MONTGOMERY
COUNTY PUBLIC
SCHOOLS

Evaluation of the 2017
Building Educated Leaders for Life (BELL) Summer
Learning Program in
Montgomery County Public Schools

Office of Shared Accountability

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Montgomery County Public Schools

OFFICE OF SHARED ACCOUNTABILITY

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Purpose of Study

The Building Educated Leaders for Life (BELL) summer learning program was held for the second year in Montgomery County Public Schools during summer 2017. The target population for BELL was rising third, fourth, and fifth graders who were enrolled at Title I schools and showed academic need. Program goals for students include increases in their literacy and math skills.

This evaluation examined the impact of the BELL program by comparing MAP-R and MAP-M scores of attendees (935 students who attended 19 days or more of the 25 day BELL program) to non-attendees (a random sample of 935 students who were invited to BELL but did not attend). To evaluate the impact of attending the BELL program for two summers, scores of double attendees (247 students who attended 19 days or more at both BELL 2016 and BELL 2017) were compared to non-attendees (a random sample of 247 students who did not attend any days of BELL 2016 or of BELL 2017 but were invited to both). Multiple regression analyses were used to test for significant relationships (statistically, practically, or both) between BELL attendance and student scores.

What was the impact of the BELL program on student mathematics skills? Did the impact vary by subgroups?

Evidence for a positive impact of the BELL program on math skills was very strong for Grade 4 but less so for Grades 3 and 5

- Grade 3. Significant for Black or African American students and special education recipients.
- Grade 4. Significant for all students and all subgroups: Black or African American, Hispanic/Latino, ESOL recipients, FARMS recipients, and special education recipients.
- Grade 5. Significant for all attendees and special education recipients.
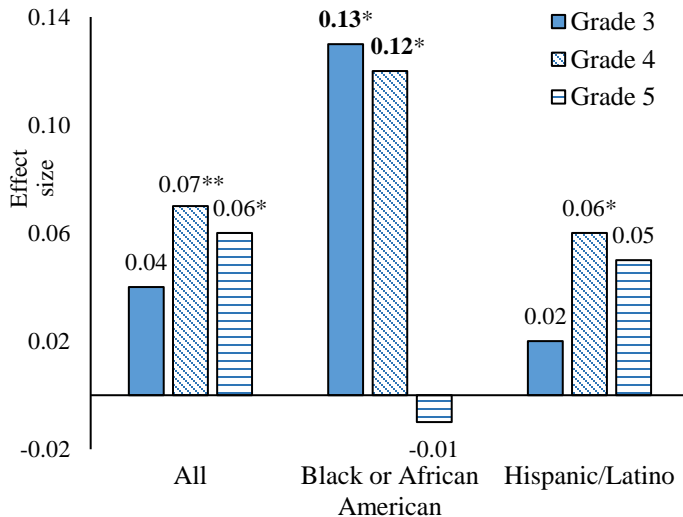

Figure I. Effect size of fall MAP-M scores for BELL attendance in 2017 by grade level, for all students and by race/ethnicity.
Note. **Bold** indicates a practically significant difference.
$*p < .05, **p < .01, ***p < .001$.

What was the impact of the BELL program on student reading skills? Did the impact vary by subgroups?

Evidence for a positive impact of the BELL program on reading skills was very limited.

- Grade 3. No evidence
- Grade 4. Significant only for Black or African American students and special education recipients
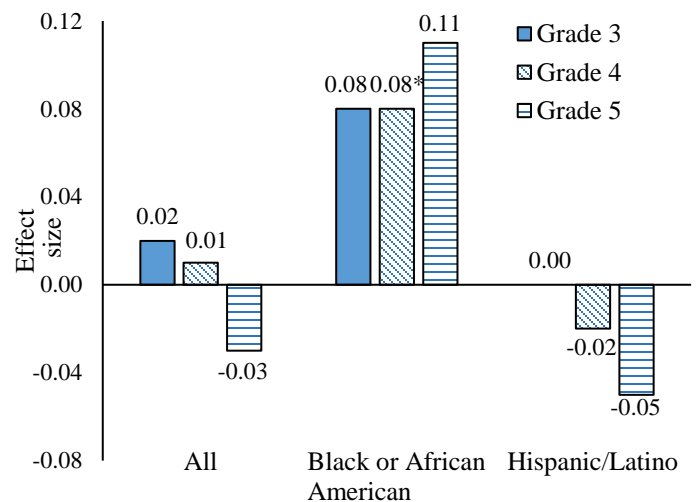- Grade 5. No evidence

Figure II. Effect size of fall MAP-R scores for BELL attendance in 2017 by grade level, for all students and by race/ethnicity.
Note. **Bold** indicates a practically significant difference.
$*p < .05, **p < .01, ***p < .001$.

What was the impact of the BELL program on student skills for students who attended BELL in both 2016 and 2017?

Evidence for a positive impact of double attendance at the BELL program was much stronger for math than reading skills.

- Significant in math among all students, FARMS recipients, and special education recipients in both Grades 4 and 5; Black or African American students in Grade 4; Hispanic/Latino students in Grade 5; and ESOL recipients in Grade 5.
- Significant in reading only for Black or African American students in Grade 4 and special education recipients in Grades 4 and 5.

Full report available at: http://www.montgomeryschoolsmd.org/departments/sharedaccountability/reports/

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Executive Summary

At the request of the Office of Curriculum and Instructional Programs, the Office of Shared Accountability evaluated the Building Educated Leaders for Life (BELL) summer learning program held in Montgomery County Public Schools (MCPS) during summer 2017. The target population for BELL was rising third, fourth, and fifth graders who were enrolled at Title I schools and showed academic need. The evaluation examined the BELL program's impact on students' mathematics and reading achievement and whether that impact varied with different student subgroups.

Summary of Methodology

To evaluate the impact of the BELL program on student achievement, this study used multiple regression analyses that included both attendees and non-attendees and controlled for students' characteristics, including their initial abilities. The attendees were 935 students in Grades 3, 4, or 5 who attended 19 days or more of the BELL program (out of 25 days) and had Measures of Academic Progress test results from before and after the BELL program in reading or mathematics or both. One fifth of these students were Black or African American. Seven out of 10 attendees were Hispanic/Latino and almost two thirds of attendees received English for Speakers of Other Languages (ESOL) services. More than 85% received Free and Reduced-price Meals System (FARMS) services and about one sixth received special education services. The comparison group of non-attendees was a random sample of 935 students who were invited to BELL but did not attend.

To evaluate the impact of the BELL program on students who attended for two summers, the double attendees were 247 students who had high attendance (i.e., 19 days or more) at both BELL 2016 and BELL 2017. The non-attendees were a random sample of 247 students who did not attend any days of BELL 2016 or of BELL 2017 but were invited to both.

Summary of Results

   Impact of the BELL program on student mathematics skills. The evidence for a positive impact of the BELL program on mathematics skills was very strong for Grade 4, but less so for Grades 3 and 5. For Grade 4, there was a significant relationship (statistically, practically, or both) between attendance and mathematics scores among all students and each tested subgroup: Black or African American, Hispanic/Latino, ESOL recipients, FARMS recipients, and special education recipients. However, the significant relationships for attendance at BELL were limited for Grade 3 to Black or African American students and special education recipients and for Grade 5 to all attendees and special education recipients.

   Impact of the BELL program on student reading skills. The evidence for a positive impact of the BELL program on reading skills was very limited and included only two subgroups in one grade level. In Grade 4, the relationship between attendance in the program and reading skills was significant among Black or African American students and special education recipients.

Impact of the BELL program in 2017 vs. 2016. For students in Grade 3, the positive impact of the BELL program on mathematics and on reading, as indicated by effect sizes, was larger in 2017 than in 2016 for two smaller subgroups: Black or African American students and special education recipients. However, for both subject areas, the effect sizes were smaller in 2017 than in 2016 for all students and the three largest subgroups: Hispanic/Latino students, ESOL recipients, and FARMS recipients.

For Grade 4, the positive impact of the BELL program on mathematics, as indicated by effect sizes, was the same or larger in 2017 than in the previous summer among all students and all subgroups. Also, the effect sizes for reading in 2017 were larger than in 2016 for two smaller subgroups of fourth graders: Black or African American students and special education. However, for all students and for the remaining subgroups, there was no evidence of an impact on Grade 4 reading scores for either the 2017 or the 2016 BELL program.

Impact of the BELL program for double attendees. There was evidence for a positive impact on mathematics skills of double attendance (i.e., 2017 and 2016) at the BELL program for both fourth graders and fifth graders, among all students, FARMS recipients, and special education recipients. Further, there was a significant relationship (statistically, practically, or both) between attendance for two summers and mathematics scores among Black or African American fourth graders, Hispanic/Latino fifth graders, and ESOL recipients in Grade 5. However, the evidence for a positive impact of double attendance on reading skills was very limited; it included Black or African American students in Grade 4 and special education recipients in Grades 4 and 5.

Conclusion

Based on all the findings, there was evidence of a positive impact of attendance at the BELL program 2017 on students' performance in mathematics, especially for Grade 4 attendees and both fourth graders and fifth graders who attended the BELL program for two summers. However, there was very little evidence of a positive impact on students' performance in reading in any grade, including students who attended BELL in both 2017 and 2016. The exceptions were two groups of Grade 4 students: Black and African American and recipients of special education services.

Evaluation of the 2017 Building Educated Leaders for Life (BELL) Summer Learning Program in Montgomery County Public Schools

The Office of Curriculum and Instructional Programs in Montgomery County Public Schools (MCPS) asked the Office of Shared Accountability (OSA) to conduct an evaluation of the BELL (Building Educated Leaders for Life) Summer Learning Program in MCPS, offered during the summer of 2017. The BELL program provided expanded learning opportunities for students in Title I schools who were performing below benchmarks in reading and mathematics; the program aimed to improve students' academic success, self-confidence, and social skills. The purpose of this evaluation was to assess changes in the academic achievement of the students enrolled in the program.

Background

During the summer, there is a tendency for students, especially those from low-income families, to lose achievement gains made during the school year. One response to preventing summer learning loss is a summer learning program. For the summer of 2017, as in summer 2016, MCPS collaborated with the Montgomery County Council, the Norman R. and Ruth Rales Foundation, the BELL organization, and the Montgomery County Department of Health and Human Services (MCDHHS) to offer a summer learning program (Montgomery County Council Presentation, 2016; Lang, 2017).

BELL is a national organization that provides extended learning opportunities after school and during the summer; it grew out of a community service project at Harvard Law School and has served more than 100,000 students nationwide since 1992 (BELL, 2016). The BELL Summer Learning Program is designed to achieve the following goals:

- Students will increase their literacy and math skills.
- Students will strengthen their self-confidence.
- Students will improve their social skills.
- Parents/guardians will become more engaged in their children's education.

To accomplish its goals, the BELL Summer Learning Program provides a summer academic and enrichment program to eligible students who are from Title I schools and show academic need. If successful in preventing summer learning loss, the program should narrow the achievement gap and help students transition from grade to grade successfully.

BELL Program at MCPS

The BELL program in MCPS was designed to offer both rigorous instruction and engaging activities. The academic component of BELL (i.e., language arts and mathematics programming) was scheduled for Monday through Thursday mornings for the length of the program. BELL partnered with Scholastic to develop a customized curriculum for the five-week program. BELL also provided, for both language arts and mathematics, professional development and instructional materials including activities, teacher's guides, and resources. To support data-driven instruction and to measure student progress, BELL administered STAR assessments in reading and

mathematics to each student (Renaissance Learning, 2014) during the first week and again in the last week of the program.

Enrichment learning was scheduled for each afternoon, Monday through Thursday, in areas such as STEM (science, technology, engineering, and math), physical activity, healthy living, character education, and creative arts. These experiential and project-based learning opportunities supported academic learning, as well as social and emotional learning. One day per week (usually Friday) the schedule included non-classroom activities that were designed to expand student learning, such as hands-on enrichment opportunities, field trips, and community service projects (BELL & MCPS, 2016).

Breakfast and lunch were offered each day, along with transportation to and from the program sites. The program operated 6.5 hours per day, five days a week, for five weeks in the summer, July 10 through August, 2017.

Participating Schools, Students, and Staff

The BELL program was located at eight MCPS elementary school sites in the summer of 2017 (see list in Appendix A). The eight sites were strategically chosen from among the 25 Title I elementary schools in MCPS to be the most accessible to students in all Title I schools.

Summer 2017 was the second year that MCPS offered the BELL program. It expanded to include rising fifth graders, along with rising third and fourth graders. The target population for the program was students who were enrolled in Title I schools and showed academic need (Lang, 2017). Eligible students were identified as follows. Rising third graders had at least one of the following criteria: Marking Period 2 Instructional Reading Level on their report card was below the expected grade level target, their Measures of Academic Progress-Primary (MAP-P) assessment was below the fall Rasch Unit (RIT) target, their MAP-P assessment was below the winter RIT target. Eligible rising fourth or fifth graders had Measures of Academic Progress-Mathematics (MAP-M) or Measures of Academic Progress-Reading (MAP-R) below the fall or winter RIT targets.

More than 4,000 eligible students were identified and their parents/guardians were sent a description of the BELL program and an application. Invitations went to all eligible students from all Title I schools. The program had capacity for 1,050 students and enrolled students on a first come, first served basis. There were more than 500 students on a waiting list to participate in the summer 2017 program.

Staff at each BELL site included a program manager, program assistant, instructional coach, and a team of teachers for each classroom. Teaching teams comprised an academic teacher for the morning, an enrichment teacher for the afternoon, and a teaching assistant for the full day. Also, each site had access to the services of an English Language Learners (ELL) coach. There were three ELL coaches (increased from two in summer 2016) who served the eight BELL sites. Also, there was a new director of programing opportunities for English-language learners. BELL administered hiring of all staff, many of them MCPS employees.

Further, BELL provided training for staff before the start of the program. Management teams from each site—comprising the program manager, instructional coach, and program assistant—had training sessions for five full days after the end of the school year and prior to the start of the BELL program. BELL provided two full-day training sessions for teachers and teaching assistants. The full-day training sessions were at the BELL sites.

Funding and Administration

There were three sources of funding for the 2017 BELL program in MCPS: a special appropriation approved by the Montgomery County Council, a public-private partnership with the Norman R. and Ruth Rales Foundation, which provided funds for the program, and funds that MCPS received to support Title I schools. Planning and implementation of the 2017 summer program was a collaboration among MCPS and BELL; MCDHHS helped with providing nursing staff to each site.

2016 BELL Program

MCPS offered the BELL program for the first time in 2016. The MCPS evaluation of that program (Cooper-Martin & Wade, 2017) made the following recommendations:[1]

- Continue the BELL program, given its positive impact on students' performance in Grade 3 mathematics, Grade 4 mathematics, and Grade 3 reading for all students, along with three subgroups: Hispanic/Latino, recipients of English for Speakers of Other Languages (ESOL) services, and recipients of Free and Reduced-price Meals System (FARMS).
- Examine how to improve the program so it has a stronger impact on Black or African American students.
- Work with BELL to maximize the value of its training for staff through the following:
    - Ensure that all materials are in hand at the start of the training.
    - Provide more time on site before the start of the program, so that program staff can work with the teachers.
    - Provide more training time to cover all the information provided.
- Improve coordination and communication between MCPS and BELL to achieve the following by the start of the program:
    - Ensure that curriculum materials match the mathematics and reading levels of all attendees.
    - Provide student information such as needs for ESOL or special education services.
    - Provide clear information on bus schedules and bus stops to site staff and parents.
- Consider providing extra support with the following:
    - Add a specialist who can support the instruction of students with disabilities.
    - Provide technology support when BELL staff set up their equipment.
- Revisit the schedule for providing a nurse or health technician to each site on every day that students are onsite.

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[1]See Cooper-Martin & Wade, 2017 for reviews of selected literature on summer learning loss and other evaluations of the BELL program outside of MCPS.

Upgrades to the BELL 2017 program addressed several of the above recommendations, as follows. BELL ensured that all materials were in hand at the start of staff training. They changed the kick-off structure, so that all staff (including teachers) had a two-hour meeting (an increase from 2016) prior to the start of the program. Improved coordination and communication between MCPS and BELL helped in several ways. As students registered, MCPS staff checked their reading and mathematics levels and communicated this information to BELL to ensure the students would have appropriate materials at the summer program. Teachers had information on whether students had received ESOL or special education services during the prior school year. Registration for 2017 started earlier than the previous year and allowed more time to share bus schedules with staff and parents prior to the beginning of the program. There was a health technician at each site on every day that students were onsite. Additionally, BELL hired and paid for a private-duty nurse to accompany certain students with health needs on field trips.

Evaluation Scope and Questions

The purpose of this study was to assess gains in the academic achievement of the students enrolled in the 2017 BELL program by addressing the following questions.

1. What was the impact of the BELL program on student mathematics skills? Did the mathematics impact of the program vary by student subgroups?
2. What was the impact of the BELL program on student reading skills? Did the reading impact of the program vary by student subgroups?
3. How does the impact of the BELL 2017 program on student skills in mathematics or reading compare to the impact of the BELL 2016 program?
4. What was the impact of the BELL program on student skills in mathematics or reading for students who attended both the BELL 2016 and the BELL 2017 program?

Methodology

Evaluation Design

The design to examine the outcomes of the BELL program was a quasi-experimental one (Shadish, Cook & Campbell, 2002) as shown in Figure 1. Reading and mathematics performance of two groups, students attending the BELL program and students in a comparison group, were compared. The emphasis in this design was on maximizing internal validity of the study by controlling for confounding variables.

Figure 1
Design of the BELL program evaluation of outcomes

	Pre-program	BELL			Post-program
BELL student group	O_1	=>	X	=>	O_2
Comparison group (Non-BELL)	O_1	=>	C	=>	O_2

O_1 – Spring 2017 local assessment results for Grades 2, 3, and 4 in mathematics and reading
X – Five weeks of BELL program treatment from July 10 through August 11, 2017
C – Non-BELL (no BELL treatment)
O_2 – Fall 2017 local assessment results for Grades 3, 4, and 5 in mathematics and reading

To improve the internal validity of the findings, this evaluation used two control techniques: control by study design and control by statistical techniques. To control by study design, a comparison group of nonparticipating students at Title I schools was identified and included in the analyses. Further, advanced statistical analyses that controlled for the initial abilities of both participants and nonparticipants were used. More details on both methods of controls follow.

Measures and Data Sources

Local assessments. Measures of Academic Progress (MAP) are integrated collections of computerized assessments (Northwest Education Association, 2008 and 2011). These tests include multiple-choice items and a variety of other item types and are designed to provide educators with instructional information about what students are ready to learn. Scores on MAP tests are reported

on the Rasch Unit (RIT) scale. The equal-interval property of the RIT scale scores makes them especially appropriate for various statistical purposes, including measuring change over time.

RIT scores from the fall 2017 administration of the Measures of Academic Progress-Reading (MAP-R) were the outcome measure in reading for all students. For the rising Grade 4 and Grade 5 students, spring 2017 MAP-R scores were the pre-program measure. For the rising Grade 3 students, the pre-program measures were reading levels from the spring 2017 Assessment Program in Primary Reading (MCPS AP-PR) because Grade 2 students in MCPS do not take MAP-R. This pre-program measure is appropriate because it is highly correlated with the post-program measure.

RIT scores from the fall 2017 administration of the Measures of Academic Progress-Mathematics (MAP-M) were the outcome measure in mathematics for all students. For the rising Grade 4 and Grade 5 students, RIT scores from the spring 2017 MAP-M were the pre-program measures. For the rising Grade 3 students, the pre-program measures in mathematics were RIT scores in mathematics from the spring 2017 administration of Measures of Academic Progress-Primary Grades (MAP-P), because Grade 2 students in MCPS do not take MAP-M.

      Student data. MCPS student-level records provided data on local assessments and demographics, including gender, racial/ethnic group, and receipt of ESOL services, FARMS services, or special education services, for students in the BELL program and students in the comparison group. Student attendance at the summer program was recorded daily by staff at each BELL program site; the BELL program provided student-level attendance data to MCPS.

Sample

There were two groups of students for the evaluation. The sample of BELL participants was all students who met the attendance threshold, defined as attending BELL in summer 2017 for 19 or more days (out of 25 days), and had both a pre-program measure and a post-program measure in reading or mathematics or both. The total number of attendees was 935.

The second group of students was non-attendees defined as students who were invited to attend BELL in summer 2017, did not attend any days of the program, and had both a pre-program measure and a post-program measure in reading or mathematics or both. This group comprised 3,058 students. Because it was three times larger than the attendee group, a random sample was selected such that the number of non-attendees in each grade level (i.e., Grades 3, 4, and 5) was the same as the number of attendees.

Table 1.0 presents the demographic characteristics of both samples of 935 students. Among attendees, there were slightly more girls than boys. Seven out of 10 were Hispanic/Latino and one fifth were Black or African American. Almost two thirds of attendees received ESOL services. Not surprisingly, because BELL served students in Title I schools, more than 85% of attendees qualified for FARMS services. Lastly, about one sixth received special education services.

Table 1.0
Characteristics of Study Samples for the 2017 BELL Program

	Attendees[a]		Non-attendees[b]	
	N	*%*	*N*	*%*
Total	935	100.0	935	100.0
Grade level as of fall 2017				
Grade 3	329	35.2	329	35.2
Grade 4	374	40.0	374	40.0
Grade 5	232	24.8	232	24.8
Gender				
Female	479	51.2	452	48.3
Male	456	48.8	483	51.7
Race/ethnicity				
American Indian	≤ 5	≤ 1.0	≤ 5	≤ 1.0
Asian	34	3.6	33	3.6
Black or African American	196	21.0	203	21.7
Hispanic/Latino	671	71.8	655	70.1
White	19	2.0	29	3.1
Pacific Islander	≤ 5	≤ 1.0	0	0.0
Two or More Races	13	1.4	13	1.4
Receipt of services during school year 2016–2017				
ESOL	589	63.0	553	59.1
FARMS	810	86.6	797	85.2
Special education	157	16.8	147	15.7

[a]Limited to students who attended BELL for 19 or more days and had MAP scores from fall & spring 2017.
[b]Limited to a random sample of students invited to BELL who did not attend and had MAP scores from fall & spring 2017.

The sample of non-attendees was similar to the attendees, although there were more girls among attendees (51%) than non-attendees (48%). Also, the frequency of ESOL recipients was higher among attendees than (63%) non-attendees (59%).

Analytical Procedures

The analyses included both statistical significance tests and effect sizes. Multiple regression analyses were used to evaluate the impact of the BELL program while controlling for differences in demographic characteristics (i.e., gender, racial/ethnic group, receipt of ESOL, receipt of FARMS, receipt of special education services) and initial (pre-program) achievement level. Effect sizes were calculated to judge whether the observed relationship between attendance at BELL attendees was large enough to be of practical significance to educators (American Psychological Association, 2010). For the multiple regression analyses, standardized regression coefficients (β values) were used as the effect size measure (Kline, 2005). To interpret the magnitude of β values, the following guidelines from Cohen (1988) were used: .10, .30, and .50 which correspond to small, medium, and large effect sizes, respectively.

However, if the number of students in a subgroup was too small (i.e., < 100) for regression analysis, t-tests were used for statistical tests. Unlike regression, t-tests cannot control for differences between students. Cohen's *d* was used for the effect size measure with the small subgroups and interpreted with the following guidelines about the magnitude of *d*: .20, .50, and .80 corresponding to small, medium, and large effect sizes, respectively.

Results

Findings for Question 1: Mathematics
What was the impact of the BELL program on student mathematics skills? Did the mathematics impact of the program vary by student subgroups?

All Students

In all three grade levels, BELL attendees as a group had higher mean scale scores on the test of math achievement (MAP-M) in fall 2017 after the BELL program, than the comparison students (Table 1.1).

Table 1.1
Mean and Standard Deviation of MAP-M Scale Scores by
Grade Level and Attendance at BELL

	Attendees			Non-attendees		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Grade 3	322	180.1	10.2	323	178.4	10.5
Grade 4	372	192.2	9.5	369	190.6	10.9
Grade 5	230	201.7	11.5	228	200.8	12.8

The regression analysis confirmed the positive relationship between BELL attendance and mathematics skills for two grades. The relationship was statistically significant for both Grade 4 ($\beta = .07$, $p < .01$) and Grade 5 ($\beta = .06$, $p < .05$) (Table 1.2). None of the relationships was practically significant ($\beta < .10$) in an educational setting.

Table 1.2
Relationship between BELL Attendance and MAP-M Scale Scores by Grade Level

	Attendance at BELL: B *(SE)*	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 ($N = 625$)	0.81 (.54)	0.04	227.8 (3, 625)	0.52
Grade 4 ($N = 722$)	1.32 (.44)	0.07**	245.7 (5, 717)	0.63
Grade 5 ($N = 447$)	1.32 (.59)	0.06*	340.5 (3, 444)	0.70

$*p < .05, **p < .01, ***p < .001.$

Subgroups

   Black or African American students. Among Black or African American students, BELL attendees in both Grades 3 and 4 had a higher mean scale score on the MAP-M in the fall after the BELL program, than the comparison students (Table 1.3). For Grade 5, the mean MAP-M scale score was the same between the two groups.

Table 1.3
Mean and Standard Deviation of MAP-M Scale Scores for Black or
African American Students by Grade Level and Attendance at BELL

	Attendees			Non-attendees		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Grade 3	61	179.7	11.0	67	177.3	12.1
Grade 4	81	192.2	9.9	89	189.0	12.1
Grade 5	53	201.3	12.5	45	201.2	13.4

Regression analysis confirmed the positive relationship between BELL attendance and mathematics skills for Black or African American students in two grades (Table 1.4). The relationship was statistically significant for Grade 3 (β = .13, p < .05) and Grade 4 (β = .12, p < .05). The relationship also was practically significant with a small effect size (β >.10) for both grades, meaning that the difference between attendees and non-attendees, although small, was large enough to be useful to educators.

Table 1.4
The Relationship between BELL Attendance and MAP-M Scale Scores for
Black or African American Students by Grade Level

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 (N = 123)	2.68 (1.33)	0.13*	61.3 (2, 121)	0.50
Grade 4 (N = 159)	2.28 (1.00)	0.12*	69.4 (3, 156)	0.56
Grade 5 (N = 98)	na	na	na	na

*p < .05, **p < .01, ***p < .001.

Because there were fewer than 100 Black or African American Grade 5 students, the analysis consisted of a t-test instead of a regression. Based on this test, there was no significant difference in scores between attendees and non-attendees for Grade 5 (t(96) = -.05, p > .05); d = 0.01.

Hispanic/Latino. Among Hispanic/Latino students, BELL attendees in all three grade levels had a higher mean scale score on the MAP-M in the fall after the BELL program, than the comparison students (Table 1.5).

Table 1.5
Mean and Standard Deviation of MAP-M Scale Scores for
Hispanic/Latino Students by Grade Level and Attendance at BELL

	Attendees			Non-attendees		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Grade 3	236	179.9	9.9	231	178.3	10.1
Grade 4	268	191.9	9.3	243	190.7	10.3
Grade 5	159	201.3	11.2	169	200.8	12.6

Regression analysis confirmed a positive relationship between BELL attendance and mathematics skills for Hispanic/Latino students only for Grade 4; the relationship was statistically significant for this grade ($\beta = .06$, $p < .05$) (Table 1.6). None of the relationships was practically significant ($\beta < .10$).

Table 1.6
The Relationship between BELL Attendance and MAP-M Scale Scores for
Hispanic/Latino Students by Grade Level

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 ($N = 457$)	0.39 (0.64)	0.02	108.2 (4, 453)	0.48
Grade 4 ($N = 500$)	1.08 (0.52)	0.06*	171.6 (5, 495)	0.63
Grade 5 ($N = 322$)	1.08 (0.71)	0.05	229.5 (3, 319)	0.68

*$p < .05$, **$p < .01$, ***$p < .001$.

ESOL recipients. Among students who received ESOL services prior to the summer, BELL attendees in all grade levels had a higher mean scale score on the MAP-M in the fall after the BELL program, than the comparison students (Table 1.7).

Table 1.7
Mean and Standard Deviation of MAP-M Scale Scores for
ESOL Recipients by Grade Level and Attendance at BELL

	Attendees			Non-attendees		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Grade 3	226	179.5	9.8	235	177.9	10.0
Grade 4	249	191.3	9.2	213	188.8	11.2
Grade 5	107	197.6	10.7	95	196.6	13.7

Regression analysis confirmed the positive relationship between BELL attendance and mathematics skills for ESOL recipients in only one grade (Table 1.8). The relationship was statistically significant for Grade 4 ($\beta = .07$, $p < .01$) but not practically significant ($\beta < .10$), meaning that the difference in scores between attendees and non-attendees was not large enough to be useful to educators.

Table 1.8
The Relationship between BELL Attendance and MAP-M Scale Scores for
ESOL Recipients by Grade Level

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 ($N = 453$)	0.68 (0.66)	0.04	105.3 (4, 449)	0.48
Grade 4 ($N = 450$)	1.45 (0.54)	0.07**	222.3 (4, 446)	0.66
Grade 5 ($N = 198$)	1.35 (0.90)	0.06	166.1 (3, 195)	0.71

*$p < .05$, **$p < .01$, ***$p < .001$.

FARMS recipients. Among students who received FARMS services prior to the summer, BELL attendees in all grade levels had a higher mean scale score on the MAP-M in the fall after the BELL program, than the comparison students (Table 1.9).

Table 1.9
Mean and Standard Deviation of MAP-M Scale Scores for
FARMS Recipients by Grade Level and Attendance at BELL

	Attendees			Non-attendees		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Grade 3	274	179.8	10.1	278	177.9	10.5
Grade 4	327	191.9	9.6	305	190.3	10.8
Grade 5	199	201.4	11.9	203	200.9	12.8

Regression analysis confirmed the positive relationship between BELL attendance and mathematics skills for ESOL recipients in only one grade (Table 1.10). The relationship was statistically significant for Grade 4 ($\beta = .06$, $p < .01$) but not practically significant ($\beta < .10$), meaning that the difference in scores between attendees and non-attendees was not large enough to be useful to educators.

Table 1.10
The Relationship between BELL Attendance and MAP-M Scale Scores for
FARMS Recipients by Grade Level

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 ($N = 673$)	0.63 (.57)	0.03	196.6 (3, 670)	0.47
Grade 4 ($N = 808$)	1.26 (.45)	0.06**	360.6 (4, 804)	0.64
Grade 5 ($N = 790$)	0.97 (.55)	0.04	383.9 (4, 786)	0.66

*$p < .05$, **$p < .01$, ***$p < .001$.

Special education recipients. Among students who received special education services prior to the summer, BELL attendees in both Grades 3 and 4 had a higher mean scale score on the MAP-M in the fall after the BELL program, than the comparison students (Table 1.11). The scores were almost identical for Grade 5 attendees and non-attendees, among special education recipients.

Table 1.11
Mean and Standard Deviation of MAP-M Scale Scores for Special
Education Recipients by Grade Level and Attendance at BELL

	Attendees			Non-attendees		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Grade 3	56	176.4	11.2	43	172.3	13.7
Grade 4*	55	187.1	10.2	52	181.4	13.0
Grade 5	45	192.6	9.7	48	192.9	15.8

*$p < .05$, **$p < .01$, ***$p < .001$.

Because there were fewer than 100 special education recipients in the Grade 3 and 5 samples, and only 107 in the Grade 4 sample, the analysis of this subgroup used t-tests instead of a regression. Based on this test, there was a statistically significant difference in scores between attendees and non-attendees for Grade 4 (t(105) = 2.55, $p < .05$). Further, this difference was practically significant ($d = 0.49$), with a small effect size ($d > 0.20$). Also, the differences between BELL attendees and the comparison group were practically significant with a small effect size for the other two grades: Grade 3 (t(97) = 1.65, $p > .05$; $d = 0.34$) or for Grade 5 (t(91) = 0.10, $p > .05$; $d = 0.21$). However, these differences were not statistically significant.

Summary. The evidence for a positive impact of the BELL program on mathematics skills was very strong for Grade 4 but less so for Grades 3 and 5 (Figures 2 and 3). For fourth graders, there was a significant relationship (statistically, practically, or both) between attendance at BELL and math scores in the fall among all students and among each tested subgroup. However, the significant evidence was limited for Grade 3 to Black or African American attendees (statistically and practically) and special education recipients (practically) and for Grade 5 to the group of all attendees (statistically) and special education recipients (practically).

Figure 2

Effect size of fall MAP-M scores for BELL attendance in 2017 by grade level, for all students and by race/ethnicity
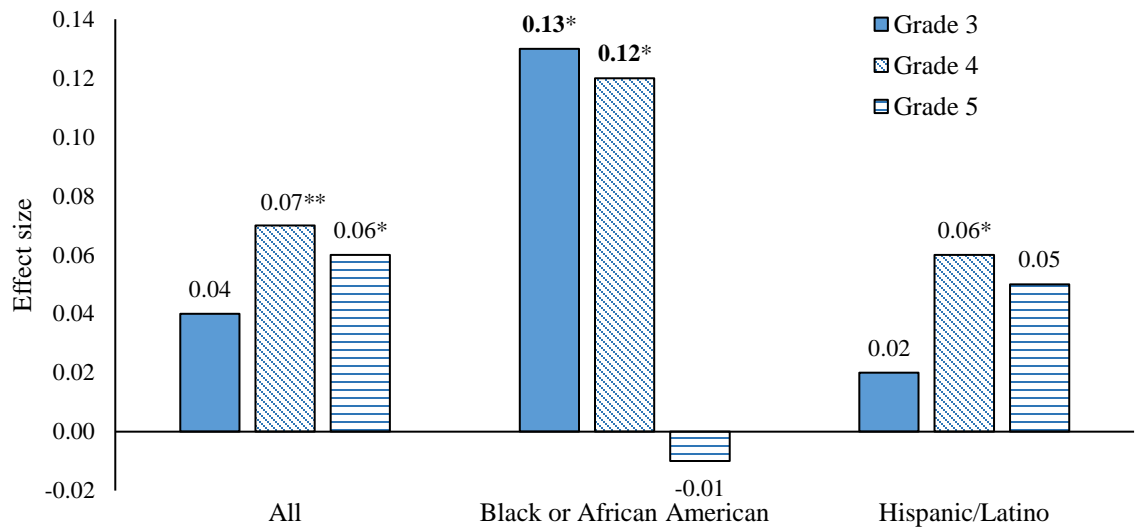
Note. **Bold** indicates a practically significant difference. Numbers of students are in Tables 1.2, 1.4, and 1.6 above.
*p < .05, **p < .01, ***p < .001.

Figure 3
Effect size of fall MAP-M scores for BELL attendance in 2017 by grade level and service receipt group
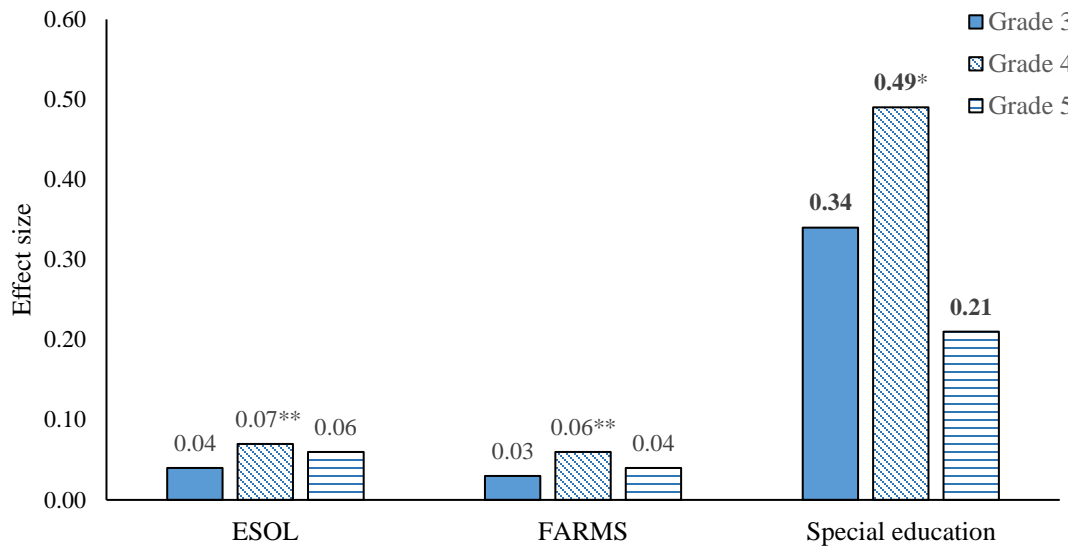
Note. **Bold** indicates a practically significant difference. Numbers of students are in Tables 1.8, 1.10, and 1.12 above.
*$p < .05$, **$p < .01$, ***$p < .001$.

Findings for Question 2: Reading
What was the impact of the BELL program on student reading skills? Did the reading impact of the program vary by student subgroups?

The approach for evaluating the impact of the BELL program on student skills in reading was the same as that for mathematics. This section presents the results of multiple regression analyses to test for a significant relationship between attendance at BELL and student achievement for the group of all students and separately for each subgroup of 100 or more students. The effect size measure for each regression analysis was a standardized regression coefficient (β). To interpret the magnitude of β values, the following guidelines from Cohen (1988) were used: .10, .30, and .50 which correspond to small, medium, and large effect sizes, respectively.

All Students

In both Grades 3 and 4, BELL attendees as a group had higher mean scale scores on the test of reading achievement (MAP-R) in fall 2017 after the BELL program, than the comparison students (Table 2.1). For Grade 5, the mean MAP-R scale score was the same between the two groups.

Table 2.1
Mean and Standard Deviation of MAP-R Scale Scores by
Grade Level and Attendance at BELL

	Attendees			Non-attendees		
	N	Mean	Standard deviation	*N*	Mean	Standard deviation
Grade 3	324	175.2	14.7	322	174.0	13.7
Grade 4	373	186.7	13.6	369	185.9	15.4
Grade 5	229	195.0	14.3	232	194.9	15.3

Based on regression analysis, there was no significant relationship (statistically or practically) for any grades, meaning that reading achievement did not differ between BELL attendees and non-attendees (Table 2.2).

Table 2.2
The Relationship between BELL Attendance and MAP-R Scale Scores by Grade Level

	Attendance at BELL: *B (SE)*	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 (*N* = 630)	0.55 (0.85)	0.02	99.9 (5, 625)	0.44
Grade 4 (*N* = 734)	0.28 (0.59)	0.01	426.6 (4, 730)	0.70
Grade 5 (*N* = 459)	-0.83 (0.76)	-0.03	262.5 (4, 455)	0.70

*$p < .05$, **$p < .01$, ***$p < .001$.

Subgroups

Black or African American students. Among Black or African American students, BELL attendees in all grade levels had higher mean MAP-R scale scores than the comparison students (Table 2.3).

Table 2.3
Mean and Standard Deviation of MAP-R Scale Scores for Black or
African American Students by Grade Level and Attendance at BELL

	Attendees			Non-attendees		
	N	Mean	Standard deviation	*N*	Mean	Standard deviation
Grade 3	61	177.5	16.5	69	174.3	14.3
Grade 4	80	191.2	13.9	89	184.9	15.5
Grade 5	52	198.2	15.3	45	196.4	17.8

Based on regression analysis, there was no significant relationship between attending BELL and reading achievement for Black or African American students in Grade 3 (Table 2.4). However, the regression analysis confirmed a statistically significant relationship for this group in Grade 4 (β =.08, p = .05), but not a practically significant relationship (β <.10) (Table 2.4).

Table 2.4
The Relationship between BELL Attendance and MAP-R Scale Scores for Black
or African American Students by Grade Level

	Attendance at BELL: *B (SE)*	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 (*N* = 120)	2.28 (1.81)	0.08	55.0 (2, 118)	0.47
Grade 4 (*N* = 156)	2.38 (1.21)	0.08*	152.6 (3, 153)	0.75
Grade 5 (*N* = 97)	na	na	na	na

*$p \leq$ .05, **$p <$ .01, ***$p <$ .001.

Because there were fewer than 100 Black or African American Grade 5 students, the analysis consisted of a t-test instead of a regression. Based on this test, there was no significant difference in mean scores (see Table 2.3 above) between attendees and non-attendees for Grade 5 (t(95) = 0.54, $p >$ .05; d = 0.11).

Hispanic/Latino.   Among Hispanic/Latino students, BELL attendees in Grade 3 had slightly higher mean scale score on the MAP-R in the fall after the BELL program, than the comparison students (Table 2.5). In both Grades 4 and 5, non-attendees had higher mean scores on MAP-R than attendees.

Table 2.5
Mean and Standard Deviation of MAP-R Scale Scores for
Hispanic/Latino Students by Grade Level and Attendance at BELL

	Attendees			Non-attendees		
	N	Mean	Standard deviation	*N*	Mean	Standard deviation
Grade 3	238	174.2	14.1	227	173.8	13.2
Grade 4	269	184.9	13.2	243	185.7	15.2
Grade 5	158	193.0	14.1	173	194.3	14.8

Based on regression analyses, there was no significant relationship (statistically or practically) between BELL attendance and reading skills for Hispanic/Latino students at any grade level tested (Table 2.6).

Table 2.6
The Relationship between BELL Attendance and MAP-R Scale Scores for
Hispanic/Latino Students by Grade Level

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 (N = 454)	0.08 (0.95)	0.00	76.2 (5, 449)	0.45
Grade 4 (N = 508)	-0.45 (0.70)	-0.02	290.5 (4, 504)	0.70
Grade 5 (N = 319)	-1.27 (0.86)	-0.05	177.1 (4, 315)	0.69

*p < .05, **p < .01, ***p < .001.

ESOL recipients. Among students who received ESOL services prior to the summer, BELL attendees in Grades 3 and 4 had higher mean MAP-R scale scores than the comparison students (Table 2.7). However, for Grade 5 students who were ESOL recipients, non-attendees had a slightly higher mean scale score on the MAP-R.

Table 2.7
Mean and Standard Deviation of MAP-R Scale Scores for
ESOL Recipients by Grade Level and Attendance at BELL

	Attendees			Non-attendees		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Grade 3	227	173.3	13.8	231	172.7	12.8
Grade 4	250	183.8	12.8	213	182.3	14.9
Grade 5	104	187.5	13.6	98	187.9	14.7

Based on regression analyses, there was no significant relationship (either statistical or practical) between BELL attendance and reading skills for ESOL recipients in Grades 3, 4, or 5 (Table 2.8).

Table 2.8
The Relationship between BELL Attendance and MAP-R Scale Scores for
ESOL Recipients by Grade Level

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 (N = 432)	0.15 (0.92)	0.01	60.6 (6, 426)	0.45
Grade 4 (N = 459)	-0.55 (0.75)	-0.02	302.9 (3, 456)	0.66
Grade 5 (N = 192)	-0.89 (1.09)	-0.03	147.8 (3, 189)	0.70

*p < .05, **p < .01, ***p < .001.

FARMS recipients. Among students who received FARMS, BELL attendees in both Grades 3 and 4 had a higher mean scale score on the MAP-R in the fall after the BELL program, than the comparison students (Table 2.9). However, for FARMS recipients in Grade 5, non-attendees had a slightly high mean scale score on MAP-R than attendees.

Table 2.9
Mean and Standard Deviation of MAP-R Scale Scores for
FARMS recipients by Grade Level and Attendance at BELL

	Attendees			Non-attendees		
	N	Mean	Standard deviation	*N*	Mean	Standard deviation
Grade 3	276	174.3	14.6	274	173.4	13.8
Grade 4	328	186.5	13.6	304	185.3	15.2
Grade 5	197	194.4	14.7	207	194.8	15.4

Based on regression analyses, there was no significant relationship (statistical or practical) between BELL attendance and reading skills for FARMS recipients at any grade level (Table 2.10).

Table 2.10
The Relationship between BELL Attendance and MAP-R Scale Scores for
FARMS Recipients by Grade Level

	Attendance at BELL: *B (SE)*	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 (*N* = 534)	0.26 (0.89)	0.01	116.1 (4, 530)	0.46
Grade 4 (*N* = 624)	-0.16 (0.62)	-0.01	387.3 (4, 620)	0.71
Grade 5 (*N* = 402)	-1.23(0.80)	-0.04	337.5 (3, 399)	0.72

*$p < .05$, **$p < .01$, ***$p < .001$.

Special education recipients. Among students who received special education services prior to the summer, BELL attendees in both Grades 3 and 4 had a higher mean scale score on the MAP-R in the fall after the BELL program, than the comparison students (Table 2.11). However, for special education recipients in Grade 5, non-attendees had a slightly high mean scale score on MAP-R than attendees.

Table 2.11
Mean and Standard Deviation of MAP-R Scale Scores for Special
Education Recipients by Grade Level and Attendance at BELL

	Attendees			Non-attendees		
	N	Mean	Standard deviation	*N*	Mean	Standard deviation
Grade 3	54	168.4	15.2	46	165.8	16.6
Grade 4*	54	174.9	11.5	51	168.5	15.5
Grade 5	45	183.0	14.3	49	184.6	14.6

*$p < .05$, **$p < .01$, ***$p < .001$.

Because there were fewer than 100 special education recipients in the Grade 3 and 5 samples, and only 105 in the Grade 4 sample, the analysis of this subgroup used t-tests instead of regressions. There was a statistically significant difference in reading scores between attendees and non-attendees for Grade 4 (t(103) = 2.41, $p < .05$). Further, this difference was practically significant, with a small effect size ($d = 0.47$). However, the differences in reading scores between BELL attendees and the comparison group were not statistically or practically significant for the other two grades: Grade 3 (t(98) = 0.81, $p > .05$; $d = 0.16$) and Grade 5 (t(92) = -0.55, $p > .05$; $d = 0.11$).

Summary. The evidence for a positive impact of the BELL program on reading skills was limited to two subgroups of fourth graders. In Grade 4, the relationship between attendance and

reading skills was statistically significant among Black or African American students (Figure 4) and statistically and practically significant for special education recipients (Figure 5).

Figure 4

Effect size of fall MAP-R scores for BELL attendance in 2017 by grade level, for all students and by race/ethnicity
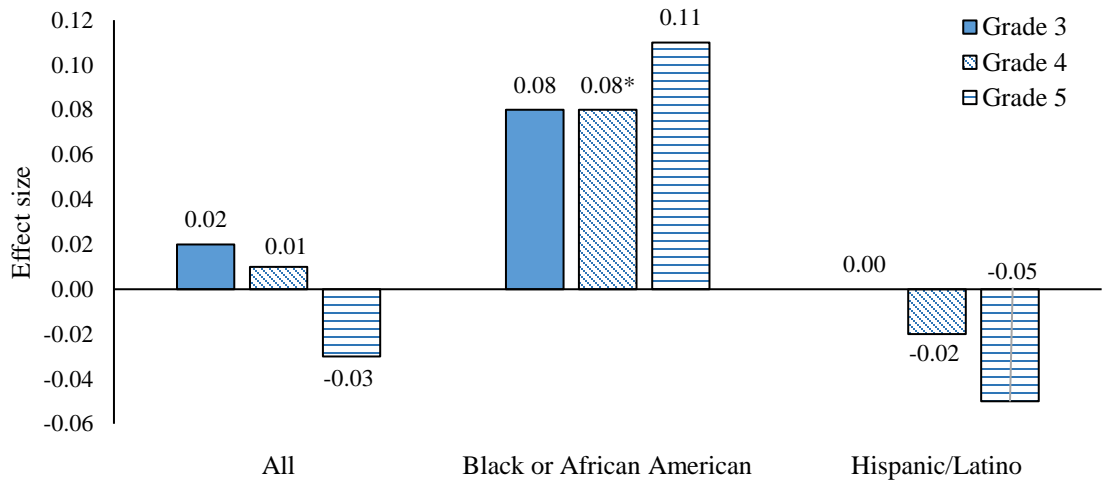
Note. **Bold** indicates a practically significant difference. Numbers of students are in Tables 2.2, 2.4, and 2.6 above. *$p \leq$ .05, **$p <$ .01, ***$p <$ .001.

Figure 5

Effect size of fall MAP-R scores for BELL attendance in 2017 by grade level and service receipt group
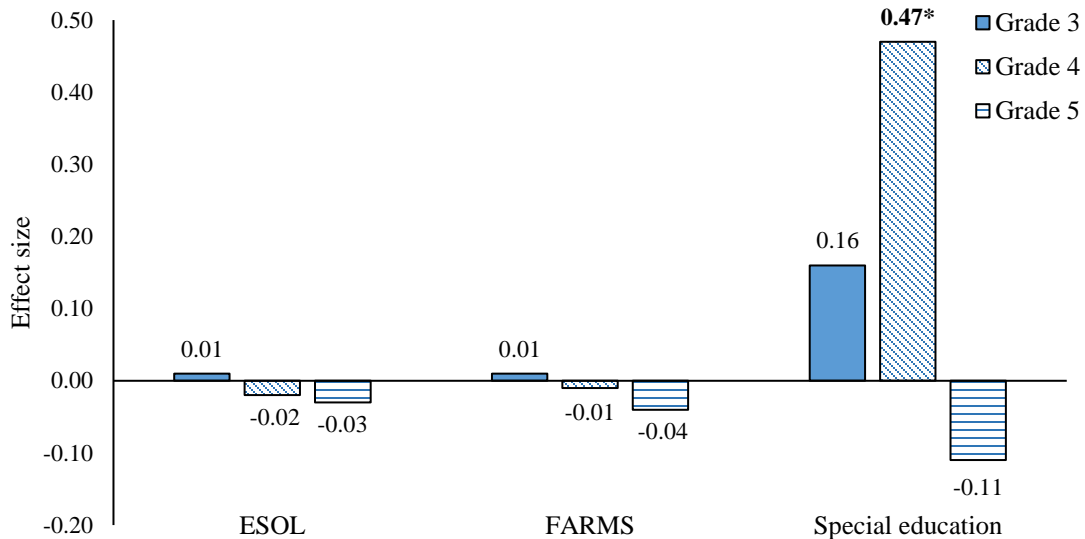
Note. **Bold** indicates a practically significant difference. Numbers of students are in Tables 2.8, 2.10, and 2.12 above. *$p <$ .05, **$p <$ .01, ***$p <$ .001.

Findings for Question 3: 2017 versus 2016
How does the impact of the BELL 2017 program on student skills in mathematics or reading compare to the impact of the BELL 2016 program?

This section compares the above findings from the BELL program in 2017 to those from the 2016 BELL program. Because the 2016 program did not include rising fifth graders, this section does not have findings for Grade 5. It is possible that some of the students in the study sample for BELL 2017 also were in the study sample for BELL 2016. Because students met the criteria to attend BELL each year, the comparisons were considered appropriate, despite this overlap.

       Mathematics. For students in Grade 3, the effect sizes for the relationship between BELL attendance and mathematics scores were smaller in 2017 than in 2016 for all students (Figure 6) and most subgroups, including Hispanic/Latino students (Figure 6) as well as ESOL and FARMS recipients (Figure 7). However, for two smaller groups, the effect sizes were larger: Black or African American (Figure 6) and special education recipients (Figure 7).

Figure 6
Effect size of fall MAP-M scores for BELL attendance in Grade 3 by year of attendance,
for all students and by race/ethnicity
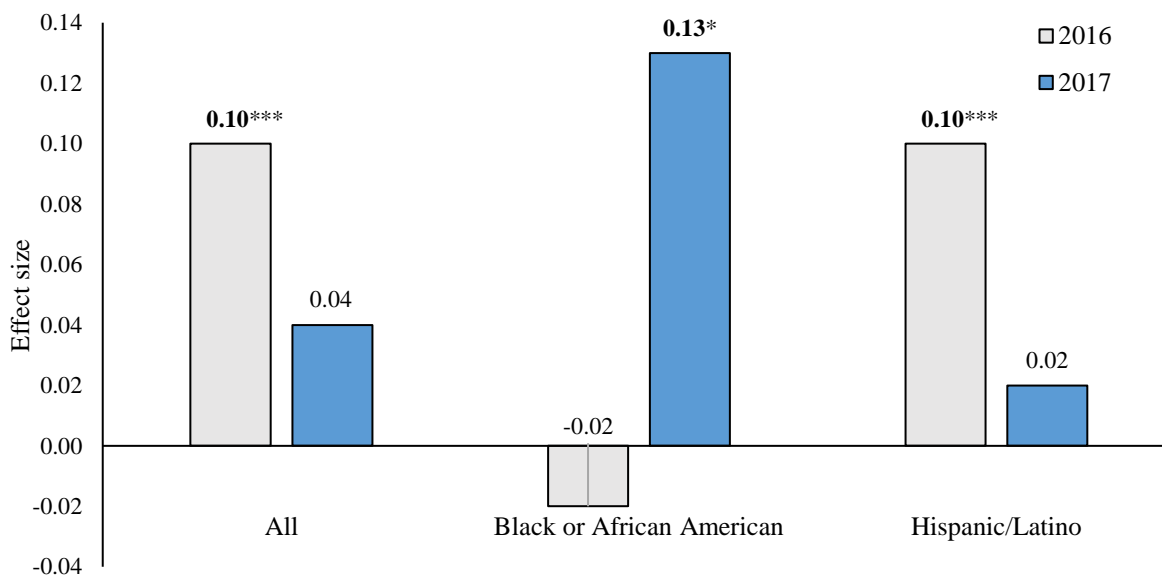
Note. Numbers of students for 2017 are in Tables above and for 2016 are in Appendix B.
Bold indicates a practically significant difference. *$p < .05$, **$p < .01$, ***$p < .001$.

Figure 7
Effect size of fall MAP-M scores for BELL attendance in Grade 3 by year of attendance and
by service receipt groups
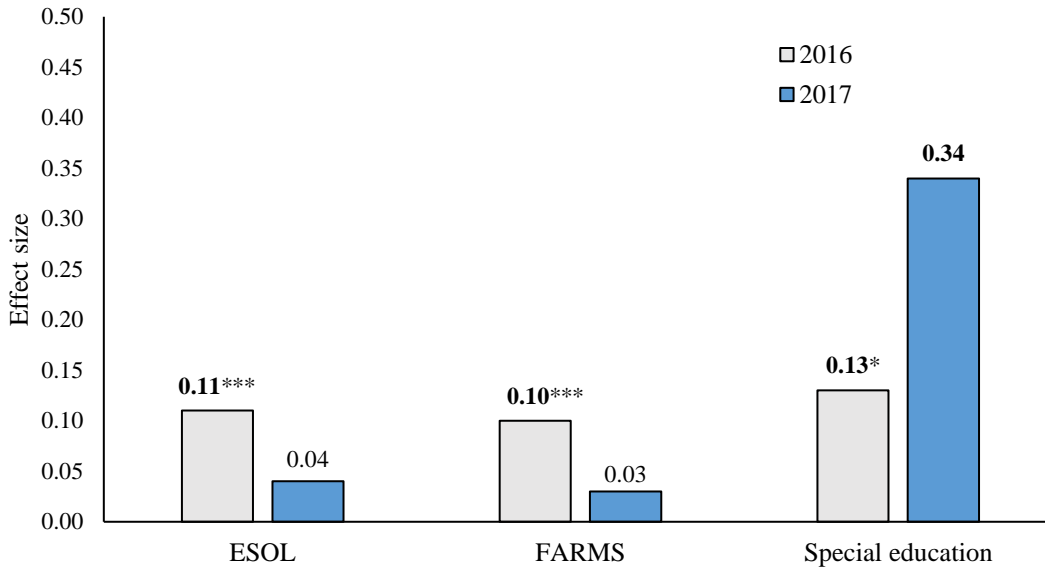
Note. Numbers of students for 2017 are in Tables above and for 2016 are in Appendix B.
Bold indicates a practically significant difference. $*p < .05, **p < .01, ***p < .001$.

For Grade 4, in contrast to Grade 3, the effect sizes for the relationship between BELL attendance and mathematics scores were the same or larger in 2017 than in 2016 among all students (Figure 8) and all subgroups (Figures 8 and 9).

Figure 8
Effect size of fall MAP-M scores for BELL attendance in Grade 4 by year of attendance,
for all students and by race/ethnicity

Note. Numbers of students for 2017 are in Tables above and for 2016 are in Appendix B.
Bold indicates a practically significant difference. *$p < .05$, **$p < .01$, ***$p < .001$.

Figure 9
Effect size of fall MAP-M scores for BELL attendance in Grade 4 by year of attendance and
by service receipt groups

Note. Numbers of students for 2017 are in Tables above and for 2016 are in Appendix B.
Bold indicates a practically significant difference. *$p < .05$, **$p < .01$, ***$p < .001$.

Reading. For students in Grade 3, the effect sizes for the relationship between BELL attendance and reading scores were smaller in 2017 than in 2016 for all students (Figure 10) and most subgroups, including Hispanic/Latino students (Figure 10) as well as ESOL and FARMS recipients (Figure11). However, for two smaller groups, the effect sizes were larger in 2017 than in 2016: Black or African American (Figure 10) and special education recipients (Figure 11). This pattern of results, smaller effect sizes for all students and the biggest subgroups but larger effect sizes for the two smallest subgroups, matched the pattern of results in mathematics for third graders.

Figure 10
Effect size of fall MAP-R scores for BELL attendance in Grade 3 by year of attendance, for all students and by race/ethnicity

Note. Numbers of students for 2017 are in Tables above and for 2016 are in Appendix B.
Bold indicates a practically significant difference. *$p < .05$, **$p < .01$, ***$p < .001$.

Figure 11
Effect size of fall MAP-R scores for BELL attendance in Grade 3 by year of attendance and
by service receipt groups

Note. Numbers of students for 2017 are in Tables above and for 2016 are in Appendix B.
Bold indicates a practically significant difference. *$p < .05$, **$p < .01$, ***$p < .001$.

For Grade 4, the effect sizes for the relationship between BELL attendance and reading scores were close to zero in both 2016 and 2017 for all students (Figure 12) and for the three largest student subgroups: Hispanic/Latino (Figure 8), ESOL recipients (Figure 13), and FARMS recipients (Figure 13). As with Grade 3 reading, the effect sizes for reading for summer 2017 were larger than for summer 2016 in two smaller subgroups: Black or African American students (Figure 12) and special education (Figure 13).

Figure 12

Effect size of fall MAP-R scores for BELL attendance in Grade 4 by year of attendance, for all students and by race/ethnicity

Note. Numbers of students for 2017 are in Tables above and for 2016 are in Appendix B.
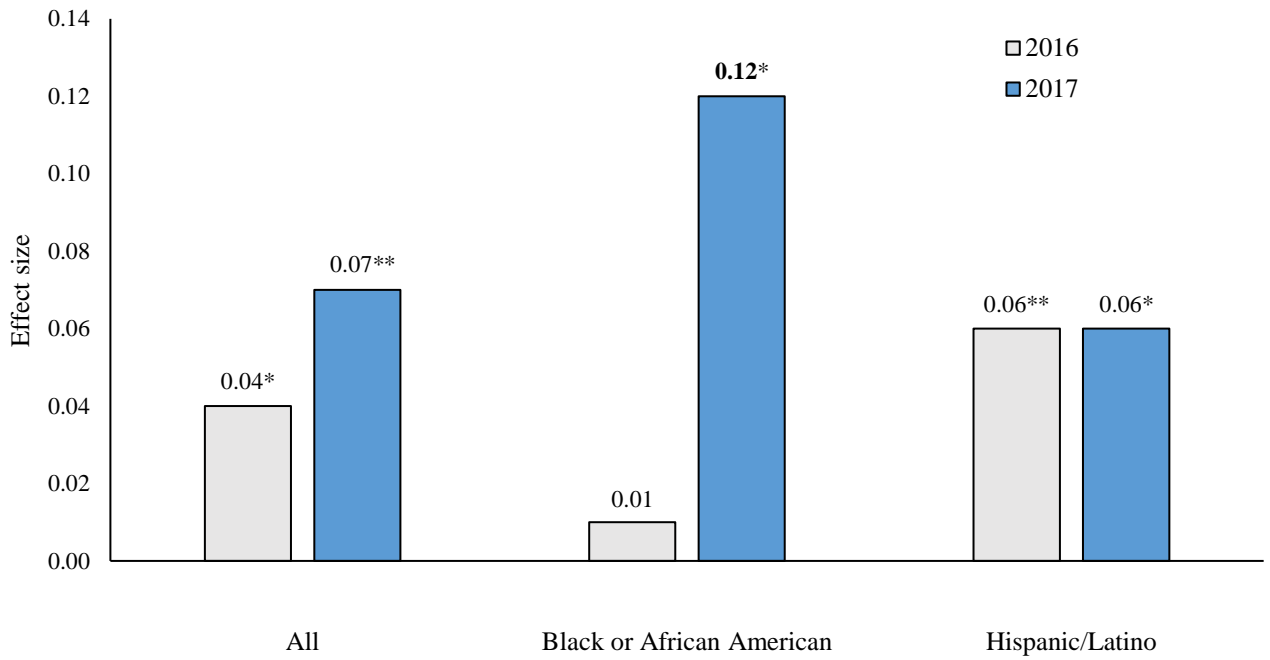**Bold** indicates a practically significant difference. *$p < .05$, **$p < .01$, ***$p < .001$.

Figure 13

Effect size of fall MAP-R scores for BELL attendance in Grade 4 by year of attendance and by service receipt groups

Note. Numbers of students for 2017 are in Tables above and for 2016 are in Appendix B.
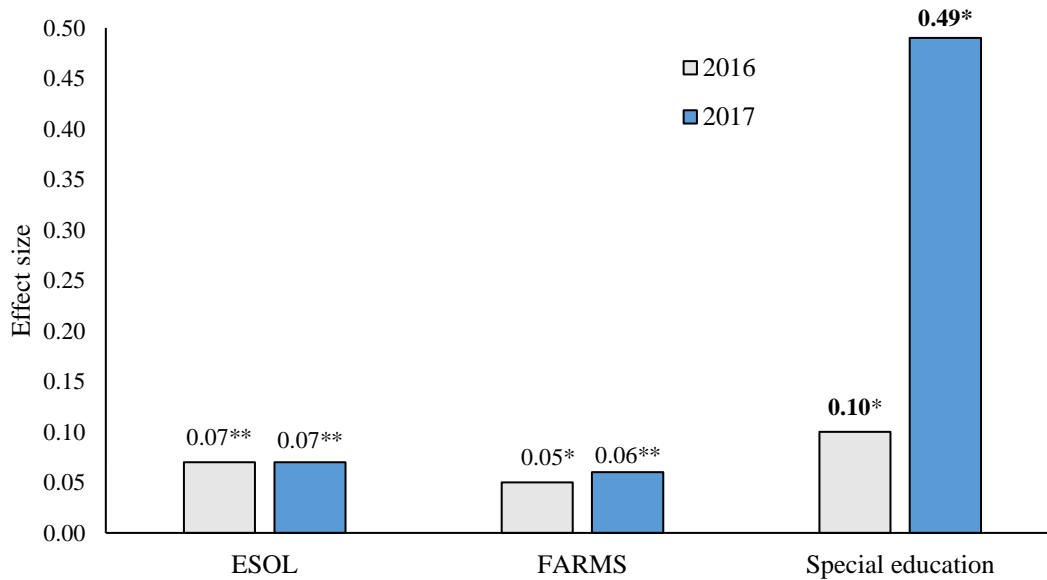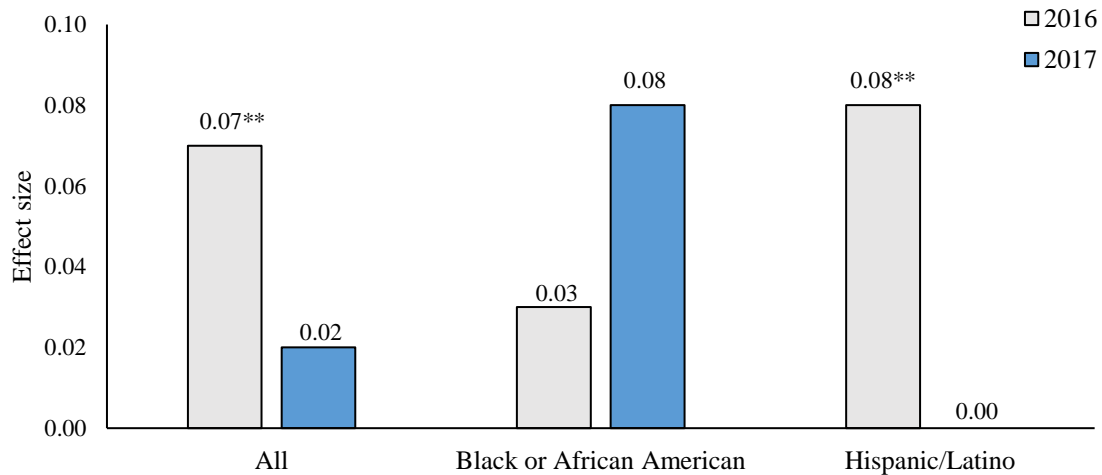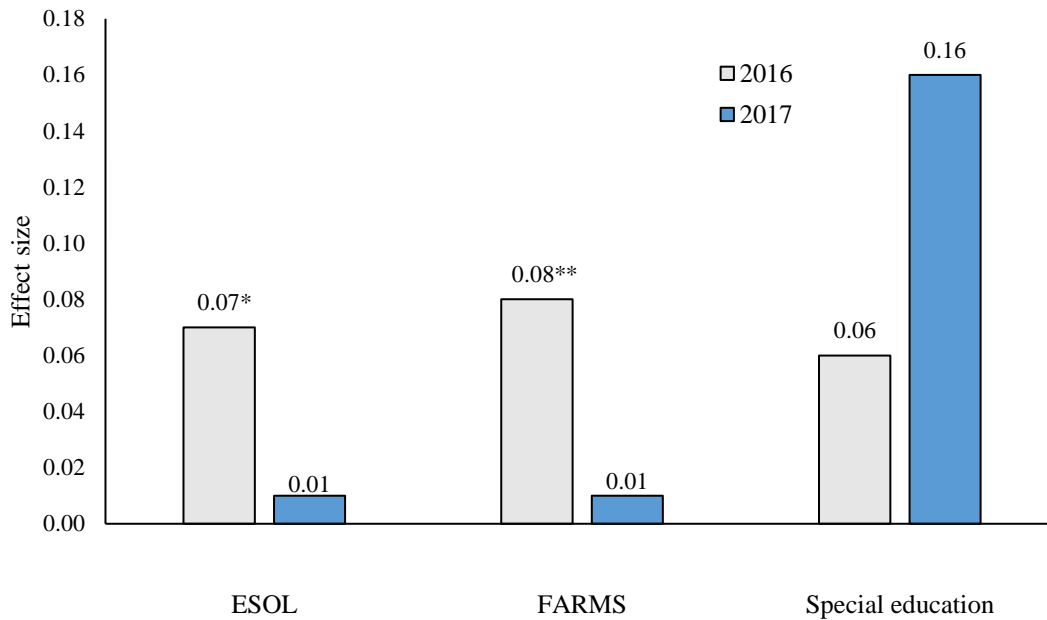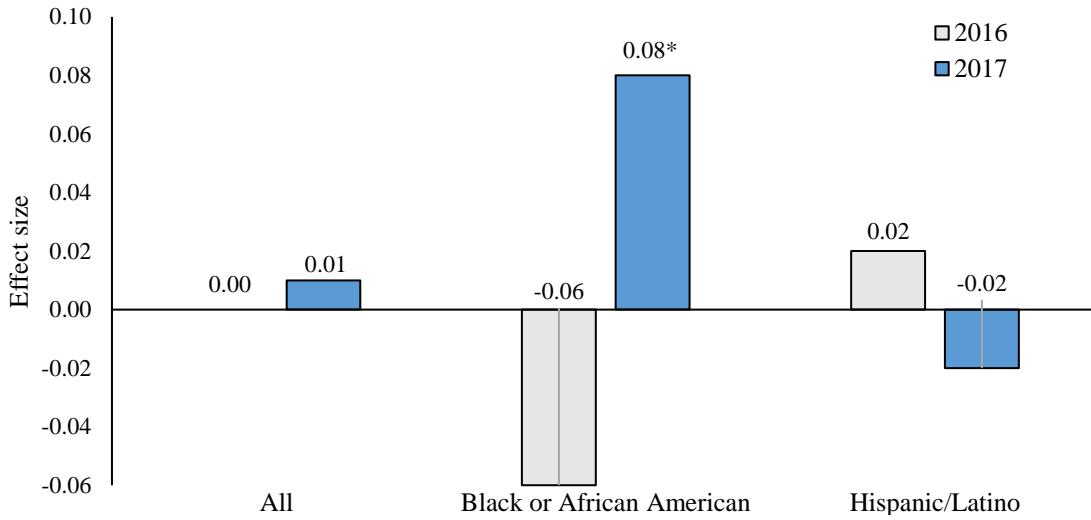**Bold** indicates a practically significant difference. *$p < .05$, **$p < .01$, ***$p < .001$.
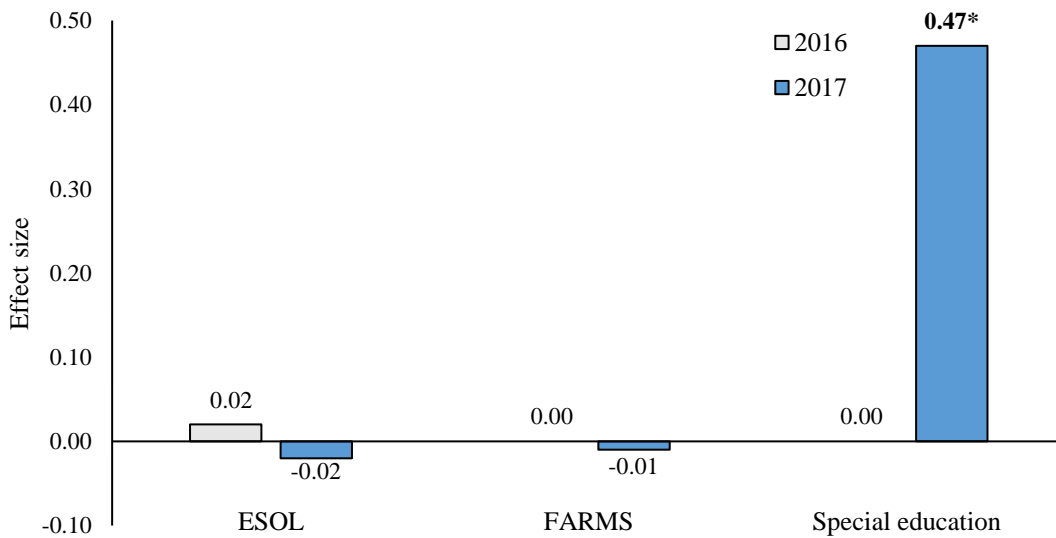
Findings for Question 4: Attendees at BELL 2016 and 2017
What was the impact of the BELL program on student skills in mathematics or reading for students who attended both the BELL 2016 and the BELL 2017 program?

     Sample. In this section, the analysis used a subset of students in the previous analyses. The attendees were 247 students who had high attendance (i.e., 19 days or more) at both BELL 2016 and BELL 2017; in other words, they attended the BELL program for two years. The non-attendees were a random sample of students who did not attend any days of BELL 2016 or of BELL 2017 but were invited to both. The number of non-attendees at each grade level in fall 2017 was set to match the number of double attendees

The characteristics of the two samples are in Table 3. The percentage of girls was higher among double attendees than non-attendees. The mix of racial/ethnic groups was similar between the two samples. However, there were more students who received each service (i.e., ESOL, FARMS, special education) among double attendees than non-attendees.

Table 3
Characteristics of Study Sample for Analysis of Attendance at Both the 2016 and 2017 BELL Programs

	Double attendees[a]		Non-attendees[b]	
	N	*%*	*N*	*%*
Total	247	100.0	247	100.0
Grade level as of fall 2017				
Grade 4	131	53.0	131	53.0
Grade 5	116	47.0	116	47.0
Gender				
Female	132	53.4	127	51.4
Male	115	46.6	120	48.6
Race/ethnicity				
American Indian	0	0.0	0	0.0
Asian	≤ 5	2.0	6	2.4
Black or African American	46	18.6	41	16.6
Hispanic/Latino	193	78.1	191	77.3
White	≤ 5	≤ 1.0	7	2.8
Pacific Islander	0	0.0	0	0.0
Two or More Races	≤ 5	≤ 1.0	≤ 5	≤ 1.0
Receipt of services during school year 2016–2017				
ESOL	178	72.1	158	64.0
FARMS	223	90.3	209	84.6
Special education	65	26.3	59	23.9

[a]Limited to students who attended BELL for 19 or more days in 2016 and 2017 and had MAP scores from fall & spring 2017.
[b]Limited to a random sample of students invited to BELL 2016 and 2017 who did not attend and had MAP scores from fall & spring 2017.

As in previous sections, the measures of achievement were MAP scores from fall 2017 in mathematics and reading.

Mathematics.   In both grade levels, BELL double attendees as a group had higher mean scale scores on the test of math achievement (MAP-M) in fall 2017 after the BELL program, than the comparison students (Table 4.1).

Table 4.1
Mean and Standard Deviation of Fall 2017 MAP-M Scale Scores by
Grade Level and Attendance at BELL 2016 and 2017

	Double attendees			Non-attendees		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Grade 4	130	189.5	9.2	128	186.6	10.3
Grade 5	116	199.6	10.0	114	198.0	10.1

The regression analysis confirmed the positive relationship between attendance at two BELL programs and mathematics skills for both grades. The relationship was statistically and practically significant with a small effect size for both Grade 4 ($\beta = .14$, $p < .001$) and Grade 5 ($\beta = .11$, $p < .01$) (Table 4.2).

Table 4.2
Relationship Between Attendance at BELL 2016 and 2017
and Fall 2017 MAP-M Scale Scores by Grade Level

	Attendance at BELL: *B (SE)*	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 4 ($N = 249$)	2.57 (0.75)	0.14***	87.1 (4, 245)	0.58
Grade 5 ($N = 225$)	2.04 (0.67)	0.11**	166.0 (4, 221)	0.75

*$p < .05$, **$p < .01$, ***$p < .001$.

Among Black or African American students, BELL double attendees in Grade 4 had a higher mean scale score on the MAP-M in the fall after the BELL 2017 program, than the comparison students (Table 4.3). For Grade 5, however, the mean MAP-M scale score was slightly smaller for double attendees than non-attendees for the same comparison.

Table 4.3
Mean and Standard Deviation of Fall 2017 MAP-M Scale Scores for Black or African
American Students by Grade Level and Attendance at BELL 2016 and 2017

	Double attendees			Non-attendees		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Grade 4	25	190.5	8.5	22	185.6	10.2
Grade 5	21	197.6	12.8	19	198.5	10.2

Due to the small number of Black/African American students (i.e., < 100), t-tests were used instead of regression analysis. Based on these tests, the difference between double attendees and non attendees for Grade 4 was practically significant with a medium effect size (t(45) = 1.78, $p = .08$; $d = 0.52$). There were no significant differences between double attendees and non-attendees for Grade 5 (t(38) = -0.23, $p > .05$; $d = -.07$), among Black/African American students.

Among Hispanic/Latino students, BELL double attendees in both grades levels had a higher mean scale score on the MAP-M in the fall after the 2017 BELL program, than the comparison students (Table 4.4).

Table 4.4
Mean and Standard Deviation of Fall 2017 MAP-M Scale Scores for
Hispanic/Latino Students by Grade Level and Attendance at BELL 2016 and 2017

	Double attendees			Non-attendees		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Grade 4	102	189.0	9.4	97	186.1	10.1
Grade 5	91	200.0	9.4	89	197.6	10.2

Regression analysis confirmed a positive relationship between attendance at two BELL programs and mathematics skills for Hispanic/Latino students only in Grade 5; the relationship was statistically significant for this grade ($\beta = .06$, $p < .05$) (Table 4.5).

Table 4.5
Relationship Between Attendance at BELL 2016 and 2017 and MAP-M Scale Scores for
Hispanic/Latino Students by Grade Level

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 4 ($N = 190$)	1.37 (0.87)	0.08	55.8 (4, 186)	0.54
Grade 5 ($N = 175$)	1.60 (0.74)	0.08*	130.4 (4, 171)	0.75

*$p < .05$, **$p < .01$, ***$p < .001$.

Among students who received ESOL services prior to summer 2017, BELL double attendees in both grade levels had a higher mean scale score on the MAP-M in the fall after the 2017 BELL program, than the comparison students (Table 4.6).

Table 4.6
Mean and Standard Deviation of Fall 2017 MAP-M Scale Scores for
ESOL Recipients by Grade Level and Attendance at BELL 2016 and 2017

	Double attendees			Non-attendees		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Grade 4	103	189.0	9.4	98	186.3	11.0
Grade 5	75	197.8	9.9	55	193.8	9.8

Regression analysis confirmed a positive relationship between attendance at two BELL programs and mathematics skills for ESOL recipients in Grade 5; the relationship was statistically and practically significant for this grade ($\beta = .13$, $p < .01$) (Table 4.7). The relationship for Grade 4 was not significant.

Table 4.7
Relationship Between Attendance at BELL 2016 and 2017 and Fall 2017 MAP-M Scale
Scores for ESOL Recipients by Grade Level

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 4 ($N = 197$)	1.29 (1.02)	0.06	73.1 (3, 194)	0.52
Grade 5 ($N = 124$)	2.50 (0.92)	0.13**	102.0 (3, 121)	0.71

*$p < .05$, **$p < .01$, ***$p < .001$.

Among students who received FARMS services prior to the summer of 2017, BELL double attendees in both grade levels had a higher mean scale score on the MAP-M in the fall after the 2017 BELL program, than the comparison students (Table 4.8).

Table 4.8
Mean and Standard Deviation of Fall 2017 MAP-M Scale Scores for FARMS
Recipients by Grade Level and Attendance at BELL 2016 and 2017

	Double attendees			Non-attendees		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Grade 4	118	189.4	9.2	108	186.8	10.2
Grade 5	104	199.6	10.2	96	198.8	9.8

Regression analysis confirmed the positive relationship between BELL attendance and mathematics skills for ESOL recipients in both grades (Table 4.9). The relationship was statistically and practically significant with a small effect size for Grade 4 ($\beta = .10$, $p < .05$) and statistically significant for Grade 5 ($\beta = .09$, $p < .05$).

Table 4.9
Relationship Between Attendance at BELL 2016 and 2017 and Fall 2017 MAP-M Scale
Scores for FARMS Recipients by Grade Level

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 4 ($N = 216$)	1.77 (0.80)	0.10*	71.7 (4, 212)	0.57
Grade 5 ($N = 193$)	1.73 (0.74)	0.09*	125.6 (4, 189)	0.73

*$p < .05$, **$p < .01$, ***$p < .001$.

Among students who received special education services prior to the summer of 2017, BELL double attendees in both Grades 4 and 5 had a higher mean scale score on the MAP-M in the fall after the 2017 BELL program, than the comparison students (Table 4.10).

Table 4.10
Mean and Standard Deviation of Fall 2017 MAP-M Scale Scores for Special
Education Recipients by Grade Level and Attendance at BELL 2016 and 2017

	Double attendees			Non-attendees		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Grade 4**	32	188.1	9.0	31	181.2	11.4
Grade 5	33	192.2	7.4	27	188.5	9.1

*$p < .05$, **$p \leq .01$, ***$p < .001$.

Due to the small number of students who received special education services (i.e., < 100), t-tests were used instead of regression analysis. Based on this test, the difference between double attendees and non attendees for Grade 4 was statistically significant (t(61) = 2.68, p = .01) and practically significant with a medium effect size (d = 0.67). For Grade 5, the difference between double attendees and non-attendees was practically significant with a small effect size (t(58) = 1.70, p = .09; d = .44).

Mathematics summary. There was evidence for a positive impact on mathematics skills of double attendance at the BELL program for both fourth graders and fifth graders (Figures 14 and 15). In Grade 4, there was a significant relationship between double attendance and math scores among all students (statistically and practically) and three subgroups: Black or African American students (practically), FARMS recipients (statistically and practically), and special education recipients (practically). Further, there were significant relationships in Grade 5 between double attendance and math scores among all students (statistically and practically) and four subgroups: Hispanic/Latino students (statistically), ESOL recipients (statistically and practically), FARMS recipients (statistically), and special education recipients (statistically and practically).

Figure 14
Effect size of fall 2017 MAP-M scores for BELL double attendance by grade level in 2017, for all students and by race/ethnicity
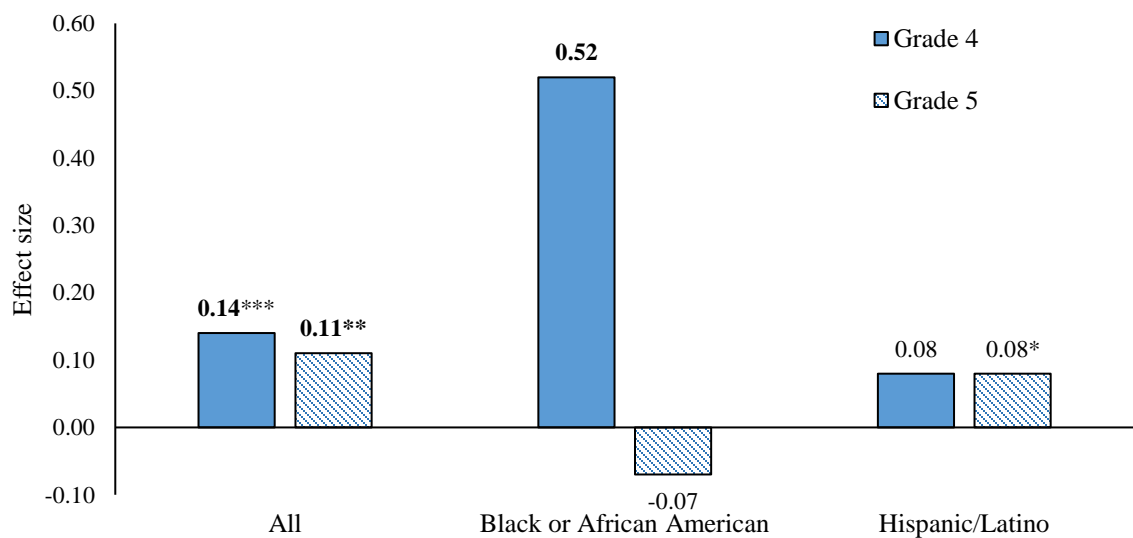
Note. **Bold** indicates a practically significant difference. Numbers of students are in Tables 4.2, 4.3, and 4.5 above. *p < .05, **p < .01, ***p < .001.

Figure 15
Effect size of fall 2017 MAP-M scores for BELL attendance double attendance by grade level in 2017 and service receipt group
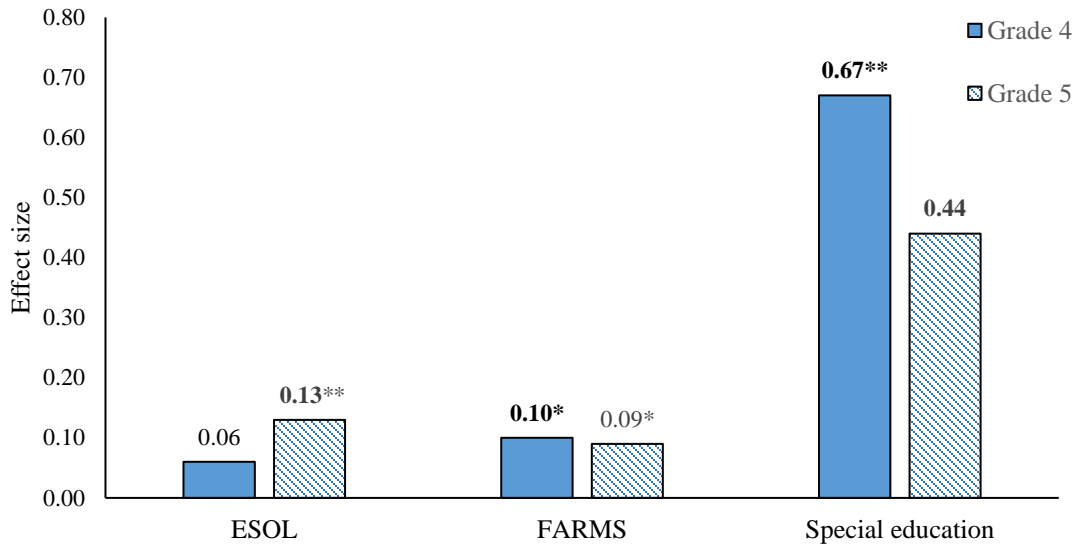
Note. **Bold** indicates a practically significant difference. Numbers of students are in Tables 4.7, 4.9, and 4.10 above. **p* < .05, ***p* < .01, ****p* < .001.

Reading. Among fourth graders, BELL double attendees as a group had higher mean scale scores on the test of reading achievement (MAP-R) in fall 2017 after the second year of the BELL program than the comparison students (Table 4.11). But for fifth graders, the scores were nearly identical.

Table 4.11
Mean and Standard Deviation of Fall 2017 MAP-R Scale Scores by Grade
Level and Attendance at BELL 2016 and 2017

	Double attendees			Non-attendees		
	N	Mean	Standard deviation	*N*	Mean	Standard deviation
Grade 4	130	182.0	13.1	131	179.7	14.0
Grade 5	114	191.4	12.2	116	191.5	13.4

Based on regression analysis, there was no significant relationship (statistically or practically) for any grades, meaning that reading achievement among all students did not differ between BELL double attendees and non-attendees (Table 4.12).

Table 4.12
Relationship Between Attendance at BELL 2016 and 2017 and
Fall 2017 MAP-R Scale Scores by Grade Level

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 4 ($N = 258$)	1.37 (1.08)	0.05	77.5 (5, 252)	0.60
Grade 5 ($N = 229$)	-0.73 (1.06)	-0.03	96.7 (4, 224)	0.63

*$p < .05$, **$p < .01$, ***$p < .001$.

Among Black or African American students, BELL double attendees in Grade 4 had higher mean
MAP-R scale scores than the comparison students (Table 4.13). For Grade 5, however, the mean
MAP-R scale score was smaller for double attendees than non-attendees.

Table 4.13
Mean and Standard Deviation of Fall 2017 MAP-R Scale Scores for Black or
African American Students by Grade Level and Attendance at BELL 2016 and 2017

	Double attendees			Non-attendees		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Grade 4	24	187.3	14.1	22	180.6	13.1
Grade 5	20	194.2	14.6	19	196.8	13.1

As with mathematics scores, the analysis for reading scores of Black/African American students
used t-tests. The difference between double attendees and non attendees was practically significant
with a medium effect size for Grade 4 (t(44) = 1.69, p =.10; d = 0.50) but was not statistically or
practically significant for Grade 5 (t(37) = -0.60, p > .05; d = -0.19).

Among Hispanic/Latino students, BELL double attendees in Grade 4 had a higher mean scale
score on the MAP-R in the fall after the 2017 BELL program, than the comparison students
(Table 4.14). However, BELL double attendees who were Hispanic/Latino students and in
Grade 5 had a slightly lower mean scale score on the MAP-R than the comparison students.

Table 4.14
Mean and Standard Deviation of Fall 2017 MAP-R Scale Scores for
Hispanic/Latino Students by Grade Level and Attendance at BELL 2016 and 2017

	Double attendees			Non-attendees		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Grade 4	102	180.5	12.5	100	178.8	14.1
Grade 5	90	190.4	11.7	91	190.8	12.8

Based on regression analysis, there was no significant relationship (statistically or practically) for
either grade level of Hispanic/Latino students (Table 4.15).

Table 4.15
Relationship Between Attendance at BELL 2016 and 2017 and Fall 2017 MAP-R Scale
Scores for Hispanic/Latino Students by Grade Level

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 4 ($N = 199$)	0.47 (1.17)	0.02	159.1 (2, 196)	0.62
Grade 5 ($N = 181$)	-1.24 (1.12)	-0.05	78.8 (4, 176)	0.63

*$p < .05$, **$p < .01$, ***$p < .001$.

Among students who received ESOL services prior to the summer of 2017, BELL double attendees in Grade 4 and 5 had higher mean scale score on the MAP-R in the fall after the 2017 BELL program, than the comparison students (Table 4.16).

Table 4.16
Mean and Standard Deviation of Fall 2017 MAP-R Scale Scores for ESOL
Recipients by Grade Level and Attendance at BELL 2016 and 2017

	Double attendees			Non-attendees		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Grade 4	103	180.3	12.3	101	178.8	14.2
Grade 5	73	187.8	11.8	57	186.4	13.2

Based on regression analysis, there was no significant relationship (statistically or practically) between attendance at two BELL programs and mathematics skills for either grade level of ESOL recipients (Table 4.17).

Table 4.17
Relationship Between Attendance at BELL 2016 and 2017 and Fall 2017 MAP-R Scale
Scores for ESOL Recipients by Grade Level

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 4 ($N = 202$)	0.56 (1.24)	0.02	86.9 (3, 198)	0.56
Grade 5 ($N = 130$)	-0.75 (1.35)	-0.03	72.0 (3, 126)	0.62

*$p < .05$, **$p < .01$, ***$p < .001$.

Among students who received FARMS services prior to the summer of 2017, BELL double attendees in Grade 4 had a higher mean scale score on the MAP-R in the fall after the 2017 BELL program, than the comparison students (Table 4.18). However, BELL double attendees who were Hispanic/Latino students and in Grade 5 had a slightly lower mean scale score on the MAP-R than the comparison students.

Table 4.18
Mean and Standard Deviation of Fall 2017 MAP-R Scale Scores for FARMS
Recipients by Grade Level and Attendance at BELL 2016 and 2017

	Double attendees			Non-attendees		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Grade 4	118	182.0	13.0	111	179.6	13.9
Grade 5	102	191.2	12.8	98	191.8	13.1

Based on regression analysis, there was no significant relationship between attending two summers of the BELL program and reading scores, among FARMS recipients at either grade level.

Table 4.19
Relationship Between Attendance at BELL 2016 and 2017 and Fall 2017 MAP-R Scale
Scores for FARMS Recipients by Grade Level

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 4 (N = 228)	0.28 (1.10)	0.01	124.6 (3, 224)	0.62
Grade 5 (N = 199)	-1.16 (1.08)	-0.05	100.6 (4, 194)	0.67

*$p < .05$, **$p < .01$, ***$p < .001$.

Lastly, among students who received special education services prior to the summer of 2017, BELL double attendees in both Grades 4 and 5 had a higher mean scale score on the MAP-R in the fall after the BELL 2017 program, than the comparison students (Table 4.20).

Table 4.20
Mean and Standard Deviation of Fall 2017 MAP-R Scale Scores for Special
Education Recipients by Grade Level and Attendance at BELL 2016 and 2017

	Double attendees			Non-attendees		
	N	Mean	Standard deviation	N	Mean	Standard deviation
Grade 4	31	174.2	11.4	31	168.8	12.4
Grade 5	32	181.9	11.6	28	178.9	8.8

As with mathematics scores, the analysis for reading scores of students with disabilities used t-tests. Based on these tests, the difference between double attendees and non attendees was practically significant with a small effect size for both Grade 4 (t(60) = 1.78, p =.08; d = 0.45) and Grade 5 (t(58) = 1.10, p > .05; d = 0.28).

Reading summary. The evidence for a positive impact of attending two summers of the BELL program on reading skills was limited to the smaller subgroups. In Grade 4, the difference between double attendees and non-attendees in reading scores was practically significant among Black or African American students (Figure 12). In Grades 4 and 5, the difference in reading scores was practically significant among special education recipients (Figure 13). Note that all of these findings were based on t-tests that do not control for differences between the two groups (i.e., double attendees and non-attendees). Therefore, some other difference between the groups (that was not controlled) may be the reason for these significant results.

Figure 16

Effect size of fall 2017 MAP-R scores for BELL double attendance by grade level in 2017, for all students and by race/ethnicity
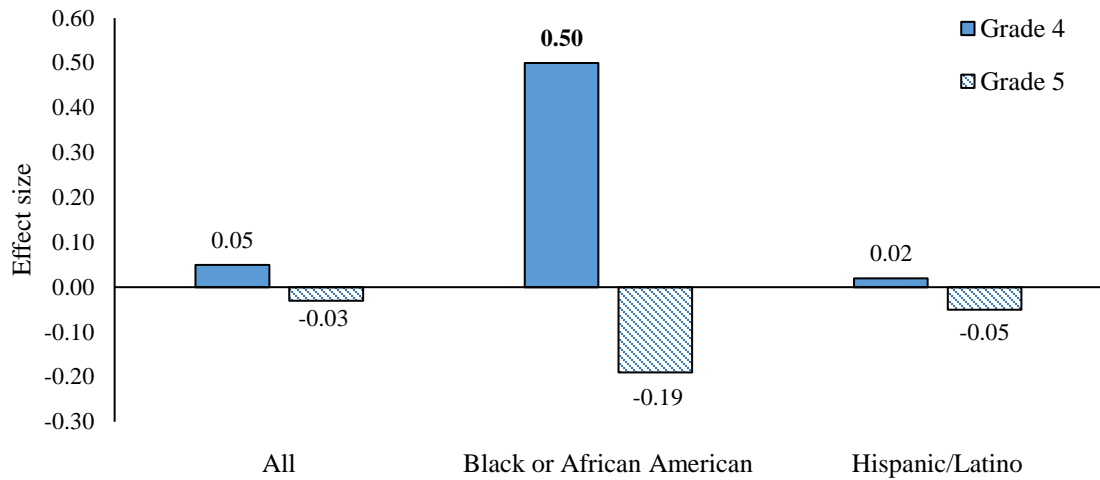
Note. **Bold** indicates a practically significant difference. Numbers of students are in Tables 4.12, 4.13, and 4.15 above. *$*p \leq .05$, $**p < .01$, $***p < .001$.

Figure 17

Effect size of fall 2017 MAP-R scores for BELL attendance double attendance by grade level in 2017 and service receipt group
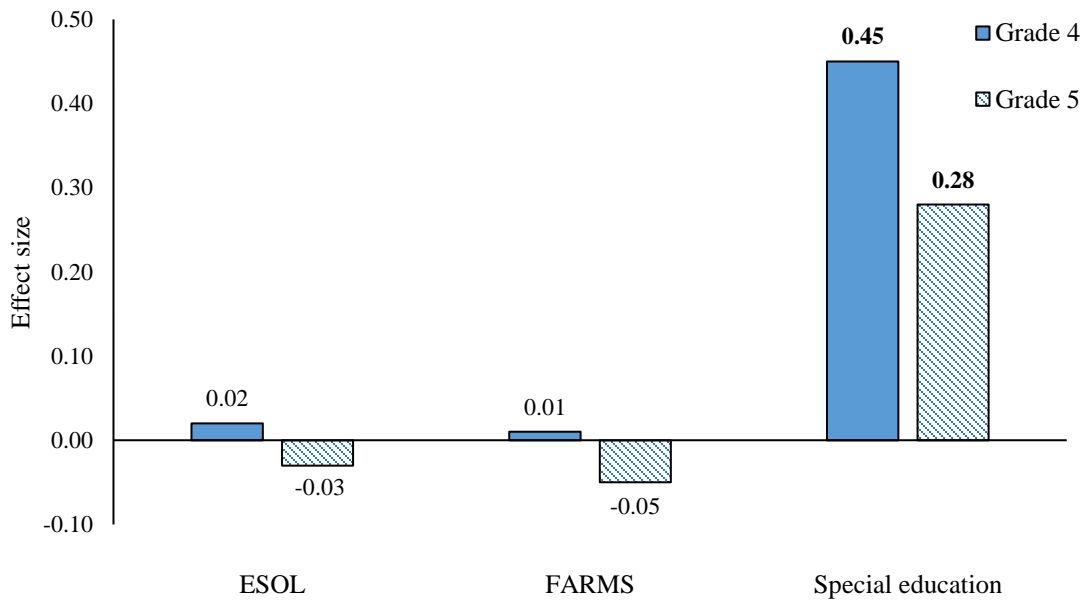
Note. **Bold** indicates a practically significant difference. Numbers of students are in Tables 4.17, 4.19, and 4.20 above. *$*p < .05$, $**p < .01$, $***p < .001$.

Conclusion

Based on all the findings, there was evidence of a positive impact of attendance at the BELL program 2017 on students' performance in mathematics, especially for Grade 4 attendees and students who attended the BELL program in both 2017 and 2016. However, there was very little evidence of a positive impact on students' performance in reading in any grade, including students who attended BELL for two summers.

Acknowledgments

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Appendix A
2017 BELL Summer Learning Program Sites

Arcola Elementary School

Bel Pre Elementary School

Cresthaven Elementary School

Capt. James E. Daly Elementary School

Sargent Shriver Elementary School

Summit Hall Elementary School

Watkins Mill Elementary School at Stedwick Elementary School

Weller Road Elementary School

Appendix B
Numbers of Students in Analyses of BELL 2016

Table B1
The Relationship between BELL 2016 Attendance and MAP-M Scale Scores
for All Students in Grades 3 and 4

	Attendance at BELL: *B (SE)*	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 (N = 789)	1.82 (.47)	0.10***	270.82 (3, 785)	0.51
Grade 4 (N = 1,113)	0.91 (.38)	0.04*	485.63 (4, 1,108)	0.64

*p < .05, **p < .01, ***p < .001.

Table B2
The Relationship between BELL 2016 Attendance and MAP-M Scale Scores
for Black or African American Students in Grades 3 and 4

	Attendance at BELL: *B (SE)*	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 (N = 166)	-0.44 (1.08)	-0.02	52.7 (4, 161)	0.56
Grade 4 (N = 238)	0.16 (0.94)	0.01	73.7 (4, 233)	0.55

*p < .05, **p < .01, ***p < .001.

Table B3
The Relationship between BELL 2016 Attendance and MAP-M Scale Scores
for Hispanic/Latino Students in Grades 3 and 4

	Attendance at BELL: *B (SE)*	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 (N = 576)	1.86 (0.56)	0.10***	178.5 (3, 572)	0.48
Grade 4 (N = 802)	1.30 (0.44)	0.06**	271.1 (5, 796)	0.63

*p < .05, **p < .01, ***p < .001.

Table B4
The Relationship between BELL 2016 Attendance and MAP-M Scale Scores
for ESOL Recipients in Grades 3 and 4

	Attendance at BELL: *B (SE)*	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 (N = 589)	2.05 (0.54)	0.11***	189.0 (3, 586)	0.49
Grade 4 (N = 729)	1.42 (0.48)	0.07**	183.4 (6, 722)	0.60

*p < .05, **p < .01, ***p < .001.

Table B5
The Relationship between BELL 2016 Attendance and MAP-M Scale Scores
for FARMS Recipients in Grades 3 and 4

	Attendance at BELL: *B (SE)*	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 (N = 701)	1.89 (.50)	0.10***	220.9 (3, 697)	0.49
Grade 4 (N = 973)	0.97 (.40)	0.05*	420.8 (4, 968)	0.63

*p < .05, **p < .01, ***p < .001.

Table B6
The Relationship between BELL 2016 Attendance and MAP-M Scale Scores
for Special Education Recipients in Grades 3 and 4

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 ($N = 121$)	2.38 (1.05)	0.13*	58.8 (4,116)	0.66
Grade 4 ($N = 210$)	2.13 (1.00)	0.10*	152.0 (2, 207)	0.59

*$p < .05$, **$p < .01$, ***$p < .001$.

Table B7
The Relationship between BELL 2016 Attendance and MAP-R Scale Scores
For All Students in Grades 3 and 4

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 ($N = 765$)	1.78 (0.69)	0.07**	148.4 (4, 760)	0.44
Grade 4 ($N = 1,123$)	-0.13 (0.50)	-0.00	799.4 (3, 1,119)	0.68

*$p < .05$, **$p < .01$, ***$p < .001$.

Table B8
The Relationship between BELL 2016 Attendance and MAP-R Scale Scores
for Black or African American Students in Grades 3 and 4

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 ($N = 160$)	0.83 (1.83)	0.03	33.4 (2, 157)	0.29
Grade 4 ($N = 238$)	-1.80 (1.13)	-0.06	192.54 (2, 235)	0.62

*$p < .05$, **$p < .01$, ***$p < .001$.

Table B9
The Relationship between BELL 2016 Attendance and MAP-R Scale Scores
for Hispanic/Latino Students in Grades 3 and 4

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 ($N = 561$)	2.10 (0.80)	0.08**	90.15 (5, 555)	0.44
Grade 4 ($N = 803$)	0.57 (0.58)	0.02	575.95 (3, 799)	0.68

*$p < .05$, **$p < .01$, ***$p < .001$.

Table B10
The Relationship between BELL 2016 Attendance and MAP-R Scale Scores
for ESOL Recipients in Grades 3 and 4

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 ($N = 577$)	1.72 (0.79)	0.07*	94.9 (4, 572)	0.40
Grade 4 ($N = 732$)	0.42 (0.61)	0.02	289.9 (5, 726)	0.66

*$p < .05$, **$p < .01$, ***$p < .001$.

Table B11
The Relationship between BELL 2016 Attendance and MAP-R Scale Scores
for FARMS Recipients in Grades 3 and 4

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 (N = 687)	2.07 (0.76)	0.08**	116.9 (4, 682)	0.40
Grade 4 (N = 979)	0.06 (0.53)	0.00	519.8 (4, 974)	0.68

*p < .05, **p < .01, ***p < .001.

Table B12
The Relationship between BELL 2016 Attendance and MAP-R Scale Scores
for Special Education Recipients in Grades 3 and 4

	Attendance at BELL: B (SE)	Attendance at BELL: β	Model fit: F (df)	Model fit: adjusted R^2
Grade 3 (N = 127)	1.37 (1.43)	0.06	82.8 (2, 124)	0.57
Grade 4 (N = 219)	-0.01 (1.11)	0.00	228.3 (2, 216)	0.68

*p < .05, **p < .01, ***p < .001.