

Efficacy Study of the Impact of Concentric Educational Solutions' C9 Program on Students' Chronic Absenteeism, Academic Performance, and Behavior

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EXECUTIVE SUMMARY:

Efficacy Study of the Impact of Concentric Educational Solutions' C9 Program on Students' Chronic Absenteeism, Academic Performance, and Behavior

The purpose of the present study was to evaluate the efficacy of Concentric Educational Solutions' (CES) C9 Program in Baltimore City Public Schools for improving students' chronic absenteeism, academic performance, and behavior. As described by CES, C9 is intended to strengthen students' academic performance, attendance, and social and emotional skills through a range of supports including home visits, tutoring, social-emotional learning groups, check-ins, and classroom observations.

This quasi-experimental study analyzed quantitative data to examine the relationship between participation in C9 and academic performance, attendance, and behavior and to compare the outcomes for students participating in C9 and similar students not participating in the program. The study examined data from the 2019-20 school year, including data provided by CES about students' participation in C9 and data provided by Baltimore City Public Schools (BCPS) about C9 participants' and comparison students' academic performance, attendance, and behavior.

C9 Experience

The CES participation data indicated that there were a total of 1,716 home visits to 200 C9 students. The most frequent result of a home visit was for a CES Professional Student Advocate (PSA) to leave a letter for the student and parents/guardians because no one was home (48.5% of all home visits). The second most common result was for the PSA to speak with the parent/guardian (16.8%), followed by identifying an incorrect address (10.6%). In 7.2% of home visits, the PSA spoke with the student.

When examining the home visits for each student, we saw that 60.5% of students had at least one home visit when a PSA talked with their parent/guardian, and 40.5% of students themselves talked with a PSA during at least one home visit. In addition, a letter was left at least once for 90.5% of students, an incorrect address was identified for 38.0% of students, and a PSA spoke with another family member of 34.0% of students.

C9 Students' Academic, Attendance, and Behavior Outcomes

Student outcome data indicated that in the 2019-20 school year, C9 students missed an average of 19.3 days out of the 121 days when school attendance was recorded, yielding an attendance rate of 84.0%. (Attendance was tracked for only 121 days because tracking was disrupted by the COVID-19 pandemic beginning in March

2020.) Twenty-four C9 students had at least one suspension. Those students had a total of 44 suspensions, with the average suspension lasting 5.2 days.

Comparison of C9 Participants and Similar Students Not Participating in C9

After controlling for attendance in the 2018-19 school year and demographics, C9 students showed a 3.5% greater improvement in attendance rates than did comparison students not participating in C9, indicating a small but statistically significant impact of C9 home visits on attendance. The number of students receiving suspensions, the number of suspensions, and the average length of suspension all decreased slightly from 2018-19 to 2019-20 for C9 and comparison students. C9 students slightly outgained propensity-matched comparison students in their reading and mathematics growth, but these advantages were not statistically significant or practically significant in either subject area. Having had at least one home visit resulting in a PSA talking with the student was significantly associated with i-Ready mathematics scores. Subgroup analyses did not find any differential effects on attendance, behavior, or academics across schools, grade levels, or other subgroups of interest.

Conclusion

The key results and conclusions of this evaluation are as follows:

- C9 students slightly outgained comparison students on the i-Ready mathematics and reading achievement assessments. Neither of these associations was statistically significant.
- While C9 students were absent from school more often than comparison students, C9 students showed significantly greater attendance gains from the 2018-19 school year to the 2019-20 school year than did comparison students.
- The most common home visit contact type was a PSA leaving a letter. PSAs spoke with a student in about 7% of total contacts, reaching 40% of students in the C9 sample in at least one visit. PSAs averaged slightly more than eight total contacts per C9 student.
- Home visits in which a PSA spoke with a student were significantly and positively associated with mathematics achievement gains, in relation to comparison students.
- Subgroup analyses did not find any differential effects across schools, grade levels, or other student subgroups of interest.

Efficacy Study of the Impact of Concentric Educational Solutions C9 Program on Students' Chronic Absenteeism, Academic Performance, and Behavior

The Center for Research and Reform in Education (CRRE) is a research center affiliated with the School of Education at Johns Hopkins University (JHU) specializing in K-12 education program evaluations. In 2021, Concentric Educational Solutions (CES) contracted with CRRE to conduct an efficacy study of CES's C9 Program in Baltimore City Public Schools (BCPS) during the 2019-20 school year, as well as efficacy studies of their home visit framework and their tutoring and mentoring program in BCPS during the 2021-22 school year. This report focuses on the study of C9.

According to its website, CES's mission is "to support students, families, and schools by identifying barriers that negatively impact education and provide resources and services to improve student outcomes." CES's services include home visits, mentoring and tutoring, professional development, and technical assistance.

As described in CES's *C9 End of Year Summary Report Academic Year 2019-2020*, the C9 Program was a collaboration of CES, BCPS, and the Community Learning Network (CLN9) to offer intensive and comprehensive student support services to selected students at five schools, with the goal of improving students' academic performance, attendance, and social-emotional competence. Supports included home visits, academic support, social-emotional learning groups, check-ins, and classroom observations. In addition, CES developed relationships with school administrators, teachers, counselors, and parents. According to the report, 40 students from each school were initially selected to participate in C9. The selection criteria were that students had Tier 2 or 3 attendance and had failed at least one core class in the 2018-19 school year. When C9 participants left their school because of transfer or incarceration or left C9 because of a lack of interest, some additional students were added to the program. There were 177 students in the program as of June 2020.

In this report, we describe the methods and present results from an evaluation of the efficacy of the C9 Program for improving students' academic, attendance, and behavior outcomes in participating BCPS schools during the 2019-20 school year.

Research questions addressed by the study are:

1. How does the **attendance** of students participating in the C9 Program compare to that of similar students not participating in C9?
2. How does **behavior** of students participating in the C9 Program compare to that of similar students not participating in C9?
3. How does the **academic performance** of students participating in the C9 Program compare to that of similar students not participating in C9?

Method

Research Design

This study analyzed extant reading and mathematics achievement data, along with attendance and behavioral data, which was provided by BCPS to CRRE. Specifically, i-Ready assessment scores in reading and mathematics were examined as progress monitoring achievement data, while measures of days absent and percentages of days present were used as attendance outcomes, and suspension counts were used as behavioral outcomes. In addition, the study analyzed counts of home visit contacts provided by CES to CRRE. Achievement, attendance, behavioral, and program participation data were analyzed descriptively to examine general trends. A quasi-experimental design (QED) was used to compare CES impacts on achievement and attendance, with multiple regression analyses used to conduct these contrasts.

Participants

BCPS is a large urban school district of approximately 78,000 students located in the City of Baltimore, Maryland. According to the National Center for Education Statistics, BCPS is comprised largely of Black and White students (62% and 27%, respectively), with small percentages of Hispanic and Asian students. According to the Maryland Department of Education, 62.1% of BCPS students are economically disadvantaged. CES’s C9 program served selected students from five schools in the 2019-20 school year: Baltimore Design School, Booker T. Washington Middle School, National Academy Foundation, Stadium School, and Vanguard Collegiate Middle School.

CES provided to CRRE an initial roster of 203 C9 participants and a log of home visits to participants. When CES participation data and BCPS student outcomes were matched, the resulting analysis sample of treatment students included 200 students in Grades 6 through 8, including 28 6th graders, 73 7th graders, and 99 8th graders.

The initial pool of comparison students was selected by BCPS research staff and consisted of additional students from the same five schools. We conducted propensity-score matching (described in more detail later) to create comparison groups for mathematics and reading that were most similar to C9 participants in terms of prior achievement and demographic variables. Demographics of treatment and comparison students are shown in Table 1.

Table 1
Student characteristics of analytic sample

Group	Treatment	Comparison (All)	Matched Comparison ¹
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% Black	95.54	90.24	94.67
% White	0.89	2.12	2.37
% Hispanic	2.67	5.75	1.78
% Female	44.64	46.65	41.42
% Economically disadvantaged	73.21	59.21*	78.11
% Special Education	26.79	26.83	30.77
% ELLs	1.79	10.61*	2.37
<i>N</i>	112	1,461	169

Note. * $p < .05$.

¹Includes students matched to a treatment student for mathematics and/or reading.

Treatment students were nearly all Black, and nearly three-quarters of students were classified as economically disadvantaged. About one-quarter of treatment students received special education services, while only a small number (less than 2%) of students were identified as English Language Learners (ELLs). The initial pool of comparison students contained significantly smaller proportions of economically disadvantaged students and significantly larger proportions of EL learners than the treatment sample. However, after propensity-matching was performed, these differences disappeared, leaving matched comparison groups with demographic features very similar to that of the treatment group (see last column in Table 3).

Measures

i-Ready Assessment. BCPS provided CRRE available i-Ready reading and mathematics assessment scores for 6th, 7th, and 8th grade students who participated in CES's C9 program in the 2019-20 school year and for the pool of comparison students selected by BCPS personnel. Because of the COVID-19 pandemic, only beginning-of-year (BOY) and middle-of-year (MOY) scores were available, but not end-of-year (EOY) scores. BCPS treats scores from the 2020 MOY assessment, given in January to February, as EOY scores for 2019-20, so this report follows suit and uses the same language. It is important to consider that the lack of true EOY student outcomes limits us to examining half-year CES program impacts. i-Ready Diagnostic assessment scores range from 0 to 800 and are vertically scaled and nationally normed across grades, meaning that scores can be directly compared to each other, regardless of a student's current grade level. It is important to note that i-Ready data obtained from BCPS contained considerable numbers of observations with missing data for both treatment and comparison students. Specifically, i-Ready mathematics scores were available for only slightly more than half of all C9 students, while i-Ready reading scores were only available for about 45% of C9 students. BCPS did not provide a reason for missing data, so we cannot report on factors that may have caused it. However, rates of missingness were similar for C9 and comparison students. i-Ready data were provided for students with both BOY and EOY scores, but not for students with only BOY scores or only EOY scores; therefore, it is not possible to determine whether there was a difference in BOY performance between students who did and did not have EOY scores available.

Attendance. BCPS provided CRRE with attendance data from the 2018-19 and 2019-20 school years. Specific variables provided included counts of days attended, days absent, and days enrolled. Days absent was used as one of the attendance outcome variables of interest. We also created a variable measuring percentage of enrolled and recorded days absent, which was created by dividing days absent by days enrolled when attendance was recorded. This measure helped to account for differences in counts of days enrolled across treatment and comparison students. The 2019-20 data were used as outcome variables, while 2018-19 data were used as baseline (pre-treatment) measures.

Behavioral data. BCPS provided CRRE with behavioral data from the 2018-19 and 2019-20 school years. BCPS provided data on each suspension that occurred during both school years, including length and type of suspension (i.e., in-school or out-of-school), along with the cause of the suspension. BCPS did not provide a definitive indication that students not in the suspension file had not had any suspensions, and we did not make that assumption. For our analyses, we examined counts of suspensions and average length of suspension as the main outcome variables in this domain. As with attendance data, 2019-20 data were used as outcome variables, while 2018-19 data were used as baseline measures.

Program data. CES provided CRRE with home visit data from all C9 program students in the 2019-20 school year. Program data consisted of counts of home visit contact types for each program student, as recorded by CES PSAs. Contact types could consist of a PSA talking to the student, a PSA talking to the parent/guardian, a PSA leaving a letter because no one answered the door, or a PSA discovering that an address was not valid, as well as other contact types. We overview all possible home visit contact types later in this report.

Analytical Approach

Data for all students were analyzed descriptively by examining patterns in achievement, attendance, and behavioral outcomes, as well as patterns in CES program visit outcomes. Multiple linear regression analyses were used to determine CES program impacts on achievement and attendance. Demographic variables including gender, ethnicity, grade level, school, ELL status, economically disadvantaged status, and special education status were included in all analytic models. Impacts of selected individual C9 home visit contact types on student achievement were measured by replacing the treatment variable in the regression models with the selected home visit contact type. This procedure allowed us to estimate the unique impact of a home visit contact type on student achievement in relation to comparison students, who did not receive any home visits.

To adjust for prior achievement and demographic differences between treatment and comparison groups, propensity score matching (PSM) was used to create comparison groups of students that were as similar as possible to treatment students. Propensity scores were computed using the `psmatch2` command in Stata (v 17.0), with one-to-one matching using the Mahalanobis distance metric. This procedure created comparison groups that were of equal size to the treatment group and, based on prior achievement and demographic variables, as similar as possible to treatment students. The result of the PSM procedure was that treatment students were individually matched with comparison students who were as similar as possible in terms of prior achievement and demographic variables, allowing for a stronger comparison of treatment and comparison students. The PSM procedure was conducted twice, once to identify a comparison sample for mathematics achievement analyses, and again to identify a comparison sample for ELA achievement analyses. The matched samples demonstrated baseline equivalence on both outcome measures and across all grade levels; full tables of baseline equivalence for these samples can be found in Appendix A. The full comparison sample was used in the analyses of attendance and behavior.

Results

We begin by descriptively examining CES home visit data for treatment students from the 2019-20 school year, as well as achievement, attendance, and behavioral outcomes for both treatment and comparison students from the 2018-19 and 2019-20 school years. This analysis is followed by regression analyses examining the impacts of CES home visits on mathematics and reading i-Ready scores, as well as on attendance rates. We then examine results of additional regression analyses examining the impacts of selected CES home visit contact types on achievement gains, allowing us to separately estimate impacts of specific contact types. We also overview the results of subgroup analyses on the main achievement analyses, where applicable.

Descriptive Analyses

CES home visits. Table 2 shows frequencies and percentages for all possible home visit contact types for treatment students in the 2019-20 school year. This table considers home visits to all C9 cohort students.

Table 2
CES Home Visit Outcome Frequencies (all students)

Outcome	Frequency	%
Left Letter	833	48.54
Spoke with Parent or Guardian	289	16.84
Incorrect Address (Spoke w/ Current Resident)	181	10.55
Spoke with Student	123	7.17

No Access	121	7.05
Spoke with Family Member	99	5.77
Vacant Property	44	2.56
Spoke with Family Friend	17	0.99
Other	7	0.41
Address Not Valid	2	0.12
Total	1,716	
Average Total Contacts per student	8.36 (3.92)*	

**Note: SD in parentheses.*

Out of a total of 1,716 reported home visits, the most common home visit contact type was for a CES PSA to leave a letter at the door of a student’s home. This contact type occurred for just less than half of all home visits. The next most common contact types were a PSA speaking with a student’s parent or guardian (16.8%) and a PSA finding that the address provided was incorrect (10.6%). Just over 7% of all PSA home visits resulted in student contact. Across all C9 students, the average number of total PSA contacts was slightly more than eight contacts per student, with total contacts ranging from as few as one contact to as many as 27 contacts.

Focusing specifically on C9 students with at least one non-missing outcome variable (i.e., achievement, attendance, or behavior), Table 3 shows the frequencies and percentages of treatment students who received at least one visit of a given home visit contact type. In other words, we are tabulating counts of students who received at least one letter or students who spoke to a PSA at least one time in person, for example. (Note that Table 2 provided an overview of all home visits for all treatment students, including those treatment students missing all three program outcome variables [achievement, attendance, behavior]).

Table 3
CES Home Visit Outcome Frequencies, by student (n = 200)

Outcome	Frequency	%
Left Letter	181	90.50
Spoke with Parent or Guardian	121	60.50
Spoke with Student	81	40.50
Incorrect Address (Spoke w/ Current Resident)	76	38.00
Spoke with Family Member	68	34.00
No Access	53	26.50
Vacant Property	27	13.50
Spoke with Family Friend	15	7.50
Other	7	3.50
Address Not Valid	2	1.00

Over 90% of students had a letter left by a CES PSA. CES personnel spoke with a parent or guardian for just over 60% of students, while just over 40% of students spoke with a PSA. This contact type was closely followed by PSAs going to an incorrect address (38.0% of students) and PSAs speaking with a family member of a student (34.0%). Notably, over one-quarter (26.5%) of students had a PSA report no access to the property in at least one visit, while 13.5% of students had a PSA report that their given address was a vacant property in at least one visit. Given the residential mobility of some students and the fact that students and/or their parents/guardians may have been at work or out of the home for other reasons when the PSA visited, it is not surprising that considerable percentages of students had home visits resulting in contact types without any interaction, such as leaving a letter, arriving at an incorrect address, or simply having no access to a student’s address.

Attendance patterns. Next, we examined unadjusted attendance trends for treatment and comparison students in both the 2018-19 and 2019-20 school years. Table 4 shows average counts of days absent across both years for students in both conditions, as well as percentages of enrolled and recorded days absent. It is important to consider that, while the 2018-19 school year was a full 180-day year, the 2019-20 school year only contained a maximum of 121 counted school days because of the COVID-19 pandemic starting in March 2020.

Table 4
Attendance by condition, 2018-19 and 2019-20 school years

Measure	Treatment			Comparison		
	18-19	19-20	N	18-19	19-20	N
Days Absent	34.85	19.34	198	19.32	11.69	670
% Days Absent ¹	19.36	15.98	198	10.73	9.66	670

¹Days absent relative to the total number of days the student was enrolled and attendance was recorded.

Not surprisingly given that C9 students were selected for program participation because they had room for improvement in their academic, attendance, and/or behavior outcomes, treatment students in both school years averaged considerably more days absent than did comparison students. Specifically, treatment students averaged more than 15 additional days absent in relation to comparison students in the 2018-19 school year, while treatment students averaged approximately eight additional days absent in the 2019-20 school year. However, as total days attendance counted differed considerably across the two school years as a result of the pandemic, we also reported on percentages of absent days. Treatment students were absent approximately 8.5% more often than comparison students in the 2018-19 school year. This gap closed slightly in the 2019-20 school year to slightly more than a 6% difference. Thus, while C9 students were still missing more school days than

comparison students, there was preliminary evidence of this gap in attendance starting to close. Regression models estimating CES program impacts on attendance are discussed below.

Behavioral patterns. We also examined unadjusted behavioral trends for treatment and comparison students in the 2018-19 and 2019-20 school years. Table 5 shows counts of total suspensions and students with at least one suspension in both school years, as well as the average suspension length. It is important to note that BCPS provided data for students who had at least one suspension. Rather than make the assumption that no data on a suspension for a student meant that the student had not been suspended, we report only on counts of suspensions provided by BCPS but did not calculate percentages of students with at least one suspension for either condition.

Table 5
Suspensions by condition, 2018-19 and 2019-20 school years

Measure	Treatment		Comparison	
	18-19	19-20	18-19	19-20
Students with 1+ suspension	32	24	173	144
Total suspensions	52	44	280	229
Average suspension length (days)	5.56	5.21	9.90	6.23

The number of students receiving one or more suspensions decreased slightly from 2018-19 to 2019-20 across both treatment and comparison students, with eight fewer treatment students and 29 fewer comparison students receiving at least one suspension in the 2019-20 school year. Similarly, fewer total suspensions were given to students in both groups, with similar decreases in both conditions. It is important to note that the pool of comparison students was considerably larger than that of treatment students, so comparing raw counts of suspended students or total suspensions is not recommended. Interestingly, the average length of suspensions dropped in 2019-20 for students in both conditions. Across both years, the average suspension length was slightly shorter for treatment students than for comparison students. We urge considerable caution in interpreting these results, as sample sizes were considerably different across condition. Additionally, suspension assignment and duration can vary for a host of different reasons, both random and systematic, so this metric should be interpreted as a very coarse-grained indicator of suspension severity.

Impact Analyses

We start by highlighting the results of the main impact achievement analyses, which used i-Ready mathematics and reading scores for Grades 7 and 8 students. This is followed up by an analysis of program impacts on attendance, using a model similar to that used for achievement impact analyses. The main impact analyses are followed by subgroup analyses for grade levels and schools. Finally, we overview the results of regression analyses estimating the impact of one unit of selected C9 home visit contact types (e.g., one meeting with student, one meeting with family, one letter left) on achievement, in relation to comparison students who did not have any home visits.

Achievement impacts. The results of the main achievement impact analyses for mathematics and reading are shown in Tables 6 and 7, respectively. Sixth graders are excluded from these analyses because of an inadequate sample size. Descriptive analyses of unadjusted average scores, by grade and condition, can be found in Appendix B. It is important to consider that the samples for these analyses consist of treatment students with non-missing mathematics and/or reading scores, as well as comparison students identified by the propensity-matching procedure described earlier. Thus, sample sizes are slightly different for each set of analyses described here. In addition, large numbers of students had missing i-Ready data, as described above in the Methods section. This high attrition rate reduced the statistical power of these analyses, especially as we cannot report on why so much i-Ready data were missing. These impact models control for prior (BOY) achievement, as measured by fall 2019 i-Ready scores, as well as demographic variables. In both analyses, the sample consisted of treatment and matched comparison students with non-missing i-Ready achievement scores.

Table 6
Impact Analysis of C9 Home Visits on i-Ready mathematics scores (n = 214)

Variable	Estimate	Standard Error	p value	Effect Size
Participation in C9	0.185	2.514	.942	.005
Constant	453.346***	1.705	<.001	

Note: *** p < .001.

Table 7
Impact Analysis of C9 Home Visits on i-Ready reading scores (n = 182)

Variable	Estimate	Standard Error	p value	Effect Size
Participation in C9	1.977	5.638	.726	.03
Constant	528.352***	3.881	<.001	

Note: *** p < .001.

Results of these analyses show that CES C9 students gained essentially the same in mathematics as propensity-matched comparison students. C9 students slightly

outgained propensity-matched comparison students in reading, although the advantage was not statistically significant. The regression estimate can be interpreted as an expected increase in BOY to EOY i-Ready score associated with participation in the CES C9 program, in relation to comparison students. Thus, participation in the C9 program was associated with an approximately 0.2-point increase in i-Ready mathematics gains and a nearly 2-point increase in i-Ready reading score gains. Effect sizes for these analyses were relatively small, ranging from .005 SDs for mathematics scores to .03 SDs for reading scores.

Attendance impacts. We conducted a similar analysis on attendance patterns across years. Since counts of days attended or absent were difficult to interpret because of COVID-related attendance issues (i.e., attendance was not recorded during COVID), we created a variable that measures percentage of enrolled and counted days a student was present for school. Specifically, we divided the number of days a student was present by the total number of days each student was enrolled and attendance was counted. This was done for all students in both conditions, across both years. Results are summarized in Table 8. Note that all students with non-missing attendance data across both years were included in this analysis. Percentage of school days attended in 2018-19 served as the pretest or baseline outcome measure, while percentage of school days attended in 2019-20 was the outcome variable in this analysis.

Table 8
Impact Analysis of participation in C9 on attendance (n = 865)

Variable	Estimate	Standard Error	p value	Effect Size
Participation in C9	0.035**	0.012	.003	.191
Constant	0.854***	0.005	<.001	

Note: *** $p < .001$ ** $p < .01$.

Results of this analysis show a small to moderate statistically significant impact of C9 participation on attendance rates. The regression estimate reveals that CES C9 students averaged 3.5% higher attendance rate increases from 2018-19 to 2019-20 than did comparison students who did not participate in the C9 program. This result builds on the results of descriptive attendance analyses, which yielded preliminary evidence of attendance gaps narrowing between treatment and comparison students.

Subgroup analyses. We conducted subgroup analyses on the main mathematics and reading achievement impact analyses to examine potential differential program impacts. We specifically performed subgroup analyses across grade level, school, and special education status. Full regression results from subgroup analyses can be found in Appendices C and D.

In all, no statistically significant differential effects were found across any subgroups in either mathematics or reading achievement analyses. Directionally, C9 impacts tended to be more positive for 8th grade students across both subjects, while trends across schools and for special education and non-special education students were generally equivocal. It is important to note that, because of the small analytic samples sizes (especially by school and for special education students), some subgroup analyses were somewhat underpowered, so results should be interpreted with caution.

Program participation impacts. We also conducted analyses that examined the impacts of selected C9 home visit contact types on mathematics and reading achievement gains. These analyses were similar to the main achievement impact analyses, with the treatment variable being replaced by one of the C9 participation home visit contact types (e.g., “spoke with student,” “left letter”). We display the results of these analyses in Tables 9 and 10 for mathematics and reading achievement, respectively.

Table 9
Associations between C9 home visit contact types and mathematics achievement gains (n = 214)

Home Visit Contact Type	Estimate	Standard Error	p value
Any contact type	0.035	.270	.897
Spoke with Student	6.104***	1.356	<.001
Spoke with Parent/Guardian	0.225	0.912	.805
Spoke with Family Member	-0.530	1.592	.740
Left Letter	-0.416	0.418	.320

Notes: 1. *** p < .001. 2. The estimate reflects the expected increase resulting from each home visit of a given contact type.

In relation to mathematics achievement gains, home visit contact types that resulted in a PSA speaking to a student were significantly positively associated with i-Ready mathematics scores. Specifically, a home visit when a PSA spoke with a student was associated with a 6-point increase in i-Ready mathematics score. None of the other home visit contact type variables was significantly associated with mathematics achievement. In addition, counts of total contacts of any type were also not significantly associated with mathematics achievement gains.

Table 10
Associations between C9 home visit outcomes and reading achievement gains (n = 182)

Home Visit Contact Type	Estimate	Standard Error	p value
Any contact type	0.228	0.625	.716
Spoke with Student	3.191	3.349	.342
Spoke with Parent/Guardian	-0.166	2.127	.937

Spoke with Family Member	2.846	3.463	.412
Left Letter	-0.235	0.955	.806

Note: The estimate reflects the expected increase resulting from each home visit of a given contact type.

None of the C9 home visit contact types were significantly associated with reading achievement gains. However, in terms of direction and magnitude, the most positive achievement trends were associated with home visits that involved a PSA speaking to a student. Specifically, a home visit resulting in contact with a student was associated with slightly more than a 3-point increase in reading achievement, although this association did not reach statistical significance.

Taken together, the results of these analyses potentially highlight the importance of PSAs making direct contact with students who have been identified as needing the home visit intervention. An important limitation to consider is that only about 7% of total home visits resulted in speaking to a student, and only about 40% of treatment students received a home visit that resulted in a PSA speaking to a student. Thus, there may have been other factors influencing why a student was available to speak directly to a PSA that may have also impacted achievement patterns. A potential aim for future home visit programs may be to increase the percentage of home visits when a PSA speaks to a student in person. Of course, students can be very difficult to access for a variety of reasons, but these analyses show preliminary evidence of the importance of speaking in person to home visit students, given the comparatively more positive impacts of PSAs speaking to students, in relation to other home visit contact types.

Discussion

The purpose of this evaluation was to conduct an efficacy study in Baltimore City Public Schools to compare 2019-20 achievement, attendance, and behavioral data for students in Concentric Educational Solutions' C9 program and comparison students who were not enrolled in the program. Propensity-score matching was used to identify comparison students who were most similar to C9 students. We also included findings related to C9 home visit contact types, as well as analyses examining the associations between C9 home visit contact types and achievement gains in mathematics and reading.

Results from the main achievement impact analyses showed that C9 students slightly outgained comparison students on the i-Ready mathematics and reading assessments from BOY to EOY of the 2019-20 school year. Results were slightly more positive in reading, with C9 students averaging nearly 2-point larger gains than did comparison students. However, neither of the main impact analyses showed statistically significant impacts, and effect sizes ranged from .01 to .03 SDs, indicating small practical effects. Thus, the main impact analyses give equivocal to slightly positive evidence of C9 program impacts on student achievement in the 2019-20 school year. Subgroup analyses did not show any differential C9 impacts by subgroups, although it

must be noted that some of these analyses, especially those relating to schools and special education students, were underpowered, because of sample size limitations.

When examining attendance patterns, results were more encouraging. While C9 students averaged more absent days and lower attendance percentages than did comparison students in both years, gaps between C9 and comparison students closed in the 2019-20 school year. The main attendance impact analysis, which used percentage of enrolled days present as the outcome variable, showed a statistically significant positive impact of the C9 program on attendance rates, with C9 students averaging attendance rate gains 3.5% larger than those of comparison students from the 2018-19 to 2019-20 school years. This result gives evidence of the C9 program helping chronically absent students attend school more regularly, which was one of the main goals of the C9 program.

Associations between home visit contact types and achievement gains were generally nonsignificant. However, one notable significant finding was evidenced, as home visits resulting in a CES PSA speaking with a program student were significantly positively associated with larger mathematics achievement gains. A similar nonsignificant advantage was also found with reading achievement gains. None of the other home visit contact types was significantly associated with achievement gains. Similarly, counts of total PSA contacts were also not significantly associated with achievement gains. The results of these analyses suggest the importance of PSAs making direct contact with the chronically absent students that were assigned to the C9 program. Only 40% of C9 students spoke in person with a PSA, and only about 7% of total contacts resulted in a PSA speaking with a C9 program student. Understandably, chronically absent students are generally difficult to reach directly, and reliable addresses for these students were not always available; however, as the most positive program impacts were evidenced when PSAs spoke to students, the development of strategies that increase the frequency of PSAs speaking to chronically absent students may be helpful in maximizing CES program efficacy across achievement, attendance, and behavioral outcomes. Further, given the potential benefits of these interactions between PSAs and students, it could be helpful to record whether or not a PSA spoke with a student at all on a given visit, even if the primary interaction was with the parent/guardian or another person. More granular tracking of interactions with students at school could also make possible future research on the particular experiences that are most closely related to student outcomes.

In interpreting the results of this evaluation, some important caveats should be considered. First, sample sizes were relatively small in the main achievement analyses, as data were only available for a small number of treatment students across Grades 7 and 8. Specifically, only about 40 to 50 treatment students in each of these grades had non-missing achievement data, while Grade 6 achievement data were so sparse that they could not be used in analysis. Thus, the achievement analyses conducted, though statistically rigorous and controlling for as many potential confounding variables as

possible, were somewhat underpowered. Subsequently, subgroup analyses, especially those relating to school membership and special education status, were also somewhat underpowered. Further, even though propensity score matching was used to identify comparison students who were as similar as possible to treatment students, and were from the same schools as C9 participants, it is likely that treatment students differed considerably from comparison students, even though baseline equivalence on achievement and demographic variables was met. These unobservable differences may have affected patterns of achievement score gains observed in this evaluation. In addition, all analyses contained in this evaluation were correlational in nature. Thus, causal inferences cannot be drawn from the results of this evaluation.

Conclusions

The key results and conclusions of this evaluation are as follows:

- C9 students slightly outgained comparison students on the i-Ready mathematics and reading achievement assessments. Neither of these associations was statistically significant.
- While C9 students were absent from school more often than comparison students, C9 students showed significantly greater attendance gains from the 2018-19 school year to the 2019-20 school year.
- The most common home visit contact type was a PSA leaving a letter. PSAs spoke with a student in about 7% of total contacts, reaching 40% of students in the C9 sample in at least one visit. PSAs averaged slightly more than eight total contacts per C9 student.
- Home visits in which a PSA spoke with a student were significantly and positively associated with mathematics achievement gains, in relation to comparison students.
- Subgroup analyses did not find any differential effects across schools, grade levels, and other student subgroups of interest.

Appendix A: Baseline Equivalence Tables

Table A1

Unadjusted baseline equivalence, i-Ready Math Analyses

	Overall Mean	Treatment Mean (SD)	Comparison Mean (SD)	Adjusted T v C Difference	Pooled Unadjusted SD	Stan. Mean Diff.
Grade 7	449.49	447.02 (31.89)	449.97 (39.04)	-2.95	37.99	-0.08
Grade 8	455.68	452.62 (39.04)	456.61 (40.96)	-3.99	40.52	-0.10
All students	452.41	450.16 (36.02)	452.96 (40.01)	-2.80	39.26	-0.07

Table A2

Unadjusted baseline equivalence, i-Ready Reading Analyses

	Overall Mean	Treatment Mean (SD)	Comparison Mean (SD)	Adjusted T v C Difference	Pooled Unadjusted SD	Stan. Mean Diff.
Grade 7	521.16	514.80 (67.42)	522.98 (67.20)	-8.18	67.25	-0.12
Grade 8	539.96	540.87 (67.39)	535.68 (81.17)	5.19	78.02	0.07
All students	528.56	527.69 (68.30)	528.82 (74.09)	-1.13	72.78	-0.02

Table A3

Baseline equivalence after PSM, i-Ready Math Analyses

	Overall Mean	Treatment Mean (SD)	Comparison Mean (SD)	Adjusted T v C Difference	Pooled Unadjusted SD	Stan. Mean Diff.
Grade 7	446.09	447.02 (31.89)	445.24 (34.96)	1.78	33.52	0.05
Grade 8	454.74	452.62 (39.04)	450.80 (39.14)	1.81	39.08	0.05
All students	449.15	450.16 (36.02)	448.15 (37.14)	2.01	36.58	0.05

Table A4
Baseline equivalence after PSM, i-Ready Reading Analyses

	Overall Mean	Treatment Mean (SD)	Comparison Mean (SD)	Adjusted T v C Difference	Pooled Unadjusted SD	Stan. Mean Diff.
Grade 7	515.06	514.80 (67.42)	515.32 (74.05)	-0.51	70.74	-0.01
Grade 8	540.73	540.87 (67.39)	540.60 (75.61)	0.27	71.71	0.003
All students	528.03	527.69 (68.30)	528.37 (75.52)	-0.68	72.00	-0.01

Appendix B: Descriptive Achievement Analyses

Table B1

Average i-Ready mathematics scores, by grade, 2019-20 school year

Condition	BOY	EOY	Change
Grade 7			
CES C9 ($n = 47$)	447.02	450.53	3.51
Matched Comparison ($n = 51$)	445.24	451.51	6.27
All Comparison ($n = 242$)	449.97	456.38	6.41
Grade 8			
CES C9 ($n = 60$)	452.62	460.00	7.38
Matched Comparison ($n = 56$)	450.80	455.02	4.22
All Comparison ($n = 198$)	456.61	459.77	3.16

Table B2

Average i-Ready reading scores, by grade, 2019-20 school year

Condition	BOY	EOY	Change
Grade 7			
CES C9 ($n = 46$)	514.80	523.04	8.24
Matched Comparison ($n = 44$)	515.32	517.68	2.36
All Comparison ($n = 161$)	522.98	524.96	1.98
Grade 8			
CES C9 ($n = 45$)	540.87	541.31	0.44
Matched Comparison ($n = 47$)	540.60	534.96	-5.64
All Comparison ($n = 137$)	535.68	531.22	-3.46

Appendix C: Mathematics Subgroup Analyses

Table C1
i-Ready mathematics regression results with SPED interaction

	Estimate	Standard Error	<i>p</i> value
CES	-0.554	2.889	.848
CES*SPED	2.724	5.224	.603
SPED	-10.444*	4.208	.014
Constant	454.501***	1.709	<.001

Note. * *p* < .05; *** *p* < .001.

Table C2
i-Ready mathematics regression results with Grade-level interaction

	Estimate	Standard Error	<i>p</i> value
CES (Grade 8)	2.234	3.327	.503
CES*Grade 7	-4.728	5.025	.348
Grade 7	0.402	3.356	.905
Constant	454.515***	1.706	<.001

Note. *** *p* < .001.

Table C3
i-Ready Mathematics regression results with school-level interactions

	Estimate	Standard Error	<i>p</i> value
CES (School 5)	4.138	14.381	.774
CES*School 1	-0.639	15.242	.967
CES*School 2	-5.817	15.292	.704
CES*School 4	-1.670	15.073	.912
CES*School 6	-11.378	15.793	.472

Note. School 3 contained only one observation and was thus not included in these analyses.

Appendix D: Reading Subgroup Analyses

Table D1

i-Ready reading regression results with SPED interaction

	Estimate	Standard Error	<i>p</i> value
CES	-0.495	8.650	.954
CES*SPED	-4.908	18.343	.790
SPED	-24.618	17.929	.173
Constant	530.664***	6.636	<.001

Note. *** *p* < .001.

Table D2

i-Ready reading regression results with Grade-level interaction

	Estimate	Standard Error	<i>p</i> value
CES (Grade 8)	3.519	8.008	.661
CES*Grade 7	-3.167	11.648	.786
Grade 7	1.593	7.858	.840
Constant	528.382***	3.893	<.001

Note. *** *p* < .001.

Table D3

i-Ready reading regression results with school-level interactions

	Estimate	Standard Error	<i>p</i> value
CES (School 6)	-46.558	39.186	.237
CES*School 1	49.290	40.029	.220
CES*School 2	50.208	40.767	.220
CES*School 4	48.686	41.004	.237
CES*School 5	53.817	54.898	.328

Note. School 3 contained only one observation and was thus not included in these analyses.