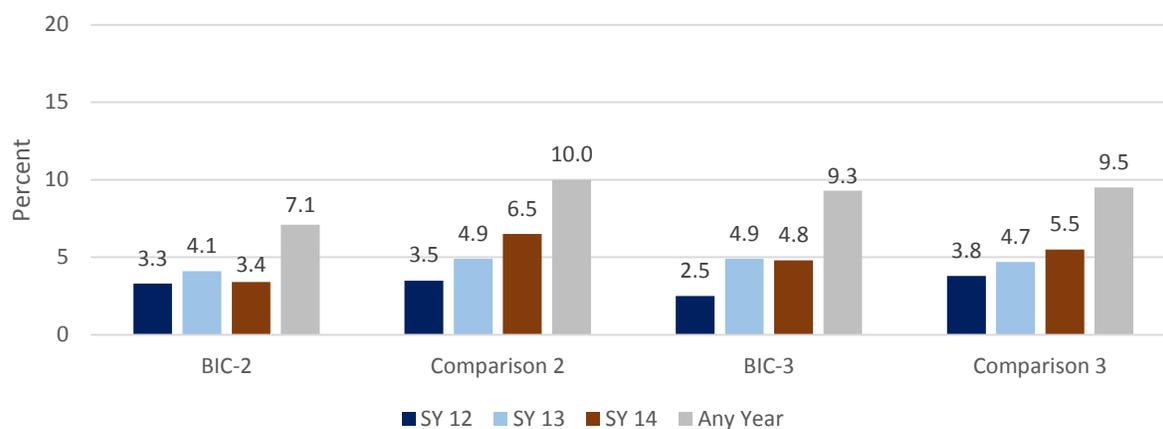
⁴ BIC 2 any year: $X^2(1, 306) = 3.48, p < .06$; BIC 3 any year: $X^2(1, 219) = 3.75, p < .06$.

As detailed previously, breakfast programs have been found to significantly improve attendance while reducing tardiness in multiple states including Minnesota, Massachusetts, New York, Pennsylvania and Maryland. For the purposes of this study, excessive tardiness was defined as being at or above the 95th percentile for tardy minutes. The cut point used was established based on trends in SY13-14 and used consistently for all three years.

As shown in Figure 3 below, reductions in excessive tardiness were statistically significant for the BIC-2 group both in all years combined and for SY13-14.⁵ This same pattern was not found for the BIC-3 students where no differences could be found between the BIC-3 students and their comparison group.

⁵ SY 14: $X^2(1, 2,511) = 12.84, p < .01$; Any Year: $X^2(1, 2,511) = 7.03, p < .01$.

Figure 3. Percent of youth excessively tardy in SY12, SY13, SY14, or in any of the three study years



When students with IEPs were examined in terms of their rates of being excessively tardy, no differences were observed. Among IEP students, patterns of excessive tardiness in any of the three study years ranged from 10.7% to 10.3% for the BIC-2 and Comparison-2 groups. Excessive tardy rates for IEP students were 11.3% and 11.5% for the BIC-3 and Comparison-3 groups.

OFFICE REFERRALS

Patterns of office referrals were examined for the BIC-2 and BIC-3 groups as compared to their respective comparison groups because of the strong evidence that providing breakfast improves student behavior as evidenced by lower rates of disciplinary office referrals.

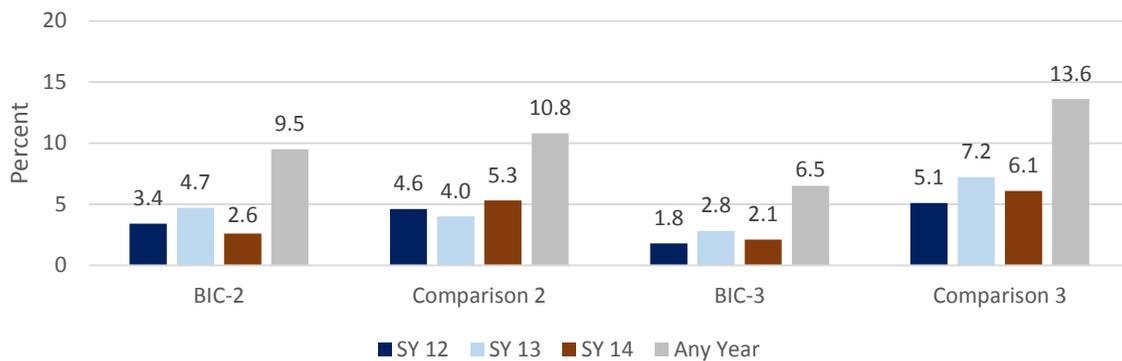
The results show that the *Breakfast in the Classroom* program has had a positive influence on office referrals for the BIC-2 students, most particularly in SY 2013-14. The impact of breakfast is even stronger for the BIC-3 students for whom significant differences in office referrals were found for all three school years as compared to their comparison group.

Among the BIC-2 students, the percent of students with one or more office referrals was comparable to the Comparison 2 students for SY12, and SY 13 but was significantly lower in SY14, $X^2(1, 2,511) = 11.48, p < .01$. These patterns suggest that office referrals could be expected to drop over time as the BIC program becomes integrated into the daily school routine.

For the BIC-3 students, the percent of students with one or more office referral was consistently lower for students in the BIC-3 group as compared with students in the Comparison 3 group for all three years as well as in any year.⁶ The results suggest a pattern of lower office referrals than expected, an effect that is consistent from year to year. (See Figure 4)

⁶ SY 12: $X^2(1, 1,960) = 15.80, p < .01$; SY 13: $X^2(1, 1,960) = 19.22, p < .01$; SY 14: $X^2(1, 1,960) = 19.84, p < .01$; Any Year: $X^2(1, 1,960) = 27.34, p < .01$

Figure 4. Percent of youth receiving one or more office referral in SY12, SY13, SY14, or in any of the three study years



To assure that these differences were not related to the presence of groups known to have differential patterns of discipline referrals, this same analysis was repeated testing whether differential patterns of office referrals for African American students or students with an IEP were inadvertently affecting the results. When the analyses were repeated excluding these groups, the significant differences between the BIC-2 and BIC-3 groups relative to their comparison groups remained the same.

When African-American students were excluded from all groups, the BIC-2 students continued to show significantly lower rates of office referrals for SY 2013-14. Similarly, the BIC-3 students demonstrated significantly lower office referral rates for all years combined as well as in any single year. The same patterns held true when IEP students were excluded from the analysis.

Due to the absence of an experimental design it is impossible to definitively attribute the lower office referral rates to BIC. However, the fact that significant differences persist even when African-American and special needs students are excluded from the analysis bolsters the original hypothesis that office referrals may drop over time as implementation of the BIC becomes integrated into a school’s daily routine.

ACADEMIC ACHIEVEMENT

Denver Public Schools uses the Developmental Reading Assessment 2nd Edition (DRA2) and its Spanish version, the Evaluacion del Desarrollo de la Lectura (EDL2) to provide a standardized method for assessing primary student reading development. These tests are administered by teachers once in the fall and once in the spring. Kindergarten students are tested mid-year. To assess the impact of the *Breakfast in the Classroom* program on students’ academic performance, we analyzed differences in DRA scores because it is administered to all K-3 students on an annual basis. The possible ratings are “above grade level,” “at grade level” and “below grade level.”

In general, the students included in this evaluation were highly likely to be rated as underperforming based on their DRA assessments. As shown in Table 2, when the DRA

results are viewed for all of the students in all groups (BIC-2, Comparison Group-2, BIC-3 and Comparison Group-3), nearly half of the students scored as being below grade level in each of the study years (2011-12, 2012-13 and 2013-14).

Table 2. Proportion of Students Rated as Below Grade Level by School Year

	School Year 2011-12		School Year 2012-13		School Year 2013-14	
	BIC 2/Comp	BIC 3/Comp	BIC 2/Comp	BIC 3/Comp	BIC 2/Comp	BIC 3/Comp
Below Grade Level	55.0%	43.3%	49.3%	43.3%	48.7%	42.1%
At Grade Level	25.4%	27.6%	28.1%	24.3%	29.0%	26.7%
Above Grade Level	19.6%	29.1%	22.7%	32.4%	22.3%	31.1%

- Percentages are based on the total number of youth for whom DRA scores were reported in each school year.

We sought to examine differences in DRA scores between each of the BIC student groups (BIC-2 and BIC-3) relative to their comparison groups, but no statistically significant differences could be observed. In addition, analyses were conducted to examine patterns of changes in proficiency levels over time for each of the four groups (BIC-2, Comparison-2, BIC-3 and Comparison-3). As before, no consistent patterns of improvement in academic performance could be identified over time.

There are several possible reasons why results related to academic achievement could not be found. First, the DRA allows for only three categories of performance (below grade level, at grade level and above grade level). As such, it may not be sufficiently fine-tuned to observe more subtle levels of improvements in reading performance. Secondly, to an unknown extent, students in the Comparison Groups 2 and 3 are also likely to be accessing breakfast, albeit not in the classroom. In this regard, true differences related to the value of a nutritional breakfast cannot be fully discriminated.

Conclusions

This evaluation has examined the impact of the *Breakfast in the Classroom* program in Denver Public Schools over three school years 2011-12, 2012-13 and 2013-14. A comparison study was conducted to examine the impact of the programs on elementary grade students who had participated in the program as compared to an equivalent group of students in non-participating schools. Program impacts were evaluated in terms of chronic absences, excessive tardiness, office referrals and reading scores as measured through the Developmental Reading Assessment program.

Initial analyses revealed that substantial differences between students who participated for only two years (BIC-2) as compared to those with three years of program participation (BIC-3). To adjust for these differences, two separate comparison groups, one each for the BIC-2 and BIC-3 students. Analyses confirmed that the overall profile of students in the comparison groups paralleled that of the students who had participated in the *Breakfast in the Classroom* for both

the BIC-2 and BIC-3 student groups. The only significant differences found related to the BIC-2 students who were observed to be less likely to have an IEP and to be enrolled in a school with a higher disadvantage score. BIC-3 students were found to be more likely to be African-American or an Other Race relative to the comparison students.

In terms of program impacts, the areas where significant differences were found can be briefly summarized:

- Students in the BIC-2 group were found to have significantly lower rates of chronic absences compared to the Comparison-2 student group. Similar differences were not observed for students in the BIC-3 schools.
- BIC-2 students were also found to have significantly lower rates of excessive tardiness than students in their Comparison Group. Similar differences were not observed for students in the BIC-3 schools.
- Students in both the BIC-2 and the BIC-3 groups were found to have significantly lower office referral rates compared to their respective comparison groups. These differences remained even when the analysis was restricted to exclude African-American and IEP students who traditionally have higher rates of office referrals.
- No differences were found in the DRA scores for the BIC-2 or BIC-3 student groups relative to their comparison groups which tested reading proficiency for students in the elementary grades (K-3).

Of interest in the study are the variable results for the BIC-2 and BIC-3 participating student groups. As noted earlier, students in the BIC-2 group have been found to be more likely to be enrolled in a disadvantaged school compared with the BIC-3 students. The study findings suggest that the *Breakfast in the Classroom* program has a stronger influence on attendance as measured through rates of chronic absences and excessive tardiness in schools with higher disadvantage scores.

At the same time the breakfast program was found to have a significant impact on reducing office referrals among both the BIC-2 and the BIC-3 student groups.

Relative to academic achievement, no improvements could be observed for either the BIC-2 or the BIC-3 groups in terms of reading proficiency. It is possible that the impact of the *Breakfast in the Classroom* program could be more meaningfully evaluated in terms of short-term testing performance or through the use of more precise quantitative based testing metrics. While eating breakfast has been shown to impact attention and concentration, it remains unclear to what extent it can contribute to overall academic performance as measured on a yearly basis.

Nonetheless, the results of this evaluation confirm those in the larger reported literature, affirming the value of a breakfast in the classroom program, particularly for students in schools identified as having higher rates of disadvantage.

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- ¹ Basch, CE (2011) Breakfast and the achievement gap among urban minority youth. *Journal of School Health*. 81(10):635-640.
- ² Basch, CE (2011) Breakfast and the achievement gap among urban minority youth. *Journal of School Health*. 81(10):635-640
- ³ Frisvold, DE (2015) Nutritional and cognitive achievement: an evaluation of the school breakfast program. http://www.econ.gatech.edu/files/seminars/Frisvold_SP2012.pdf. Accessed 3/3/1/15.
- ⁴ Wahlstrom, K.L. & Begalle M.S. (1999) More than test scores: results of the Universal School Breakfast Pilot in Minnesota. *Topics in Clinical Nutrition* 15(1):17-29.
- ⁵ Meyers, A.F., Sampson A.E., Weitzman M., Rogers B.L., & Kayne G. (1989). School Breakfast Program and performance. *American Journal of Diseases of Children* 143:1234-1239.
- ⁶ Murphy J.M., Drake J.E., & Weineke K.M. (2005). *Academics & Breakfast Connection Pilot: final report on New York's Classroom Breakfast Project*. Nutrition Consortium of New York State. Albany, New York.
- ⁷ Murphy, J.M., Pagano M.E., Nachmani J., Sperling P., Kane S., & Kleinman R.E. (1998). The relationship of school breakfast to psychosocial and academic functioning: cross-sectional and longitudinal observations in an inner-city school sample. *Archives of Pediatric and Adolescent Medicine* 152:899-907.
- ⁸ Murphy, J.M., Pagano M.E., Nachmani J., Sperling P., Kane S., & Kleinman R.E. (1998). The relationship of school breakfast to psychosocial and academic functioning: cross-sectional and longitudinal observations in an inner-city school sample. *Archives of Pediatric and Adolescent Medicine* 152:899-907.
- ⁹ Powell C.A., Walker, S.P., Change S.M., Grantham-McGregor S.M. (1998). Nutrition and education: a randomized trial of the effects of breakfast in rural primary school children. *American Journal of Clinical Nutrition* 68:873-9.
- ¹⁰ Murphy H.M., Wheler C.A., Pagano M.E., Little M., Kelnman R.F., & Jellinek M.S. (1998). Relationship between hunger and psychosocial functioning in low-income American children. *Journal of the American Academy of Child and Adolescent Psychiatry* 37:163-170.
- ¹¹ Alaimo, K., Olson C.M., & Frongillo E.A. (2001). Food insufficiency and American school-aged children's cognitive, academic and psychosocial development. *Pediatrics* 108:55-53.
- ¹² Wahlstrom, K.L. & Begalle M.S. (1999). More than test scores: results of the Universal School Breakfast Pilot in Minnesota. *Topics in Clinical Nutrition* 15(1):17-29.
- ¹³ Wahlstrom, K.L., & Begalle M.S. (1999). More than test scores: results of the Universal School Breakfast Pilot in Minnesota. *Topics in Clinical Nutrition* 15(1):17-29.
- ¹⁴ Wahlstrom, K.L., & Begalle M.S. (1999). More than test scores: results of the Universal School Breakfast Pilot in Minnesota. *Topics in Clinical Nutrition* 15(1):17-29.
- ¹⁵ Vaisman N., Voet H., Akivis A., & Vakil E. (1996). Effect of breakfast timing on the cognitive functions of elementary school students. *Archives of Pediatric and Adolescent Medicine* 150:1089-1092.
- ¹⁶ Widenhorn-Muller K., Hille K., Klenk J., & Weiland U. (2008). Influence of having breakfast on cognitive performance and mood in 13 to 20 year old high school students: results of a crossover trial. *Pediatrics*, 122:279-284.
- ¹⁷ Pollitt E., Cueto S., & Jacoby E.R. (1998) Fasting and cognition in well- and undernourished schoolchildren: a review of three experimental studies. *The American Journal of Clinical Nutrition* 67(4):779S-784S.
- ¹⁸ Kleinman R.E., Murphy J.M., Little, M., Pagano P., Wehler C.S., Regal K., & Jellinek M.S. (1998). Hunger in children in the United States: potential behavioral and emotional correlates. *Pediatrics* 101:1-6.
- ¹⁹ Rampersaud G.C., Pereira M.A., Girar B.I., Adams J., & Metz H.D. (2005). Breakfast habits, nutritional status, body weight and academic performance in children and adolescents. *Journal of the American Dietetic Association*. 105(5):743-60.
- ²⁰ Frisvold, DE (2014) **Nutrition and cognitive achievement: An evaluation of the School Breakfast Program**. *Journal of Public Economics*, 2014; DOI:[10.1016/j.jpubeco.2014.12.003](https://doi.org/10.1016/j.jpubeco.2014.12.003)
<http://www.sciencedaily.com/releases/2015/03/150317112032.htm> Accessed 3/31/15

²¹ Kleinman, R., Hall S., & Green H. (2002). Diet, breakfast and academic performance in children. *Annals of Nutrition and Metabolism* 46(1):S24-S30.

²² Imberman, S.A., & Kugler A.D. (2013). The effect of providing breakfast in class on student performance. *NBER Working Paper*.