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The effects of increased learning time on student academic and nonacademic outcomes: Findings from a meta-analytic review

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Key findings

This report summarizes a review of rigorous research studies on increased learning time. Findings across studies have been combined using meta-analysis techniques.

- Increased learning time programs improved literacy and math achievement when instruction was led by certified teachers, though the effects were small.
- Effects varied by type of instruction. Programs that used a traditional instruction style improved literacy and math achievement. Programs that used an experiential learning instruction style improved student social-emotional skills. In both cases the effects were small.
- Increased learning time improved the literacy achievement of students performing below standards and the social-emotional skills of students with attention deficit/hyperactivity disorder.

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Summary

Interest in increased learning time programs delivered beyond the regular school day has grown (Stonehill et al., 2011). These programs provide additional instruction in English language arts, math, and other subjects and are meant to enhance students' academic interests and success (Redd et al., 2012). The most common approaches include out-of-school programs (before- and after-school and weekend programs); summer school; schools with longer school days, weeks, or years; and year-round schools.

Numerous evaluations have tested the effects of such programs on students' academic knowledge, study skills, social skills, and motivation to learn. This meta-analysis examined more than 7,000 studies, sorted them by scientific rigor, and identified 30 that used research designs capable of yielding strong evidence about the outcomes of increased learning time. In some cases the 30 studies found that increased learning time programs had a positive effect on student outcomes; in other cases the studies found no positive effect. This suggests that no single increased learning time program fits the needs of all students.

The information in this report should help practitioners decide how best to select and implement an increased learning time approach. The programs were found, for example, to improve academic outcomes when instruction was led by certified teachers. Ten studies reported that literacy instruction was delivered by certified teachers and found a statistically significant positive effect on literacy achievement. Five studies reported that math instruction was conducted by certified teachers and found a statistically significant positive effect on math achievement. In both cases, however, the effects were small.

Programs that used a traditional instruction style (with the teacher responsible for the progression of activities and students following directions to complete tasks) improved academic outcomes in literacy (nine studies) and math (four studies). The effects were small for both subjects. Programs that used an experiential learning instruction style (such as hands-on, inquiry-based instruction) improved student social-emotional skill development (for example, self-confidence and self-management; four studies). Again, the effects were small.

The findings also show that increased learning time can benefit students at risk of academic failure. Increased learning time improved the literacy achievement of students performing below standards (three studies). Increased learning time also promoted the social-emotional skill development (for example, emotional well-being and externalizing behavior) of students with attention deficit/hyperactivity disorder (three studies).

Programs that targeted specific student subgroups (such as struggling readers) and used explicit instruction to teach well specified skills tended to show a positive effect on student outcomes. Practitioners who wish to use increased learning time programs might therefore set goals and design activities based on a deep understanding of student needs and interests.

Because this study examined the data one category at a time, it does not provide information on potential interactions among implementation features, such as how the effectiveness of experiential learning, might vary with teacher–student ratio or the frequency and duration of classes. As the evidence base grows, studies like this one will be able to assess the effects of increased learning time using multiple factors at the same time.

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Why this study?

Interest in increased learning time programs has grown in recent decades (Stonehill et al., 2011). Such programs offer additional instruction in English language arts, math, and other subjects to enhance students' academic interests and success (Redd et al., 2012). Some students lack vital foundational skills; these students may need several weeks of instruction that delivers a supplemental curriculum. Increased learning time provides an opportunity to offer supplemental instruction to enable struggling students to catch up (Gersten et al., 2009; Gersten et al., 2008) and to match instruction with students' learning styles (Beckett et al., 2009).

Increased learning time programs are typically funded by federal grants, private foundations, or other local resources. For example, in 2011 the U.S. Department of Education's 21st Century Community Learning Centers funded afterschool programs for more than 1.6 million students in more than 10,000 school- and community-based centers across the country; the Appalachia Region is estimated to have more than 700 centers (Hammer & White, 2012; King, Kemp, Muller, Simmons, & Gorrell, 2005).

Given the variety of increased learning time approaches, schools and districts need credible information about the types and features of programs that are most likely to produce desired student outcomes

Given the variety of increased learning time approaches from which to choose (see box 1), schools and districts need credible information about the types and features of programs that are most likely to produce desired student outcomes. This systematic review of the empirical literature is therefore meant to provide information to both education practitioners and researchers. It is intended to help practitioners select and implement an effective increased learning time program and help researchers identify areas for future inquiry.

A growing evidence base on the academic, social, and other benefits of increased learning time programs has accompanied the growing interest in the programs. Several systematic literature reviews have been conducted over the past decade. However, each review adopted a specific focus. For example, two systematic reviews examined research on summer remediation and enrichment programs (Cooper, Charlton, Valentine, & Muhlenbruck, 2000; Terzian, Moore, & Hamilton, 2009), and two others investigated the effects of afterschool and summer programs (Lauer et al., 2006; Zief, Lauver, & Maynard, 2006). Another review focused on the effects of afterschool programs on social-emotional skill development (Durlak, Weissberg, & Pachan, 2010). In addition to promoting academic knowledge and skills, increased learning time programs may lead to other personal growth opportunities, including higher self-confidence, better interpersonal or study skills, and greater commitment to school and learning (Davies & Peltz, 2012). A meta-analysis of afterschool programs demonstrated a connection between these skills and success at school, finding that participants in afterschool programs that included explicit instruction in social skills significantly increased their positive social behaviors and academic achievement compared with students in a control group (Durlak, Weissberg, & Pachan, 2010).

The specific focus of these reviews makes it difficult to consider findings across types of programs and populations. This evidence review moves beyond past reviews by including more recent research and employing a more rigorous approach for selecting studies. It also draws on a broader evidence base, reviewing research on multiple types of increased learning time programs and student outcomes, with the aim of producing a more comprehensive understanding of the characteristics of successful increased learning time programs.

Box 1. Approaches to increased learning time

This report defines increased learning time as programs that extend students' exposure to instruction beyond the traditional school day and, in some cases, beyond the traditional school year (Stonehill et al., 2011). The most commonly adopted approaches include:

- *Out-of-school programs:* Enrichment and academic programs that operate during the school year but outside regular school hours. These programs may take place before school, after school, or during weekends. They may operate on school campuses or at other sites such as community centers and college campuses.
- *Summer schools:* Study programs held during the summer, chiefly for supplementary and remedial study.
- *Expanded learning time schools:* Schools that increase the number of hours in the school day or the number of days in the school year for all students in one or more grade levels.
- *Year-round schools:* Schools that operate year-round and replace the long summer recess with shorter breaks between school sessions (referred to as intersessions). Extended school days may be offered during intersessions.

In addition to types of programs, other factors might also affect program effectiveness, such as instructors' qualifications and pedagogical practices used. For example, teaching during increased learning time can augment the instruction that occurs during the regular school day without replicating that instruction. Afterschool, weekend, and summertime instruction offers opportunities to recruit additional instructors from the community (such as college students, parents, and individuals with an interest in teaching) and integrate them into programs to boost teacher–student ratios. Instructors can connect their teaching to students' interests and experiences and encourage inquiry and exploration (Beckett et al., 2009).

Two examples of programs that employ additional factors to increase their effectiveness are reading clubs and the National Aeronautics and Space Administration's (NASA) Science, Engineering, Mathematics, and Aerospace Academy out-of-school science program. The reading clubs are before- or after-school programs for grade 2 students who struggle with reading (Berninger, Abbott, Vermeulen, & Fulton, 2006). The club format is intended to motivate students to spend extra time on reading. Students have to whisper the secret password chosen by each club and have their hand stamped every time they enter a club session. Activities are designed to be fun and engaging. Each session begins with an activity called "You [sic] Got to Laugh." Students select riddles and jokes from a collection provided by the teachers and read them to each other. Once a month students vote on their favorite jokes, scoring them on a "laugh-o-meter." The NASA out-of-school science program, which operates from institutions of higher education that target racial/ethnic minority students across the country, is directed to populations typically underserved and underrepresented in science, technology, engineering, and math (Martinez and Cosentino de Cohen, 2010). The program teaches elementary and secondary school students to problem solve real-life situations while completing projects and learning science.

This review also estimates the effects of increased learning time on various student subgroups. Knowing the effects of increased learning time on specific student groups (rather than on the overall student population) can guide program planning. For example, research has shown that students from economically disadvantaged households tend to have fewer

learning opportunities and experience a less supportive learning environment than their more affluent peers (Reardon, 2011). One example of difference in learning opportunities is loss in reading skills during summer recess (Allington, 2010; Cooper, Nye, Charlton, Lindsay, & Greathouse, 1996; Downey, von Hippel, & Broh, 2004). Lack of access to books, encouragement to read, and reading support during summer recess, compounded year after year, may be one of several reasons that students from disadvantaged households are consistently outperformed in reading by their more affluent peers (Allington, 2010). Offering additional reading support beyond the regular school day to students from economically disadvantaged households might help close the achievement gap.

Increased learning time is intended not only for struggling students but also for high-potential students with limited learning opportunities and for students who perform well at school and seek additional learning opportunities (Mahoney, Parente, & Zigler, 2009). Such enrichment activities might boost the skills, academic engagement, education aspirations, and self-confidence of high-potential students from low-income backgrounds who otherwise might not have access to such education programs (VanTassel-Baska & Stambaugh, 2007). For example, some programs use new educational technologies to help students understand ideas in science and the physical world. Some of these programs allow students to express their understanding and ideas in creative ways (Finkelstein & Mayhew, 2008).

What the study considered

The meta-analysis was guided by five research questions:

- To what extent do the four types of increased learning time approaches (out-of-school programs, summer schools, expanded learning time schools, and year-round schools) affect student outcomes?
- What are the effects of increased learning time program characteristics, such as instructors' qualifications, instruction approach, and teacher–student ratio?
- Are increased learning time programs effective for students at risk of academic failure?
- Are increased learning time programs effective for students in urban, suburban, and rural schools?
- Are increased learning time programs effective for students in elementary and secondary grade levels?

Box 2 summarizes the data sources and methodology used for this literature review; appendix A provides more detail.

Box 2. Data sources and methodology

More than 7,000 studies of increased learning time programs were identified for possible review. Of these studies 165 experimental and quasi-experimental studies were identified and screened (see appendix A for more on the review process). Reviewers excluded 135 of these studies in the advanced screening process (see table A2 in appendix A for the primary reasons for excluding each study). Two-thirds of the studies that did not meet the advanced evidence screen were quasi-experimental design studies that did not establish the baseline equivalence of the intervention and comparison groups. That left 30 relevant studies.

The 30 studies were conducted relatively recently (half were published within the last five years). The most commonly represented increased learning time approach in the data was out-of-school time. No studies of expanded learning time schools or year-round schools met the screening criteria (except studies of full-day kindergarten), so no conclusions could be drawn for those approaches. Appendixes B and C detail the study, program, and sample characteristics for each of the 30 studies. Appendix D describes the 21 programs implemented in these studies.

Meta-analysis was used to summarize the findings across the 30 studies that met all screening criteria (see appendix A for the statistical techniques used). The effects of all relevant studies were combined to arrive at a single estimate of the size of the effect (the summary effect). Meta-analysis increases the power of statistical analyses, detecting intervention effects in a set of studies that individually could not detect effects (Cohn & Becker, 2003). Meta-analytic techniques can also be used to determine whether particular features of studies are related to the size of the effect estimate.

Several features of the meta-analysis should be kept in mind when interpreting the results:

- This review uses an effect size of 0.25 as a benchmark of "educational significance," as recommended by Hill, Bloom, Black, and Lipsey (2008). The What Works Clearinghouse terminology of "substantively important" is used when referring to this benchmark.
- Not all studies focusing on a particular program type examined the same outcomes. For example, some studies that examined the effect of out-of-school programs focused on academic outcomes (such as literacy or math achievement) while others looked at non-academic outcomes (such as social-emotional skill development).
- Research evidence that is based on fewer than three studies may be insufficient to provide confident answers to the study's research questions. Therefore, effect sizes based on one or two studies are presented separately.

Findings of the research review

This section details the findings for the report's five research questions. These are based on the 30 studies that were analyzed using meta-analysis approaches, which are outlined in appendix A.

Across all student subgroups, increased learning time programs had a positive effect on students' academic motivation but not on literacy or math achievement

Out-of-school programs (before- and after-school and weekend programs) had a statistically significant but small[1] positive effect on students' academic motivation (table 1). There was no evidence of effect on literacy achievement, math achievement, or social-emotional skill development.[2] Box 3 compares the findings of the current study with those of other meta-analyses of the research on increased learning time.

There is insufficient evidence to suggest that increased learning time is an effective approach for promoting the academic outcomes of all students in all settings

These results portray the extent of change in students' knowledge and skills regardless of their academic needs, grade level, or socioeconomic background. There is insufficient evidence to suggest that increased learning time is an effective approach for promoting the academic outcomes of all students in all settings.

There are other studies (from the set of 30 in this synthesis) that are suggestive of a few program effects. As noted in box 2 however, there are too few (that is, only one or two studies) that examined the effect of the same increased learning time approach on the same student outcome from which to draw a firm conclusion. In the interest of being comprehensive, statistically significant findings from this limited evidence base are described here separately (table 2). Findings from the limited research base are shown because, in addition to suggesting possible program effects, the information also highlights areas in which more research is needed.

Table 1. Summary effects of increased learning time programs, by approach

Outcome	Number of studies	Increased learning time approach	Hedges' *g*[a] (standard deviations)	Standard error	95 percent confidence interval[b]		*Z*-score	*p*-value	Hedges' *g* and 95 percent confidence interval
					Lower limit	Upper limit			–1.00 –0.50 0.00 0.50 1.00 Favors non-ILT Favors ILT
Literacy achievement	7	Out-of-school	–0.04	0.08	–0.21	0.12	–0.51	0.61	
	6	Summer school	0.16	0.10	–0.04	0.36	1.57	0.12	
Math achievement	5	Out-of-school	0.03	0.02	–0.02	0.08	1.34	0.18	
Academic motivation	10	Out-of-school	0.04*	0.02	0.00[c]	0.08	2.05	0.04	
Social-emotional skill development	11	Out-of-school	0.03	0.04	–0.05	0.10	0.73	0.46	

ILT is increased learning time.

* Statistically significant.

a. Average weighted effect size.

b. There is a 95 percent probability that the "true" effect size lies between the lower and upper limits. If the interval includes 0, the average weighted effect size is not statistically significant.

c. Greater than 0 but less than 0.005.

Source: Authors' calculations based on data from the studies reviewed.

Box 3. Comparison of findings to past meta-analyses of increased learning time

This review's findings on the effects of out-of-school programs on literacy and math achievement are consistent with the summary effects reported by Zief, Lauver, and Maynard (2006). Their meta-analysis, which was based on six experimental design studies, did not find a statistically significant effect on literacy or math achievement. In contrast, a meta-analysis by Lauer et al. (2006) found statistically significant effects on literacy (0.13) and math (0.17), though the summary effects were not substantively important (the effect sizes were smaller than 0.25; see box 2).

This review found that out-of-school programs had a negligible effect on social-emotional skill development (0.03). This is in contrast to a meta-analysis of 67 studies of out-of-school programs that reported a statistically significant effect on social-emotional skill development, including reduced problem behavior (effect size = 0.19), increased positive behavior (0.19), increased school bonding (0.14), and more positive self-perceptions (0.34; Durlak, Weissberg, & Pachan, 2010). Unlike the current review, which includes only group-based increased learning time programs, the 67 studies included both one-on-one and group-based interventions, some of which offered interventions during the regular school day as well.

This review found that full-day kindergarten had a small, statistically significant effect on math achievement; however, this finding is based on only two studies and should be interpreted with caution (see table 2). Promising results for full-day kindergarten were also found in a meta-analysis of 40 studies, which showed a statistically significant and substantially important effect on academic achievement (Cooper, Allen, Patall, & Dent, 2010). Yet, unlike the current review, that meta-analysis included mostly studies with a less rigorous study design (for example, the studies did not use comparable control groups).

This review did not find that summer schools had a statistically significant effect on student outcomes. Another meta-analysis, with 41 studies of summer schools, reported a statistically significant positive effect on literacy achievement (effect size = 0.26) and math (0.26; Cooper et al., 2000). However, the 41 studies in that meta-analysis included mostly studies with less rigorous study design (for example, the studies did not use comparable control groups). In addition, the 41 studies evaluated remediation programs for struggling students (for additional information about increased learning time programs for struggling students, see the findings for the third research question).

Two studies suggest that full-day kindergarten may have a statistically significant but small positive effect on math achievement. Evidence from two other studies suggests that out-of-school programs may have a statistically significant and substantively important positive effect on study skills. However, these findings should be interpreted with caution because they are based on limited evidence.

Certified teachers and traditional instruction each had a positive effect on students' academic outcomes; experiential instruction had a positive effect on social-emotional skill development

Employing certified teachers had a statistically significant but small positive effect on students' literacy achievement and math achievement (table 3). These findings support expert recommendations to employ certified teachers in increased learning time programs. Certified teachers are more familiar with state standards and can help align instruction in out-of-school programs and summer schools with the curriculum and expectations of schools and districts (Beckett et al., 2009). Analyses focusing on the teacher–student ratio did not find that group

Table 2. Additional evidence on the effects of increased learning time programs, by approach

Outcome	Number of studies	Increased learning time approach	Hedges' *g*[a] (standard deviations)	Standard error	95 percent confidence interval[b] Lower limit	Upper limit	*Z*-score	*p*-value	Hedges' *g* and 95 percent confidence interval −1.00 −0.50 0.00 0.50 1.00 Favors non-ILT / Favors ILT
Literacy achievement	2	Full-day kindergarten	0.13	0.14	−0.14	0.41	0.96	0.34	
	2	Out-of-school time (school year and summer)	0.09	0.15	−0.20	0.38	0.62	0.53	
Math achievement	2	Full-day kindergarten	0.10*	0.02	0.06	0.14	4.91	0.00	
	2	Out-of-school time (school year and summer)	0.08	0.05	−0.02	0.19	1.61	0.11	
	1	Summer school	−0.23	0.17	−0.57	0.11	−1.33	0.18	
Study skills	2	Out-of-school	**0.87***	0.23	0.42	1.32	3.78	0.00	
	1	Summer school	0.14	0.14	−0.14	0.41	0.97	0.33	
Academic motivation	1	Out-of-school time (school year and summer)	−0.02	0.10	−0.23	0.18	−0.24	0.81	
Social-emotional skill development	1	Summer school	0.12	0.17	−0.20	0.45	0.75	0.45	

ILT is increased learning time.

* Statistically significant but reflects findings of a small number of studies.

Note: Bold value indicates substantively important effect size (at least 0.25).

a. Average weighted effect size.

b. There is a 95 percent probability that the "true" effect size lies between the lower and upper limits. If the interval includes 0, the average weighted effect size is not statistically significant.

Source: Authors' calculations based on data from the studies reviewed.

size in academic instruction was associated with the statistically significant or substantively important effects of increased learning time programs, so those findings are not reported.

Traditional instruction programs had a statistically significant but small positive effect on students' literacy achievement and math achievement (table 4; see box 4 for definitions of instruction styles). Experiential education programs had a statistically significant but small positive effect on students' social-emotional skill development. Although educators have conceptualized experiential education as a means for engaging students and sparking their interest in learning (Petress, 2008), the four studies reviewed that measured academic motivation provide no evidence that this instruction style led to improved academic outcomes. Guided practice showed no statistically significant effect on any outcome.

Additional evidence from a more limited research base of one or two studies suggests that experiential education may have a statistically significant and substantively important positive effect on literacy achievement (table 5). In addition, two studies (that focused on students with attention deficit/hyperactivity disorder, ADHD) suggest that increased learning time programs that used guided practice (with academic materials such as textbooks and worksheets) may have a statistically significant and substantively important positive effect on students' study skills.

Table 3. Summary effects of increased learning time programs, by instructor qualifications

Outcome	Number of studies	Instructor qualification	Hedges' *g*[a] (standard deviations)	Standard error	95 percent confidence interval[b] Lower limit	Upper limit	*Z*-score	*p*-value	Hedges' *g* and 95 percent confidence interval −1.00 −0.50 0.00 0.50 1.00 Favors non-ILT Favors ILT
Literacy achievement	6	Noncertified	−0.08	0.07	−0.22	0.06	−1.08	0.28	
	10	Certified	0.18*	0.07	0.04	0.32	2.60	0.01	
Math achievement	5	Noncertified	0.03	0.03	−0.02	0.09	1.35	0.18	
	5	Certified	0.09*	0.02	0.05	0.13	4.90	0.00	
Academic motivation	8	Noncertified	0.04	0.02	−0.01	0.08	1.55	0.12	
	3	Certified	0.04	0.04	−0.03	0.11	1.05	0.29	
Social-emotional skill development	9	Noncertified	0.04	0.04	−0.04	0.13	1.01	0.31	
	3	Certified	0.01	0.06	−0.12	0.13	0.08	0.93	

ILT is increased learning time.

* Statistically significant.

a. Average weighted effect size.

b. There is a 95 percent probability that the "true" effect size lies between the lower and upper limits. If the interval includes 0, the average weighted effect size is not statistically significant.

Source: Authors' calculations based on data from the studies reviewed.

Table 4. Summary effects of increased learning time programs, by pedagogical approach

Outcome	Number of studies	Pedagogical approach	Hedges' *g*[a] (standard deviations)	Standard error	95 percent confidence interval[b] Lower limit	Upper limit	*Z*-score	*p*-value	Hedges' *g* and 95 percent confidence interval −1.00 −0.50 0.00 0.50 1.00 Favors non-ILT Favors ILT
Literacy achievement	6	Guided practice	−0.11	0.07	−0.25	0.03	−1.61	0.11	
	9	Traditional	0.14*	0.07	0.01	0.27	2.04	0.04	
Math achievement	6	Guided practice	0.03	0.02	−0.01	0.08	1.44	0.15	
	4	Traditional	0.10*	0.02	0.06	0.13	5.01	0.00	
Academic motivation	4	Experiential	0.06	0.04	−0.02	0.14	1.52	0.13	
	6	Guided practice	0.03	0.03	−0.03	0.09	1.08	0.28	
Social-emotional skill development	4	Experiential	0.11*	0.01	0.09	0.13	11.32	0.00	
	8	Guided practice	−0.02	0.02	−0.06	0.01	−1.19	0.23	

ILT is increased learning time.

* Statistically significant.

a. Average weighted effect size.

b. There is a 95 percent probability that the "true" effect size lies between the lower and upper limits. If the interval includes 0, the average weighted effect size is not statistically significant.

Source: Authors' calculations based on data from the studies reviewed.

Box 4. Definitions of instruction style and at-risk student subgroups

Instruction style

Experiential education: A form of explicit instruction. It differs from traditional instruction because it uses hands-on activities, project-based learning, and field trips as the main learning activities. Examples of experiential education activities reported in the studies reviewed include working with lab equipment in science centers, writing for the school newspaper, and designing projects in science and technology.

Guided practice: Instruction that provides students with time and supervision as they work independently on their tasks. Students may interact with adults as they ask questions and receive feedback on their work.

Traditional instruction: A form of explicit instruction and the most common instruction approach in schools today. The teacher is responsible for the progression of activities and the explicit instruction of the concepts and skills. Students follow directions to complete tasks, and the teacher checks on their understanding through participation in class, student products, quizzes, and exams.

At-risk student subgroups

Students from low-income households: Students enrolled in schools with high rates of student poverty as defined by eligibility for Title I, Part A, funds.

Students performing below standards: Students performing below academic standards who are identified based on teachers' observations of performance in class or on district assessments (for students in kindergarten–grade 2) and based on academic grades and scores on state standardized tests and teacher concerns about academic progress (all other students).

Students with chronic behavior problems: Students with a high number and severity of disciplinary infractions on school grounds, such as disrespect for school personnel and school property, and involvement in violent or illegal behavior.[1]

Students with individualized education programs: As mandated by the Individuals with Disabilities Education Improvement Act, students with disabilities who are eligible for special education services (Kleiner, Porch, & Farris, 2002). The research team reviewed studies that included students with different types of special needs. However, only one type of disability, attention deficit/hyperactivity disorder (ADHD), was analyzed in studies with sufficient rigor to be included in the review. The disorder is characterized by a persistent pattern of inattention and hyperactivity-impulsivity that is more frequently displayed and severe than is typically observed for a specified age group. These difficulties interfere with developmentally appropriate social and academic functioning (American Psychiatric Association, 2000). About 8.4 percent of children ages 3–17 are diagnosed with the disorder (Bloom, Cohen, & Freeman, 2012).

Note

1. Because of the small number of studies that included students with behavior problems (one measuring literacy skills and another measuring social-emotional skills), it is not possible to draw conclusions about the effectiveness of increased learning time for this student subgroup. Moreover, one study focused on literacy instruction only and did not address students' social-emotional skills, and the other study included explicit social-emotional learning instruction.

Table 5. Additional evidence on the effects of increased learning time programs, by pedagogical approach

Outcome	Number of studies	Pedagogical approach	Hedges' *g*[a] (standard deviations)	Standard error	95 percent confidence interval[b] Lower limit	Upper limit	*Z*-score	*p*-value	Hedges' *g* and 95 percent confidence interval −1.00 −0.50 0.00 0.50 1.00 Favors non-ILT Favors ILT
Literacy achievement	2	Experiential	**0.53***	0.19	0.16	0.90	2.80	0.01	
Study skills	1	Experiential	0.14	0.14	−0.14	0.41	0.97	0.33	
	2	Guided practice	**0.87***	0.23	0.42	1.32	3.78	0.00	
Academic motivation	1	Traditional	−0.02	0.11	−0.24	0.19	−0.23	0.82	

ILT is increased learning time.

* Statistically significant but reflects findings of a small number of studies.

Note: Bold values indicate substantively important effect size (at least 0.25).

a. Average weighted effect size.

b. There is a 95 percent probability that the "true" effect size lies between the lower and upper limits. If the interval includes 0, the average weighted effect size is not statistically significant.

Source: Authors' calculations based on data from the studies reviewed.

Increased learning time had a positive effect on students performing below standards

Increased learning time programs had a statistically significant and substantially important positive effect on the literacy achievement of students performing below standards (table 6; see box 4 for definitions of "students performing below standards" and other at-risk student subgroups).

Increased learning time programs also yielded a statistically significant but small effect on the literacy and math achievement of students who are not at risk.

Finally, increased learning time programs had a statistically significant and substantively important positive effect on the social-emotional skill development of students with ADHD.[3]

Table 6. Summary effects of increased learning time programs, by student subgroup

Outcome	Number of studies	Student subgroup	Hedges' *g*[a] (standard deviations)	Standard error	95 percent confidence interval[b] Lower limit	Upper limit	*Z*-score	*p*-value	Hedges' *g* and 95 percent confidence interval −1.00 −0.50 0.00 0.50 1.00 Favors non-ILT Favors ILT
Literacy achievement	3	Performing below standards	**0.56***	0.13	0.29	0.82	4.13	0.00	
	11	From low-income households	0.02	0.02	−0.02	0.06	1.03	0.30	
	4	Not at risk	0.10*	0.02	0.06	0.14	4.99	0.00	
Math achievement	7	From low-income households	0.04	0.02	0.00	0.08	1.84	0.07	
	3	Not at risk	0.09*	0.02	0.06	0.13	4.72	0.00	
Academic motivation	9	From low-income households	0.04	0.02	0.00	0.08	1.82	0.07	
Social-emotional skill development	3	With ADHD	**0.46***	0.20	0.08	0.85	2.36	0.02	
	9	From low-income households	0.01	0.04	−0.06	0.08	0.30	0.76	

ILT is increased learning time. ADHD is attention deficit/hyperactivity disorder.

* Statistically significant.

Note: Bold values indicate substantively important effect size (at least 0.25).

a. Average weighted effect size.

b. There is a 95 percent probability that the "true" effect size lies between the lower and upper limits. If the interval includes 0, the average weighted effect size is not statistically significant.

Source: Authors' calculations based on data from the studies reviewed.

Additional evidence from a more limited research base of one or two studies suggests that increased learning time programs may have a statistically significant and substantively important negative effect on the literacy achievement of students with chronic behavior problems (table 7). In contrast, increased learning time programs may have a statistically significant and substantively important *positive* effect on study skills for students with ADHD.

Table 7. Additional evidence of the effects of increased learning time programs, by student subgroup

Outcome	Number of studies	Student subgroup	Hedges' *g*[a] (standard deviations)	Standard error	95 percent confidence interval[b]		*Z*-score	*p*-value	Hedges' *g* and 95 percent confidence interval
					Lower limit	Upper limit			–1.00 –0.50 0.00 0.50 1.00 Favors non-ILT Favors ILT
Literacy achievement	1	Behavior problems	**–0.78***	0.08	–0.95	–0.61	–9.19	0.00	
Math achievement	1	Below standards	0.19	0.24	–0.29	0.67	0.78	0.44	
Study skills	2	With ADHD	**0.87***	0.23	0.42	1.32	3.78	0.00	
	1	Behavior problems	0.14	0.14	–0.14	0.41	0.97	0.33	
Academic motivation	1	With ADHD	0.29	0.30	–0.31	0.88	0.94	0.35	
	1	Not at risk	0.04	0.11	–0.17	0.25	0.34	0.73	
Social-emotional skill development	1	Behavior problems	0.12	0.16	–0.20	0.45	0.76	0.45	

ILT is increased learning time. ADHD is attention deficit/hyperactivity disorder.

* Statistically significant but reflects findings of a small number of studies.

Note: Bold values indicate substantively important effect size (at least 0.25) but reflect findings of a small number of studies.

a. Average weighted effect size.

b. There is a 95 percent probability that the "true" effect size lies between the lower and upper limits. If the interval includes 0, the average weighted effect size is not statistically significant.

Source: Authors' calculations based on data from the studies reviewed.

Increased learning time can be effective in urban, suburban, and mixed locales

Increased learning time programs had a statistically significant and substantively important positive effect on literacy achievement for students in suburban school districts (table 8). Increased learning time programs had a statistically significant but small positive effect on math achievement and academic motivation of students in mixed locales. Researchers have pointed to the greater accessibility of community-based resources in suburban and urban areas compared with those in rural areas. These resources may include partnerships with local colleges and nonprofit organizations that can provide curriculum development expertise and support staff (Grineski, 2003; Khashu & Dougherty, 2007). In two of the studies reviewed, the program was developed and supervised by a higher education institution.

Table 8. Summary effects of increased learning time programs, by locale

Outcome	Number of studies	Locale	Hedges' *g*[a] (standard deviations)	Standard error	95 percent confidence interval[b] Lower limit	Upper limit	*Z*-score	*p*-value	Hedges' *g* and 95 percent confidence interval −1.00 −0.50 0.00 0.50 1.00 Favors non-ILT Favors ILT
Literacy achievement	3	Mixed	0.08	0.11	−0.14	0.30	0.74	0.46	
	3	Unknown	0.09	0.17	−0.24	0.42	0.52	0.60	
	3	Suburban	**0.28***	0.14	0.01	0.56	2.00	0.05	
	8	Urban	−0.02	0.07	−0.16	0.13	−0.24	0.81	
Math achievement	4	Mixed	0.09*	0.02	0.05	0.12	4.97	0.00	
	4	Urban	0.04	0.03	−0.02	0.09	1.28	0.20	
Academic motivation	4	Mixed	0.05*	0.02	0.00	0.09	2.15	0.03	
	6	Urban	0.03	0.02	0.00	0.06	1.89	0.06	
Social-emotional skill development	3	Mixed	−0.03	0.04	−0.10	−0.05	−0.64	0.52	
	7	Urban	0.06	0.04	−0.01	0.14	1.62	0.11	

ILT is increased learning time.

* Statistically significant.

Note: Bold value indicates substantively important effect size (at least 0.25).

a. Average weighted effect size.

b. There is a 95 percent probability that the "true" effect size lies between the lower and upper limits. If the interval includes 0, the average weighted effect size is not statistically significant.

Source: Authors' calculations based on data from the studies reviewed.

Additional evidence based on a more limited research base of one study suggests that increased learning time programs may have a statistically significant and substantively important positive effect on study skills for students in urban and suburban districts (table 9). However, this finding should be interpreted with extreme caution because it is based on a single study.

Increased learning time programs had a positive effect on the academic achievement of elementary school students but a negative effect on the literacy achievement of middle school students

Increased learning time programs had a statistically significant positive effect on the literacy and math achievement of elementary school students (table 10). However, among studies that looked at students in middle school, increased learning time programs had no effect on math achievement and a statistically significant negative effect on literacy achievement. Neither the positive effect for elementary school students nor the negative effect for middle school students was substantively important.

Table 9. Additional evidence of the effects of increased learning time programs, by locale

Outcome	Number of studies	Increased learning time approach	Hedges' g[a] (standard deviations)	Standard error	95 percent confidence interval[b] Lower limit	Upper limit	Z-score	p-value	Hedges' g and 95 percent confidence interval
									−1.00 −0.50 0.00 0.50 1.00 Favors non-ILT Favors ILT
Math achievement	1	Unknown	−0.23	0.17	−0.57	0.11	−1.33	0.18	
	1	Rural	0.19	0.24	−0.29	0.67	0.78	0.44	
Study skills	1	Rural	0.14	0.14	−0.14	0.41	0.97	0.33	
	1	Suburban	**0.73***	0.35	0.05	1.41	2.10	0.04	
	1	Urban	**0.97***	0.31	0.37	1.57	3.19	0.00	
Social-emotional skill development	1	Unknown	0.35	0.31	−0.25	0.95	1.16	0.25	
	1	Rural	0.12	0.15	−0.17	0.42	0.81	0.42	

ILT is increased learning time.

* Statistically significant but reflects findings of a small number of studies.

Note: Bold values indicate substantively important effect size (at least 0.25) but reflect findings of a small number of studies.

a. Average weighted effect size.

b. There is a 95 percent probability that the "true" effect size lies between the lower and upper limits. If the interval includes 0, the average weighted effect size is not statistically significant.

Source: Authors' calculations based on data from the studies reviewed.

Table 10. Summary effects of increased learning time programs, by grade level

Outcome	Number of studies	Grade level	Hedges' g[a] (standard deviations)	Standard error	95 percent confidence interval[b] Lower limit	Upper limit	Z-score	p-value	Hedges' g and 95 percent confidence interval
									−1.00 −0.50 0.00 0.50 1.00 Favors non-ILT Favors ILT
Literacy achievement	13	Elementary	0.07*	0.01	0.04	0.09	4.7	0.00	
	4	Middle	−0.21*	0.05	−0.30	−0.12	−4.64	0.00	
Math achievement	6	Elementary	0.07*	0.02	0.03	0.11	3.38	0.00	
	4	Middle	0.05	0.06	−0.06	0.16	0.94	0.35	
Academic motivation	3	Elementary	0.02	0.04	−0.06	0.10	0.49	0.62	
	6	Middle	0.07	0.04	−0.01	0.16	1.65	0.10	
Social-emotional skill development	4	Elementary	−0.03	0.03	−0.08	0.03	−0.88	0.38	
	7	Middle	0.01	0.04	−0.06	0.08	0.32	0.75	

ILT is increased learning time.

* Statistically significant.

a. Average weighted effect size.

b. There is a 95 percent probability that the "true" effect size lies between the lower and upper limits. If the interval includes 0, the average weighted effect size is not statistically significant.

Source: Authors' calculations based on data from the studies reviewed.

Additional evidence from a more limited research base (of one study) suggests that increased learning time programs may have a statistically significant and substantively important positive effect on students' study skills at the elementary and middle school levels, as well as a statistically significant but small positive effect on the social-emotional skill development of high school students (table 11). However, these findings should be interpreted with extreme caution because they are based on a single study.

Table 11. Additional evidence of the effects of increased learning time programs, by grade level

Outcome	Number of studies	Grade level	Hedges' *g*[a] (standard deviations)	Standard error	95 percent confidence interval[b] Lower limit	Upper limit	*Z*-score	*p*-value	Hedges' *g* and 95 percent confidence interval −1.00 −0.50 0.00 0.50 1.00 Favors non-ILT Favors ILT
Study skills	1	Elementary	0.14	0.14	−0.14	0.41	0.97	0.33	
	1	Elementary and middle	**0.73***	0.35	0.05	1.41	2.10	0.04	
	1	Middle	**0.97***	0.31	0.37	1.57	3.19	0.00	
Academic motivation	1	Elementary and middle	0.04	0.11	−0.19	0.26	0.32	0.75	
	1	High	0.03	0.05	−0.08	0.14	0.55	0.58	
Social-emotional skill development	1	High	0.11*	0.03	0.05	0.17	3.77	0.00	

ILT is increased learning time.

* Statistically significant but reflects findings of a small number of studies.

Note: Bold values indicate substantively important effect size (at least 0.25) but reflect findings of a small number of studies.

a. Average weighted effect size.

b. There is a 95 percent probability that the "true" effect size lies between the lower and upper limits. If the interval includes 0, the average weighted effect size is not statistically significant.

Source: Authors' calculations based on data from the studies reviewed.

Implications of the study

Given the variety of increased learning time programs from which to choose, schools and districts need credible information on the types, features, and conditions under which increased learning time programs are effective. Researchers also need direction on areas for future research. The evidence base reviewed for this report identified 15 statistically significant positive effects of increased learning time programs on student outcomes (table 12).

In sum, districts and schools should choose increased learning time programs based on a program's features as well as the student outcome targeted for improvement

Not all increased learning time programs are equally effective. This review shows that the details about the programs—from the types of students targeted to the specific conditions of implementation—matter. For example, increased learning time programs had a small but statistically significant positive effect on the literacy and math achievement of elementary school students. In contrast, increased learning time programs had a small but statistically significant negative effect on the literacy achievement of middle school students and no discernible effect on the mathematics achievement of middle school students; this finding indicates that little is known about effective increased learning time programs for middle school students.

Not all increased learning time programs are equally effective. This review shows that the details about the programs—from the types of students targeted to the specific conditions of implementation—matter

The primary findings from this review indicate that increased learning time programs were effective when:

- *Certified teachers delivered the increased learning time academic instruction.* Increased learning time programs that employed certified teachers had a statistically

Table 12. Program features, student groups, and circumstances under which increased learning time produced a statistically significant effect

Outcome	Negative effect from increased learning time	Positive effect from increased learning time		
		Implementation features	Student groups	Settings
Literacy achievement	**Middle school students (4 studies)**	Certified teachers (10 studies)	**Students performing below standards (3 studies)**	Suburban locales (3 studies)
		Traditional instruction (9 studies)	**Students not at risk (4 studies)**	Elementary school (13 studies)
Math achievement		Certified teachers (5 studies)	**Students not at risk (3 studies)**	Students from a variety of locales (4 studies)
		Traditional instruction (4 studies)		Elementary school (6 studies)
Academic motivation		Out-of-school program (10 studies)		Students from a variety of locales (4 studies)
Social-emotional skill development		**Experiential instruction (4 studies)**	**Students with attention deficit/ hyperactivity disorder (3 studies)**	

Note: Bold cells indicate findings that are substantively important (effect size of at least 0.25).

Source: Authors' calculations based on data from the studies reviewed.

significant but small positive effect on students' literacy achievement and math achievement. In contrast, programs that employed instructors who were not certified (such as graduate students and volunteers) had no effect on students' academic achievement.

- *Program facilitators used traditional instruction.* Traditional instruction includes organized and focused lessons, clear articulation of learning objectives, and a sequenced demonstration of skills. Increased learning time programs that used traditional instruction had a statistically significant but small positive effect on students' literacy and math achievement. In contrast, programs based on guided practice (that is, time and supervision as students work independently on their tasks) without initial, explicit instruction did not improve students' academic achievement.
- *Program facilitators used experiential instruction.* Experiential education uses hands-on activities, project-based learning, and field trips as the main learning activities. Increased learning time programs that incorporated experiential education had a statistically significant but small positive effect on students' social-emotional skill development, including self-esteem, prosocial behavior, and self-regulation.
- *Specific student subgroups were targeted.* Broad program inclusion criteria using classification categories such as "low-income households" are not sufficient to inform effective program design. In the research reviewed, effective programs targeted specific subgroups of students (for example, students performing below literacy standards) based on district, school, and program assessments and teacher reports and offered a curriculum designed to address students' needs, such as:
  - *Students struggling to meet grade-level standards in English language arts.* Increased learning time programs in reading and writing had a statistically significant but small positive effect on literacy achievement for students at or above academic standards and a statistically significant and substantively important positive effect on literacy achievement for students below academic standards.
  - *Students with ADHD.* Afterschool activities for middle school students with ADHD produced a statistically significant but small positive effect on their social-emotional skill development (see caution below).

Additional rigorous research evidence on expanded learning time schools and year-round schools is needed to inform increased learning time practices as part of the regular school schedule

Further research is needed on increased learning time

The results of this report point to the need for additional studies to improve the knowledge base on increased learning time programs. Effective implementation features were identified based primarily on evaluations of increased learning time programs implemented outside the regular school day. Of the 30 studies in the analysis, 26 evaluated out-of-school programs and summer schools. Additional rigorous research evidence on expanded learning time schools and year-round schools is needed to inform increased learning time practices as part of the regular school schedule. Additional work is also needed to help practitioners understand the tradeoffs when adopting different types of programs.

The conclusions of the analysis reported here are based primarily on outcomes of elementary and middle school students. Only one study reported an effect on high school students. Furthermore, experts suggest that increased learning time programs for high school students should be conceptualized differently from programs for elementary and middle school students in terms of goals, content, structure, and organization (Friedman &

Bleiberg, 2007). Additional rigorous research is needed on the effects of increased learning time programs on high school students' academic and nonacademic outcomes, including their career and college readiness.

Finally, this review and meta-analysis identified only studies that examined increased learning time programs in urban and suburban locales. No recently conducted rigorous studies on the effects of increased learning time programs in rural settings were found. Future studies should examine whether the effects found for increased learning time programs in urban and suburban settings apply in rural settings as well.

Study limitations

This meta-analysis used a systematic search and screening process that prevented the research team's personal biases from affecting the findings and interpretations. Despite this strength, the review is not without limitations. First, readers can have more confidence in findings that are based on a larger number of studies (three or more). When the summary effect is based on a small number of studies (one or two), the estimates are often less stable, leading to misleading measures of effect sizes and confidence intervals.

Second, the analyses involved in examining research questions 2–5 only suggest the conditions under which student effects are largest. However, there are instances when the characteristics being examined are confounded with program effects, making interpretation difficult (Lipsey, 2003). One example involves interpreting whether increased learning time programs are especially effective at improving the study skills of students with ADHD. The same studies that looked at this relationship also noted that university staff implemented these programs. Thus, with the meta-analytic findings alone, it cannot be determined which program or student characteristic actually influenced the outcome.

A third limitation involves the limited breadth of characteristics that have been rigorously examined within the pool of 30 relevant and rigorous studies. Schools and districts looking to apply the findings of this report to their programs should take into consideration other factors that have received less attention in the research but may influence the effectiveness of their programs, such as the nature of the facility (Tanner, 2009) and program management and social climate, as indicated by supervision styles, staff turnover, and program policies pertaining to student behavior (Cross, Gottfredson, Wilson, Rorie, & Connell, 2010).

Appendix A. Research methodology

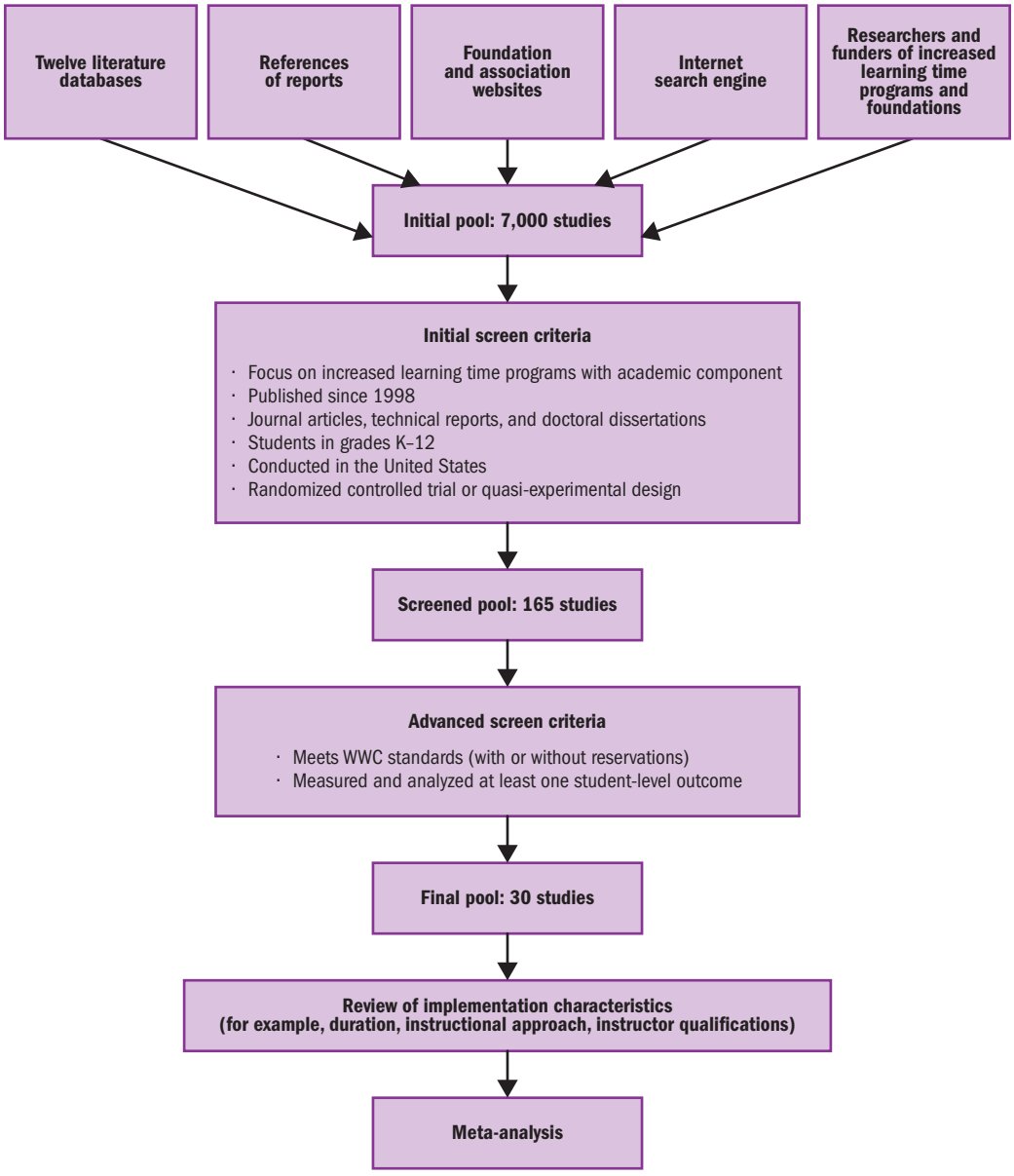
This appendix discusses the literature search and screening process, coding program characteristics, and the calculations and meta-analytic procedures used in the study.

Literature search and screening

Figure A1 shows a flow chart of the literature search and screening process.

The initial literature search cast a wide net to include all published and nonpublished research on increased learning time. The purpose of this extensive search was to ensure

Figure A1. Literature search and screening process



Source: Authors.

that the review included all the relevant research about increased learning time. This strategy identified more than 7,000 research reports.[4]

Five strategies were used to locate reports:

1. Used search strings in 12 literature databases (see table A1 for keywords):
   - Academic Search Premier.
   - Education Research Complete.
   - Education Full Text (H. W. Wilson).
   - ERIC.
   - JSTOR.
   - Professional Development Collection.
   - ProQuest.
   - PsycARTICLES.
   - PsycEXTRA.
   - PsycINFO.
   - Psychology and Behavioral Sciences Collection.
   - SocINDEX with Full Text.

2. Searched references of reports

   Many research studies mention the results of prior evaluations. Therefore, reviewers examined the references in each of the studies located through databases search. In addition, the reviewers examined references of the meta-analysis and research review

Table A1. Keywords used in academic database and Internet searches

Topic	Intervention	Evaluation
Increased learning time	Program	Evaluation
Expanded learning time	School	Effects of
Extended learning time	Intervention	Experiment
Expanded learning school	Tier 2	Comparison group
Expanded learning opportunities	Tier 3	Control group
After school	Response to intervention	Outcome
Before school	Remediation	
Weekend	Acceleration	
Summer	Credit recovery	
Longer school day	College readiness	
Longer school year	Transition to middle school	
Out-of-school	Transition to high school	
School calendar	Enrichment	
Year-round school	Clubs	
Full-day kindergarten		
All-day kindergarten		
Extended day		
Expanded day		
Length of day		
Yearlong		

Source: Authors.

reports (Cooper et al., 2010; Cooper et al., 2000; Beckett et al., 2009; Durlak et al., 2010; Lauer et al., 2006; Terzian et al., 2009).

3. Reviewed foundation and association websites

   The review team searched websites to identify research reports and references to published articles. The list below includes the links of websites searched.
   - Afterschool Alliance: http://www.afterschoolalliance.org/
   - Center for Comprehensive School Reform and Improvement: http://www.centerforcsri.org/
   - Find Youth Info: http://findyouthinfo.gov/
   - Harvard Family Research Project: http://www.hfrp.org/out-of-school-time
   - Harvard Family Research Project Out-of-School Time Program Research and Evaluation Database: http://www.hfrp.org/out-of-school-time/ost-database-bibliography
   - National Association for Year-Round Education: http://www.nayre.org/
   - National Center on Time and Learning: http://www.timeandlearning.org/
   - National Institute on Out-of-School Time: http://www.niost.org/
   - National Summer Learning Association: http://www.summerlearning.org/
   - National Network of Statewide Afterschool Networks: http://www.statewideafterschoolnetworks.net/
   - Time to Succeed Coalition: http://www.timetosucceed.com/
   - Southern Regional Education Board: http://www.sreb.org/
   - U.S. Department of Education website, including the National Center for Education Evaluation and Regional Assistance pages: http://ies.ed.gov/ncee/
   - The Wallace Foundation: Summer and Extended Learning Time: http://www.wallacefoundation.org/knowledge-center/summer-and-extended-learning-time/Pages/default.aspx

4. Used Internet search engine

   The same keywords used to search academic databases were also entered into the Google search engine to identify publicly available research reports.

5. Made inquiries to researchers and funders of increased learning time programs and foundations

   The research team sent e-mails to increased learning time researchers and to foundations that have funded research on increased learning time. This data collection activity aimed to identify unpublished research.

Screening process

Study abstracts and in some cases full study reports of the more than 7,000 experimental and quasi-experimental studies identified in the literature search were reviewed. To pass the initial screen, studies had to meet several criteria to ensure that they were relevant to the topic, were relevant to the current education system, and used a quantitative research design that included a comparison group.[5] This process screened out 6,835 studies, leaving 165 studies that progressed to advanced screening.

To be included in the review, a study had to meet the following relevancy criteria:

- *Topic relevance.* The report had to summarize a study about the effect of an increased learning time program or school on student outcomes. Eligible increased learning time programs included expanded learning time schools (schools that add to the state-required minimum annual instruction hours by lengthening the school day, week, or year) and out-of-school programs that included academic instruction (out-of-school programs that included only sports activities were not eligible for review, nor were afterschool care programs that included homework help but no purposeful academic instruction). Evaluations of multicomponent educational initiatives (such as evaluations of charter schools) in which the effects of increased learning time cannot be disentangled were excluded from the review.
- *Timeframe relevance.* The scope of the review was limited to reports of studies made available since 1998. This timeframe complements earlier reviews on similar topics conducted in the 1990s and is more relevant to the current education system; budgetary constraints prohibited reviewing studies published earlier.
- *Publication status.* To be reviewed, a study report could be published or unpublished.[6] In either case the manuscript had to be considered final by the study authors (versions labeled "draft" were not reviewed).
- *Sample relevance.* The study had to satisfy two sample-related criteria:
  - *Grade levels.* The study assessed outcomes of K–12 students. Studies assessing preschool students only were not eligible for inclusion. Studies that assessed outcomes of college students were included if the intervention evaluated was conducted within the range of K–12 grade levels (for example, a high school summer bridge program to promote academic outcomes during the freshman year in college).
  - *Location of the intervention.* Eligible studies included samples in the United States or its territories. Because of the difference in formal and informal education systems internationally, studies conducted outside the United States were considered as outside the scope of the review.
- *Design relevance.* The report had to summarize a study that included a counterfactual condition (defined as a likely result had students not been exposed to the program).

The results of the initial screening were documented in a database that tracked the bibliographic information of all studies screened. A trained researcher sorted and organized the database to ensure that multiple reports of the same study were linked together to avoid duplication in review.

The second step of the screening process focused on the studies' methodologies to identify those that could reliably assess causal relationships between increased learning time and student outcomes. Eligible studies also had to meet evidence standards established by the What Works Clearinghouse (WWC)[7] and to analyze outcomes at the student level (as opposed to the school level).[8] Reviewers certified to perform reviews for the WWC conducted the advanced screening and identified the studies that met WWC standards (see below).

The following criteria were used in the advance screen:

1. Study meets WWC standards (with or without reservations).
   - *Full reports.* Full reports were required for the completion of the advanced screening. When shortened project summaries (such as research briefs, Web-based summaries, and nontechnical summaries) were identified in searches, the literature review team attempted to find the full technical version of the report and base its eligibility on that version.
   - *Study design relevance.* Only empirical studies that used quantitative methods and inferential statistical analysis and that met WWC standards or met WWC standards with reservations were included. Studies met WWC standards if they randomly assigned units (students, classrooms, teachers, or schools) to experimental conditions and showed low overall attrition of units from the study and low differential attrition from the study (that is, units from one group discontinue study at higher rate than another experimental group). Studies met WWC standards with reservations if they were a group design (involving two or more groups, including groups from randomized controlled trials studies with high overall or differential attrition or naturally occurring groups with one exposed to the program and one not exposed to the program) and demonstrated that the groups were equivalent on a measure of the outcome at baseline.
   - *Reliability and validity of outcome measures.* Only findings from outcome measures that were reliable and valid and not overaligned with the intervention were included. Reliability was indicated by internal consistency (minimum of 0.60; Cronbach's alpha), temporal stability/test-retest reliability (minimum of 0.40), or interrater reliability (minimum of 0.50; percent agreement, correlation, Cohen's kappa). Validity refers to whether a measure assesses what it is supposed to measure for the intended purpose; it was determined based on a description or sample items of the measure. Overalignment of measures is evident when an outcome measure assesses constructs that are explicitly used in the intervention. Most measures of academic constructs (that is, achievement on assessments, graduation rates, and school attendance rates) were eligible for inclusion in the review. However, student grades, grade point averages, and office referrals were not considered as reliable or valid due to variations in how they are defined and practiced across schools.

2. Study measured and analyzed at least one student-level outcome. Classroom-level and school-level effect size were regarded as noncomparable to student-level effect size and could not be averaged together to estimate mean weighted effect sizes. Therefore, studies that reported classroom-level or school-level data only were excluded from the review.

Of the 165 studies screened in the advanced screening process, 135 were excluded; table A2 lists the primary reasons. Two-thirds of the studies that did not meet evidence screens did not establish baseline equivalence for the intervention and comparison groups used for the statistical analysis. Instances in which reviewers were unable to determine whether two groups in a study were equivalent were removed from the pool of eligible studies. The short project timelines did not allow the research team to query report authors for more clarification.

Table A2. Reasons for excluding studies during the advanced screening process

Primary reason for exclusion	Number of studies excluded	Share of total (percent)
Baseline equivalence was not demonstrated.[a]	91	67
The study did not use a "business-as-usual" comparison group.	16	12
There was only one unit assigned to one or both conditions (confounding).	7	5
The increased learning time program did not include an academic component.	5	4
Analysis did not use student-level data.	4	3
Increased learning time is not the main program component.	3	2
The study used a regression discontinuity design.	2	1
Participants were not enrolled in grades K–12 during the study.	2	1
The increased learning time program was not conducted in a group setting.	2	1
The study was conducted outside the United States.	1	1
The outcome measures were not shown to be valid and reliable.	1	1
None of the outcome measures fall within the scope of this review.	1	1
Total	135	100

a. According to What Works Clearinghouse standards, baseline equivalence should be demonstrated for quasi-experimental design studies as well as randomized controlled trials with high attrition or randomization problems.

Source: Authors.

Figure A2 summarizes the 30 studies identified by the advanced screen as eligible for inclusion in the meta-analysis by sample characteristics, and figure A3 summarizes the studies by program and study design characteristics.

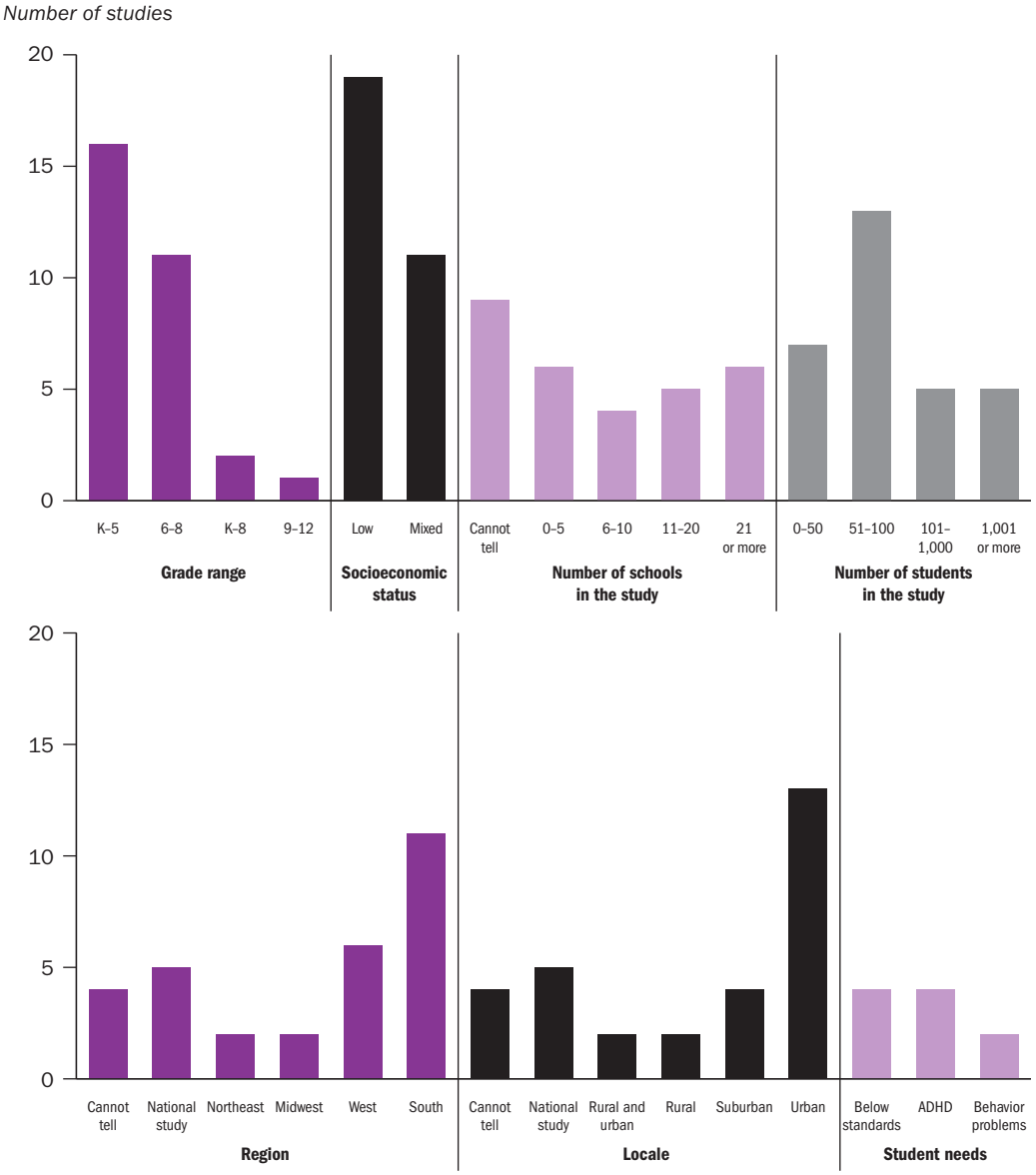
Coding program characteristics

Reviewers used the WWC study review guide from Beckett et al. (2009) to code program characteristics. A study review guide is a macro-enabled spreadsheet on which certified WWC reviewers record characteristics of the study and descriptive and inferential statistics from the study report. The guide automatically calculates an effect size based on descriptive or inferential statistics. The characteristics of most interest for this evidence review include:

- Internal validity of the study (whether groups were equivalent at baseline, confounding problems). (Studies with no major threats to their internal validity were included in the meta-analysis.)
- Characteristics of the study sample (for example, student grade level, gender, prior academic performance level, socioeconomic background).
- Characteristics of the increased learning time program (specifically, duration of the program in hours, qualifications of instruction staff, instruction approach, and teacher–student ratio).
- Statistical results of the study that can be used to calculate effect sizes.

Using the study review guide, reviewers collected information about the study design, sample, and findings and confirmed or rejected the judgment made during full screening about whether the study met WWC standards with or without reservations. Reviewers based standards for determining threats to internal validity (such as thresholds for allowable differential attrition) on What Works Clearinghouse (2010).

Figure A2. Number of studies, by sample characteristics



ADHD is attention deficit/hyperactivity disorder.

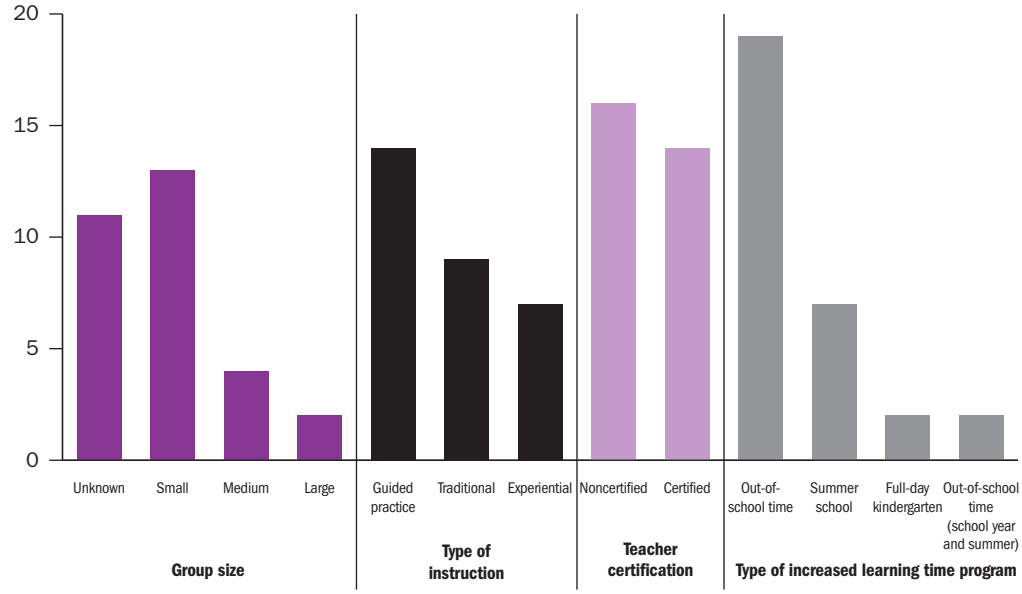
Source: Authors' calculations based on data from the studies reviewed.

The evidence review team completed study review guides for 13 of the 30 studies that passed the screening process. After the team completed these study review guides, the primary investigator sent the spreadsheets to the WWC contractor for quality assurance review. The contractor reviewed several of the study review guides multiple times based on the project team's clarifications. The contractor had already reviewed the other 17 studies for Beckett et al. (2009) and provided the evidence review team with the study review guides for those studies.

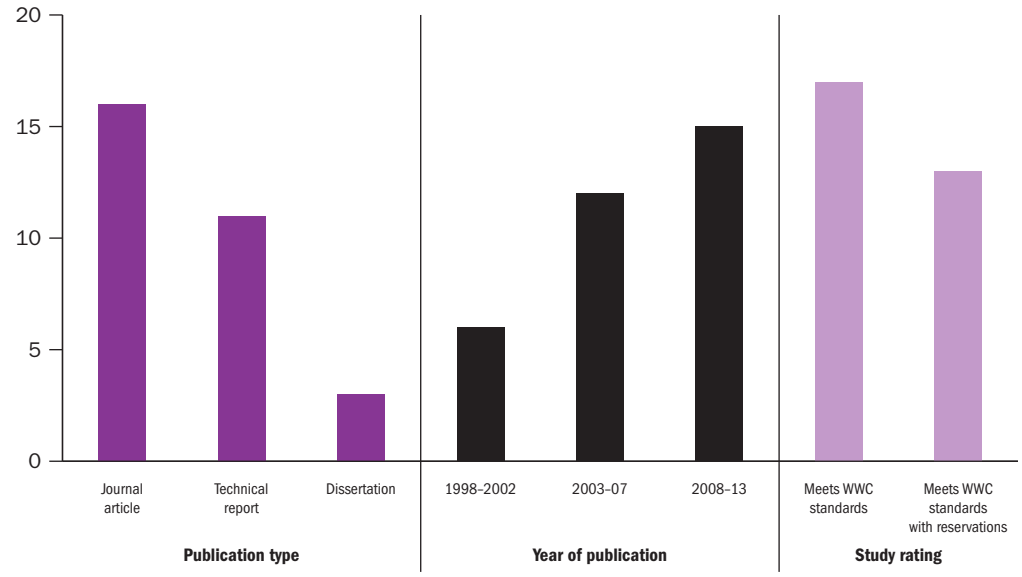
Outcome measures. The review included any academic outcome that was measured in a valid and reliable way, including reading and math achievement, graduation rates, and attendance, as well as nonacademic outcomes that were valid or reliable, including self-perceptions, self-management, and positive behavior. Outcome measures were first

Figure A3. Number of studies, by program and study design characteristics

Characteristics of increased learning time programs (number of studies)



Characteristics of studies reviewed (number of studies)



Source: Authors' calculations based on data from the studies reviewed.

classified into one of five domains: math achievement, literacy achievement, academic motivation, study skills, and social-emotional skill development. The first two domains were considered academic domains, and the remaining three were considered nonacademic domains.

The vast majority of the studies did not evaluate long-term outcomes (that is, more than one year after the end of the program). Therefore, the review focused on immediate outcomes (which makes them more comparable for the meta-analysis).

Coder reliability. Two certified WWC reviewers coded each study. If there was a discrepancy in coding, the reviewers first discussed the discrepancy. If the two reviewers could not resolve the disagreement, a third certified WWC reviewer, in consultation with a senior researcher with methodological expertise and deep understanding of WWC standards, conducted a reconciliation. Because all studies were independently coded twice and continuing disagreements were resolved by a third independent coder, researchers did not calculate reliability for this process. The reconciled coding was documented in a master study review guide. All review results were documented in detail in an Excel-based database. Completed study review guides that were not previously in the WWC database were submitted to the Institute of Education Sciences. The WWC conducted quality control reviews of these guides and, if acceptable, uploaded them to the WWC database.

Calculations of effect sizes and meta-analytic procedures

This section provides detailed information on how effect sizes were calculated, how weights were applied to effect sizes based on sample sizes, and the adjustments made to fixed-effects models to create random-effects models.

Calculating Hedges' g. Findings of the 30 studies were converted into a common metric (or effect size), Hedges' *g*. This statistic represents the standardized mean difference, or the difference between an intervention group and a control group, gauged against the average standard deviation of the two groups (equation 1).[9]

$$(1) \quad g = \frac{\chi_1 - \chi_2}{\sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}}$$

where χ_1 is the mean for the intervention group, χ_2 is the mean for the comparison group, n_1 is the student sample size for the intervention group, n_2 is the student sample size for the comparison group, s^2_1 is the variation in outcome measure for the intervention group, and s^2_2 is the variation in outcome measure for the comparison group.

The conversion of findings to Hedges' *g* involved entering the research findings into a study review guide, or a spreadsheet-based form, created by the WWC contractor to aid in standardizing study summaries across reviewers. Reviewers summarize key components of each study in different cells and enter findings from reports in the "data" tab. The spreadsheet includes macros that use the information available to calculate Hedges' *g*.

Weighting effect sizes. Per standard practice within meta-analytic research syntheses, effect sizes were weighted to reflect the sizes of samples within the studies or, put another way, the standard error of each estimate (equation 2).[10] The logic underlying the use of weights is that studies with larger sample sizes should produce effect sizes that are better reflections of the "true relationship" within the population (that is, the standard error of estimate is smaller). Thus, the effect sizes from studies with larger samples should be given more weight in the calculation of the collective effect size estimates than studies with smaller samples.[11]

The method of weighting studies is described in Cooper (2009) but is equivalent to that cited by Borenstein, Hedges, and Rothstein (2007).

$$(2) \quad w_i = \frac{2(n_{i1} + n_{i2})n_{i1}n_{i2}}{2(n_{i1} + n_{i2})^2 + n_{i1}n_{i2}d_i^2}$$

where w_i is the weight for each effect size, n_{i1} is the sample size for group 1, n_{i2} is the sample size for group 2, and d_i is the effect size. Conceptually, the weight represents the inverse of the standard error of the estimate.

Combining effect sizes across studies. For fixed-effects models—or meta-analytic models that assume that the variation of effect size estimates gathered through the literature search and screening process is due only to sampling error—the weighted average effect size is calculated to be the sum of the products of the effect sizes and the corresponding weights, divided by the sum of the weights alone (equation 3; Cooper, 2009; Borenstein et al., 2007):

$$(3) \quad g. = \frac{\sum_{i=1}^{k} g_i w_i}{\sum_{i=1}^{k} w_i}$$

where g_i is the *g*-index of the *i*th comparison, w_i is the weight for the estimate based on sample size (see equation 2), and *k* is the total number of comparisons.

Calculating confidence intervals. The confidence intervals represent the range of values within which the true effect or parameter is likely to exist. By convention, this study has adopted the 95 percent confidence interval, leaving a 5 percent likelihood of a Type 1 error (false positive).

If the value of 0 falls within the confidence interval (that is, one boundary is negative, the other positive), the average effect size is indistinguishable from 0.

For fixed-effects models the lower and upper bounds of the 95 percent confidence interval are calculated using equation 4 (Cooper, 2009):

$$(4) \quad CI_{g.95\%} = g. \pm \sqrt{\frac{1}{\sum_{i=1}^{k} w_i}}$$

where *CI* is the 95 percent confidence interval, *g.* is the weighted average effect size, $\sum_{i=1}^{k} w_i$ is the sum of the weights across the studies, and w_i is the weight associated with a particular effect size *w*.

For random-effects models the confidence intervals are calculated differently to acknowledge additional possible sources of error. This is done through an alternative calculation

for effect size weights (equation 5). All confidence intervals presented in the text are based on random-effects models.

$$(5) \quad w_i = \frac{1}{se_i^2 + \hat{v}_\theta}$$

where w_i is the random-effects weight associated with a particular effect size w, se_i is the standard error of the estimate, and $\hat{v}_\theta$ is the added error component (see equation 7).

Calculating the Hedges' Q statistic. The test for homogeneity of effects represents a test of the assumption that all effect sizes are estimating the same population value. Values derived from the test used in this review—the Hedges' Q statistic—follow an χ^2 distribution with k–1 degrees of freedom when effect sizes are estimating the same population value. When the Q statistic is statistically significant (that is, it exceeds the critical value for χ^2 with the appropriate degrees of freedom), it suggests that factors associated with the particular samples may be affecting the effects. Thus, a significant Q statistic provides justification to explore whether particular features of samples or research conditions may be related to magnitudes of effect sizes (Valentine, Piggott, & Rothstein, 2010).

The method used to calculate Hedges' Q for this research synthesis is (Valentine et al., 2010):

$$(6) \quad Q = \sum w_i (g - \bar{g}_w)^2$$

where w_i is the weight associated with a particular effect size, g is an effect size within a particular report, and $\bar{g}_w$ is the average weighted effect size for that outcome category.

Adjustments for random effects. In this study results are presented under the random-effects model. This analytical model assumes that the true effect may vary from study to study. For example, the effect size might be a little larger if the students are older, if the students are in greater need of academic support, or if the study used a more intensive or comprehensive increased learning time program. The increased learning time programs included in this review represent a wide range of out-of-school, summer school, and expanded school day models. While this review examined one implementation feature at a time in its estimation of increased learning time effects, there may still be variability in programs that share the same implementation feature. Given the wide range of increased learning time programs and study characteristics, the review team adopted the random-effects model for the analyses (Borenstein et al., 2007).

To account for random effects, an extra component, $\hat{v}_\theta$, is added to the standard error associated with an effect size estimate. The inverse of the standard error estimate becomes the new weight for the effect. The formula for $\hat{v}_\theta$ is taken from Lipsey and Wilson (2001):

$$(7) \quad \hat{v}_\theta = \frac{Q_T - k - 1}{\sum w - \left(\frac{\sum w^2}{\sum w} \right)}$$

where Q_T is the Hedges' Q statistic, k is the number of effects, and w is the weights.

$\hat{v}_\theta$ was recalculated for each point estimate, even when point estimates were calculated for categories of studies (Borenstein, Hedges, Higgins, & Rothstein, 2005).

In practice, adding the additional error to the standard error has two effects. First, it reduces the impact of the sample size weights on the average weighted effect size. Second, it increases the confidence interval around the average effect size, thereby making it less likely to find a significant effect.

Sensitivity testing of average weighted effect sizes (summary effect). To test the robustness of summary effects, analyses involving four or more effect sizes were rerun after first making adjustments to the tails of the distribution of effect sizes. One adjustment involved a 10 percent cut (removing the most extreme 5 percent of effect sizes from both positive and negative tails of distribution, with a minimum of one effect size per tail). Another adjustment involved fixing the most extreme 5 percent from each tail of the distribution of effect sizes to the same value as the next nearest effect size (called a 10 percent Winsorizing). Winsorizing is a common technique in meta-analysis that is used to ensure that extreme values do not distort the results (Lipsey & Wilson, 2001).

Appendix B. Program descriptions of the 30 reviewed studies

Table B1. Program descriptions of the 30 reviewed studies

Citation	Program	Type	What Works Clearinghouse rating	Publication type	Socio-economic status[a]	Academic needs	Social-emotional needs	Sample size	Grades	State and locale
August, Realmuto, Hektner, & Bloomquist, 2001	Early Risers' Skills for Success	Summer school	Meets standards	Journal article	Mixed	Not an inclusion criterion	History of aggressive behavior	245 students, 20 schools	K–2	Not reported, rural
Berninger, Abbott, Vermeulen, & Fulton, 2006 (study 2)	Reading clubs	Before- or after-school	Meets standards	Journal article	Mixed	Students at risk of reading difficulties	Not an inclusion criterion	98 students, 8 schools	2	Washington, suburban
Berninger, Rutberg, et al., 2006 (study 4)	Writing clubs	Before- or after-school	Meets standards	Journal article	Mixed	Students with weak writing skills	Not an inclusion criterion	94 students, 10 schools	4	Washington, suburban
Bissell, Dugan, Ford-Johnson, & Jones, 2002	Youth Services–Child Care, Academic Assistance, Recreation, and Enrichment	Afterschool, summer school	Meets standards with reservations	Technical report	Low	Not an inclusion criterion	Not an inclusion criterion	700 students, 28 schools	1–5	California, urban
Black, Somers, Doolittle, Unterman, & Grossman, 2009b (reading study)	21st Century Community Learning Centers program and enhanced academic instruction	Afterschool	Meets standards	Technical report	Low	Students performing below standards	Not an inclusion criterion	905 students (cohort 1) and 626 students (cohort 2), 12 schools	2–5	Not reported, urban
Black, Somers, Doolittle, Unterman, & Grossman, 2009a (math study)	21st Century Community Learning Centers program and enhanced academic instruction	Afterschool	Meets standards	Technical report	Low	Students performing below standards	Not an inclusion criterion	1,144 students (cohort 1) and 367 students (cohort 2), 15 schools	2–5	Not reported, urban and rural

(continued)

Table B1. Program descriptions of the 30 reviewed studies *(continued)*

Citation	Program	Type	What Works Clearinghouse rating	Publication type	Socio-economic status[a]	Academic needs	Social-emotional needs	Sample size	Grades	State and locale
Borman & Dowling, 2006	Teach Baltimore Summer Academy	Summer school	Meets standards with reservations	Journal article	Low	Not an inclusion criterion	Not an inclusion criterion	686 students, 10 schools	K–2	Maryland, urban
Borman, Goetz, & Dowling, 2008	KindergARTen Summer Camp	Summer school	Meets standards	Journal article	Low	Not an inclusion criterion	Not an inclusion criterion	128 students, 4 schools	K	Maryland
DeCicca, 2007	Full-day kindergarten	Extended school day	Meets standards with reservations	Journal article	Mixed	Not an inclusion criterion	Not an inclusion criterion	5,559 students, 714 schools	K	Nationally representative sample
Ellers, 2009	Skill Building Summer School	Summer school	Meets standards with reservations	Doctoral dissertation	Mixed	Students performing below standards	Not an inclusion criterion	10 students, 10 schools	7–8	Alaska, not reported
Evans, Schultz, DeMars, & Davis, 2011	Challenging Horizons Program	Afterschool	Meets standards with reservations	Journal article	Mixed	Students with ADHD, students with academic impairment	Students with impulsivity, hyperactivity, or inattention; students with social impairment	49 students, 2 schools	6–8	Virginia, not reported
Goldschmidt, Huang, & Chinen, 2007	Los Angeles' Better Educated Students for Tomorrow program	Afterschool	Meets standards with reservations	Technical report	Low	Not an inclusion criterion	Students from schools in high-crime neighborhoods	4,662 students, 24 schools	K–6	California, urban
Gottfredson, Cross, Wilson, Rorie, & Connell, 2010	After-School Program	Afterschool	Meets standards with reservations	Journal article	Low	Not an inclusion criterion	Not an inclusion criterion	447 students, 5 schools	6–8	Maryland, urban
Grolnick, Farkas, Sohmer, Michaels, & Valsiner, 2007	The Investigators' Club	Afterschool	Meets standards with reservations	Journal article	Low	Not an inclusion criterion	Not an inclusion criterion	90 students, 1 school	7	Not reported, urban
Hirsch, Hedges, Stawicki, & Mekinda, 2011	After School Matters	Afterschool	Meets standards[b]	Technical report	Low	Not an inclusion criterion	Not an inclusion criterion	535 students, 10 schools	9–10	Illinois, urban

(continued)

Table B1. Program descriptions of the 30 reviewed studies *(continued)*

Citation	Program	Type	What Works Clearinghouse rating	Publication type	Socio-economic status[a]	Academic needs	Social-emotional needs	Sample size	Grades	State and locale
Hobbs, 2012	21st Century Community Learning Centers program	Afterschool	Meets standards with reservations	Doctoral dissertation	Low	Students performing below standards	Not an inclusion criterion	66 students, 1 school	6–8	Georgia, rural
James-Burdumy et al., 2005a (elementary grades study)	21st Century Community Learning Centers program	Afterschool	Meets standards	Technical report	Low	Not an inclusion criterion	Not an inclusion criterion	2,308 students, 18 schools, 7 school districts	K–5	Nationally representative sample
James-Burdumy et al., 2005b (middle grades study)	21st Century Community Learning Centers program	Afterschool	Meets standards with reservations	Technical report	Low	Not an inclusion criterion	Not an inclusion criterion	4,262 students, 61 schools, 32 school districts	6–8	Nationally representative sample
Jenner & Jenner, 2007	21st Century Community Learning Centers program	Afterschool	Meets standards with reservations	Journal article	Low	Not an inclusion criterion	Not an inclusion criterion	1,192 students, 4 school districts	3 and 5	Louisiana, rural and urban
Kauh, 2011	AfterZone	Afterschool	Meets standards with reservations	Technical report	Low	Not an inclusion criterion	Not an inclusion criterion	763 students, 6 schools	6–8	Rhode Island, urban
Langberg, Epstein, Urbanowicz, Simon, & Graham, 2008	Challenging Horizons Program	Afterschool	Meets standards	Journal article	Mixed	Students with ADHD	Not an inclusion criterion	37 students, number of schools not reported	4–7	Ohio, suburban
Langberg et al., 2006	Challenging Horizons Program	Afterschool	Meets standards	Journal article	Low	Students with ADHD; students performing below standards	Students with general behavioral difficulties	48 students, 2 schools	6–7	South Carolina, urban
Lee, Burkam, Ready, Honigman, & Meisels, 2006	Full-day kindergarten	Longer school day	Meets standards with reservations	Journal article	Mixed	Not an inclusion criterion	Not an inclusion criterion	8,455 students, 504 schools	K	Nationally representative sample

(continued)

Table B1. Program descriptions of the 30 reviewed studies *(continued)*

Citation	Program	Type	What Works Clearinghouse rating	Publication type	Socio-economic status[a]	Academic needs	Social-emotional needs	Sample size	Grades	State and locale
Lightner, 2010	Small group tutoring by Intervention Services, Inc.	Afterschool	Meets standards with reservations	Doctoral dissertation	Mixed	Students at risk of dropout	Students who have been expelled due to serious disciplinary infractions	51 students, 1 school	6–8	Florida, urban
Linden, Herrera, & Grossman, 2011	The Higher Achievement Program	Afterschool, summer school	Meets standards	Technical report	Low	Students performing below standards	Not an inclusion criterion	951 students, number of schools not reported	5–6	District of Columbia, urban
Martinez & Cosentino de Cohen, 2010	National Aeronautics and Space Administration's Science, Engineering, Mathematics, and Aerospace Academy	Weekend	Meets standards	Technical report	Mixed	Not an inclusion criterion	Not an inclusion criterion	662 students, number of schools not reported	4–8	District of Columbia, Georgia Maryland, Michigan, New York, North Carolina, Ohio, urban
Molina et al., 2008	Challenging Horizons Program	Afterschool	Meets standards	Journal article	Mixed	Students with ADHD	Hyperactivity or inattention problems	23 students, 1 school	6–8	Pennsylvania, urban
Schacter & Jo, 2005	Read to Achieve Summer Literacy Day Camp	Summer school	Meets standards with reservations	Journal article	Low	Students performing below standards	Not an inclusion criterion	162 students, 3 schools	1	California, urban
Sunmonu, Larson, Van Horn, Cooper-Martin, & Nielsen, 2002	Extended Learning Opportunities Summer Program	Summer school	Meets standards with reservations	Technical report	Low	Not an inclusion criterion	Not an inclusion criterion	968 students, 18 schools	K–3	Maryland, suburban
Zvoch & Stevens, 2013	District summer literacy program	Summer school	Meets standards	Journal article	Low	Students performing below standards in reading	Not an inclusion criterion	47 students, 1 school	K–1	Oregon, urban

ADHD is attention deficit/hyperactivity disorder.

a. Defined in all studies as eligibility for free or reduced-price lunch.

b. The study met standards with reservations for one outcome (absenteeism) due to high attrition rates.

Source: Authors' literature search and screening process.

Appendix C. Program implementation in the reviewed studies

Table C1. Program implementation in the reviewed studies

Citation	Program	Duration/ intensity	Academic subjects	Nonacademic subjects	Instructors	Student group size[a]	Academic curriculum coding	Approach/curriculum
August, Realmuto, Hektner, & Bloomquist, 2001[b]	Early Risers' Skills for Success	7 hours a day, 4 days a week, 6 weeks	Core subjects (unspecified)	Social skills training, arts, sport, and group recreation	Certified teachers	—	Prescriptive, locally developed	Highly structured physical and educational activities with strategies to promote self-regulated behavior; parent education
Berninger, Abbott, Vermeulen, & Fulton, 2006 (study 2)	Reading clubs	1 hour a day, twice a week, 6.5 months	Reading instruction	None	Certified teachers and graduate students	Small	Prescriptive, locally developed	Word play (letters and sounds), word work (accuracy and automaticity of the alphabetic principle and its application to word context), and story reading
Berninger, Rutberg, et al., 2006 (study 4)	Writing clubs	1 hour a day, twice a week, 6.5 months	Writing instruction	None	Certified teachers and graduate students	Small	Prescriptive, locally developed	Comprehensive writing instruction (transcription, text generation, and executive functions)
Bissell, Dugan, Ford-Johnson, & Jones, 2002	Youth Services–Child Care, Academic Assistance, Recreation, and Enrichment	*Afterschool:* 4 hours a day, 10 months *Summer:* 6 hours a day, 8 weeks	Math, social studies, reading, and science	—	Trained hired instructors	—	Prescriptive, locally developed	Instructors develop daily lesson plans with integrated engaging activities and age-appropriate educational support materials including literacy kits and the Brainchild computer system and software.
Black, Somers, Doolittle, Unterman, & Grossman, 2009b (reading study)	21st Century Community Learning Centers and enhanced academic instruction	3 hours a day, 4 days a week throughout the school year	Reading	Enrichment and recreational activities	Certified teachers	Medium	Prescriptive, purchased	Success for All's Adventure Island curriculum

(continued)

Table C1. Program implementation in the reviewed studies *(continued)*

Citation	Program	Duration/ intensity	Academic subjects	Nonacademic subjects	Instructors	Student group size[a]	Academic curriculum coding	Approach/curriculum
Black, Somers, Doolittle, Unterman, & Grossman, 2009a (math study)	21st Century Community Learning Centers and enhanced academic instruction	3 hours a day (including 45 minutes of math), 4 days a week throughout the school year	Math	Enrichment and recreational activities	Certified teachers	Medium	Prescriptive, purchased	Harcourt Mathletics curriculum
Borman & Dowling, 2006	Teach Baltimore Summer Academy	2.5 hours a day of reading and math, 7 weeks a summer, 3 summers	Reading and math	45 minutes a day of enrichment activities (such as science investigations, arts and crafts, foreign language, music, and drama)	Undergraduate university students	—	Prescriptive, locally developed	Phonics-based instruction materials, reading comprehension and vocabulary instruction, hands-on math, and science projects
Borman, Goetz, & Dowling, 2008	KindergARTen Summer Camp	6 hours a day, 5 days a week, 6 weeks	Reading and writing	Physical activity, fine arts, science enrichment, and weekly field trips	Certified teachers and college student interns	Medium	Prescriptive, locally developed	Language and word study, shared reading, interactive writing, guided reading, Reader's Workshop, and Writer's Workshop
DeCicca, 2007	Full-day kindergarten	3 hours a day, 5 days a week throughout the school year	Kindergarten curriculum	—	Certified teachers	Large	Prescriptive, locally developed	—
Ellers, 2009	Skill Building Summer School	4 hours a day, 5 days a week, 6 weeks a summer, 2 summers	Reading, writing, and math	Physical education	Certified teachers	—	Prescriptive, purchased	Curricula purchased from education vendors
Evans, Schultz, DeMars, & Davis, 2011	Challenging Horizons Program	2 hours a day, 2 days a week, 20 weeks	Study skills, note taking, and summarizing notes	Interpersonal skills	Undergraduate university students	Small	Nonprescriptive	Homework Organization and Planning System, assisted homework, math games, literacy training, and project-based learning

(continued)

Table C1. Program implementation in the reviewed studies *(continued)*

Citation	Program	Duration/ intensity	Academic subjects	Nonacademic subjects	Instructors	Student group size[a]	Academic curriculum coding	Approach/curriculum
Goldschmidt, Huang, & Chinen, 2007	Los Angeles' Better Educated Students for Tomorrow program	5 days a week throughout the school year	Math, science, reading, and writing	Computer skills, conflict resolution skills, arts and crafts, cooking, games, holiday activities, and sports	Trained instructors and adult volunteers	—	Prescriptive, purchased	Curricula purchased from education vendors, such as KidzLit and KidzMath and additional activities developed by the school district and site staff
Gottfredson, Cross, Wilson, Rorie, & Connell, 2010	After-School Program	3 hours a day, 3 days a week, 30 weeks	Reading and math	Social skills training, sports, and crafts	Trained, hired instructors	—	Nonprescriptive	Academic assistance and All Stars curriculum, which aims to reduce substance abuse, fighting, bullying, and unsafe sexual activity
Grolnick, Farkas, Sohmer, Michaels, & Valsiner, 2007	The Investigators' Club	1.5 hours a day, 3 days a week, 15 weeks	Science	None	Trained apprentices supervised by the program developer	Small	Prescriptive, locally developed	Manual-based set of curricular units, each with a particular content focused on science (such as air pressure, sinking and floating, and mass and motion) that did not overlap with that of the science class curriculum
Hirsch, Hedges, Stawicki, & Mekinda, 2011	After School Matters	3 hours a day, 3 days a week, 20 weeks	Science and technology	Arts and job skills	Paid instructors (who are generally not teachers, but professionals in the field of apprenticeship)	Small	Nonprescriptive	Apprentices are supervised by instructors who provide information, guidance, and feedback, and introduce students to the standards, language, and culture of that line of work.
Hobbs, 2012	21st Century Community Learning Centers program	12 hours a week, 116 days during the school year	Reading and math	Enrichment (unspecified)	Certified teachers and college students	Small and large	Nonprescriptive	Homework help and whole-group academic instruction supplemented by individual or small-group tutoring

(continued)

Table C1. Program implementation in the reviewed studies *(continued)*

Citation	Program	Duration/ intensity	Academic subjects	Nonacademic subjects	Instructors	Student group size[a]	Academic curriculum coding	Approach/curriculum
James-Burdumy et al., 2005a (elementary grades study)	21st Century Community Learning Centers program	4 hours a day, 5 days a week, 129 days during the school year[c]	Reading, writing, math, and additional academic electives (such as Spanish, technology, and science)	Sports and recreational activities, cultural enrichment, and interpersonal development (such as leadership, character and education)	Teachers, paraprofessionals, college students, and parents	Small	Nonprescriptive	Homework help, direct instruction; educational technology packages to reinforce basic skills or supplement classroom instruction; practice drills, worksheets, and games; preparation for standardized tests; and electives that include project-based learning
James-Burdumy et al., 2005b (middle grades study)	21st Century Community Learning Centers program	4 hours a day, 5 days a week, 129 days during the school year	Reading, writing, math, and additional academic electives (such as Spanish, technology, and science)	Sports and recreational activities, cultural enrichment, and interpersonal development (such as leadership, character education)	Teachers, paraprofessionals, college students, and parents	Small	Nonprescriptive	Homework help; direct instruction; educational technology packages to reinforce basic skills or supplement classroom instruction; practice drills, worksheets, and games; preparation for standardized tests; and electives that include project-based learning
Jenner & Jenner, 2007	21st Century Community Learning Centers program	School year	Core academic subjects (unspecified)	—	—	—	Nonprescriptive	—
Kauh, 2011	AfterZone	2.5 hours a day, 4 days a week, 10 weeks in the fall, 6 weeks in the winter, and 11 weeks in the spring	Science and writing	Art and sports	Hired, trained instructors and AmeriCorps members	—	Prescriptive, locally developed	Academic enrichment activities developed locally by staff and program sites and science activities involving project-based learning

(continued)

Table C1. Program implementation in the reviewed studies *(continued)*

Citation	Program	Duration/ intensity	Academic subjects	Nonacademic subjects	Instructors	Student group size[a]	Academic curriculum coding	Approach/curriculum
Langberg, Epstein, Urbanowicz, Simon, & Graham, 2008	Challenging Horizons Program	75 minutes a day, twice a week, 8 weeks	55 minutes of homework, math, outlining chapters in school textbooks	20 minutes of individual counseling for study and behavior skills	Trained university undergraduate psychology students	Small	Nonprescriptive	Lesson plans following the program manual, with progress toward individual academic and behavioral goals (as identified by teachers and parents) rewarded by incentives
Langberg et al., 2006	Challenging Horizons Program	2 hours a day, 4 days a week, 1 semester (September–December)	Study skills, note-taking skills, and written language skills (such as summarization)	Planning and organizational skills, behavior management skills, and recreational activities	Trained university junior and senior psychology majors and trained school teachers	Large (academics) and small (behavior management and study skills)	Nonprescriptive	Lesson plans following the program manual, with progress toward individual academic and behavioral goals (as identified by teachers and parents) rewarded by incentives
Lee, Burkam, Ready, Honigman, & Meisels, 2006	Full-day kindergarten	2–3 additional hours a day	Reading and math	—	Certified teachers	Large	Prescriptive, locally developed	—
Lightner, 2010	Small group tutoring by Intervention Services, Inc.	1.5 hours a week, twice a week, 24 weeks	Reading	None	Instructors hired and trained by the provider	Small	Prescriptive, purchased	Head for Success by Pearson Educational, Inc.
Linden, Herrera, & Grossman, 2011	The Higher Achievement Program	25 weeks of afterschool during the school year, followed by 6 weeks of summer school	*Afterschool:* Math, English language arts, and technology *Summer school:* Math, science, social studies, and English language arts	College knowledge, weekly field trips, three-day university trip, and high school placement services	*Afterschool:* volunteer mentors *Summer:* trained faculty	Small	Prescriptive, locally developed	Homework help and academic instruction using a curriculum design to challenge students

(continued)

Table C1. Program implementation in the reviewed studies *(continued)*

Citation	Program	Duration/ intensity	Academic subjects	Nonacademic subjects	Instructors	Student group size[a]	Academic curriculum coding	Approach/curriculum
Martinez & Cosentino de Cohen, 2010	National Aeronautics and Space Administration's Science, Engineering, Mathematics, and Aerospace Academy	3 hours each Saturday, 8 weeks	Science, engineering, math, and technology	None	Trained, certified teachers with math or science background, college professors, graduate engineering students, and parent volunteers to coordinate some activities	—	Prescriptive, locally developed	Hands-on science curriculum that includes field trips, guest speakers, and career exploration; Aerospace Education Laboratory for working with simulations; and Family Café with activities for parents
Molina et al., 2008	Challenging Horizons Program	2 hours a day, 2 days a week, 10 weeks	Daily academic instruction (unspecified)	Social problem-solving and communication skills, study skills, note-taking skills, and test-taking skills	Undergraduate students closely supervised by a doctoral-level clinician	—	Nonprescriptive	Use of Challenging Horizons Program manual, individualized academic targets, and positive reinforcement
Schacter & Jo, 2005	Read to Achieve Summer Literacy Day Camp	9 hours a day, 5 days a week, 7 weeks	Reading and writing	Recreational activities (such as swimming, dance, drama, crafts, music, arcade, field trips, and other summer camp activities)	Certified teachers	—	Prescriptive, purchased	Open Court Reading series for grade 1, basal reading program for additional practice in oral reading and comprehension skills; and journal writing
Sunmonu, Larson, Van Horn, Cooper-Martin, & Nielsen, 2002	Extended Learning Opportunities Summer Program	4 hours a day, 4 weeks, plus optional enrollment in afterschool recreational activities	Reading, writing, and math	Recreational group activities	Certified teachers	Medium	Prescriptive, locally developed	Curriculum based on the district's language arts and math curriculum frameworks and performance indicators

(continued)

Table C1. Program implementation in the reviewed studies *(continued)*

Citation	Program	Duration/ intensity	Academic subjects	Nonacademic subjects	Instructors	Student group size[a]	Academic curriculum coding	Approach/curriculum
Zvoch & Stevens, 2013	District summer literacy program	3.5 hours a day, 4 days a week, 5 weeks	Literacy	—	Certified teachers	Small and large	Prescriptive, locally developed	Grouping based on skill level; direct modeling of literacy skills and opportunities for practice with corrective feedback

— is not reported.

a. *Small* refers to an instructor–student ratio of 1:2 to 1:5, *medium* to an instructor–student ratio of 1:6 to 1:15, and *large* to an instructor–student ratio of 1:16 or higher.

b. Only Year 1 outcomes are included in this evidence review. Year 2 outcomes are not included because they represent the effects of the summer program combined with mentoring, counseling, and tutoring services.

c. Refers to operating hours. Actual attendance averaged 2.7 days a week.

Source: Authors' literature search and screening process.

Appendix D. Narrative summaries of the increased learning time programs evaluated in the studies reviewed

21st Century Community Learning Centers

Black, Somers, Doolittle, Unterman, and Grossman (2009a, 2009b) evaluated the implementation of a more academically intensive approach for afterschool centers for elementary and middle school students (table D1). With funding from the National Center for Education Evaluation and Regional Assistance at the U.S. Department of Education Institute of Education Sciences, enhanced afterschool programs providing instruction in either reading or math were implemented in afterschool centers during two school years. Most of the program sites included in the evaluation received funding for 21st Century Community Learning Centers. The reading study assessed the effects of enhanced academic instruction using a reading curriculum developed by Success for All. The math study assessed the effects of the Mathletics and Adventure Island programs developed by Harcourt School Publishers. The enhanced academic instruction was offered for 45 minutes a day, four days a week (for a total of 180 minutes a week). Sites hired certified teachers who received training, ongoing onsite technical assistance site visits, continued support by locally based staff members, and daily paid preparation time.

Hobbs (2012) analyzed results from an afterschool program in a rural county in northeast Georgia that provided a 21st Century Community Learning Centers program for students in grades K–8. The program site served at-risk students who were identified based on their standardized test scores, school grades, and teacher recommendations. The study author did not report implementation quality, and the level of academic support across sites is unknown.

James-Burdumy et al. (2005a, 2005b) conducted a national evaluation of 21st Century Community Learning Centers afterschool programs. Many sites employed certified teachers, although staff turnover was high. The average elementary school student attended these programs two to three days a week, and the average middle school student attended one day a week. At the elementary school level the evaluators found that centers most commonly offered homework help. In addition, classes for reading, writing, and math were offered at least once a week at a majority of centers, while classes focused specifically on improving test scores were offered at least weekly at almost half the centers. About half the programs included in the evaluation had aligned their academic instruction with the regular school day curricula. Most centers also provided recreation and cultural enrichment activities such as music, art, or dance classes. At the middle school level program sites commonly provided homework help. Other academic activities generally focused on smaller numbers of students who needed to work on particular skills or practice for state assessment tests. Coordination with the school day curriculum was uncommon.

Jenner and Jenner (2007) conducted a statewide evaluation of 21st Century Community Learning Centers programs in Louisiana. The students in this study were drawn from four areas of Louisiana: Baton Rouge, New Orleans, Grant Parish, and Bienville Parish.

After School Matters

Hirsch, Hedges, Stawicki, and Mekinda (2011) evaluated After School Matters, the largest, single-city afterschool program for high school students in the country (table D2). After

Table D1. Effect sizes for 21st Century Community Learning Centers

Study	Outcome	Hedges' *g*	Type of increased learning time	Grades	Domain
Black, Somers, Doolittle, Unterman, & Grossman, 2009b, reading study	Attentive	0.0300	Out-of-school	Elementary	Academic motivation
	Disruptive	–0.0400	Out-of-school	Elementary	Social-emotional skill development
	Does not complete homework	–0.0100	Out-of-school	Elementary	Academic motivation
	Stanford Achievement Test Series, Tenth Edition, reading total	–0.0200	Out-of-school	Elementary	Literacy
Black, Somers, Doolittle, Unterman, & Grossman, 2009a, math study	Attentive	0.0300	Out-of-school	Elementary	Academic motivation
	Disruptive	0.0100	Out-of-school	Elementary	Social-emotional skill development
	Does not complete homework	0.1100	Out-of-school	Elementary	Academic motivation
	Stanford Achievement Test Series, Tenth Edition, math total	0.0600	Out-of-school	Elementary	Math achievement
Hobbs, 2012	Criterion-Referenced Competency Tests, math	0.1900	Out-of-school	Middle	Math achievement
James-Burdumy et al., 2005a, elementary schools	Academic effort (teacher report)	0.0600	Out-of-school	Elementary	Academic motivation
	Discipline problems (student report)	–0.0100	Out-of-school	Elementary	Social-emotional skill development
	Discipline problems (teacher report)	–0.1000	Out-of-school	Elementary	Social-emotional skill development
	Homework completion (teacher report)	–0.1200	Out-of-school	Elementary	Academic motivation
	Stanford Achievement Test Series, Ninth Edition, reading test	–0.0200	Out-of-school	Elementary	Literacy achievement
	Student absences	0.0000	Out-of-school	Elementary	Academic motivation
	Suspensions	–0.0800	Out-of-school	Elementary	Social-emotional skill development
James-Burdumy et al., 2005b, middle schools	Academic effort (teacher report)	0.1000	Out-of-school	Middle	Academic motivation
	Homework completion (teacher report)	0.0100	Out-of-school	Middle	Academic motivation
	Peer interaction composite	–0.0500	Out-of-school	Middle	Social-emotional skill development
	Social engagement composite	–0.0300	Out-of-school	Middle	Social-emotional skill development
	Student absences	0.1100	Out-of-school	Middle	Academic motivation
	Student expects to graduate from college	0.0800	Out-of-school	Middle	Social-emotional skill development
	Works out conflicts with others	–0.0900	Out-of-school	Middle	Social-emotional skill development
Jenner & Jenner, 2007	Iowa Tests of Basic Skills math score	0.0300	Out-of-school	Elementary	Math achievement

Source: Authors' calculations based on data obtained through the literature search and screening process.

School Matters is a nonprofit organization that partners with Chicago Public Schools to offer Chicago teens free out-of-school time opportunities. Youth in the program obtain training in technical skills that enable them to begin to adapt to the culture of the workplace and develop the "soft skills" increasingly demanded in the 21st century economy. Some of the apprenticeships focused exclusively on technology, such as Web design or computer repair; others combined technology and art, such as producing social documentaries; and still others had a different focus, such as improvisational theater groups.

Table D2. Effect sizes for After School Matters

Outcome	Hedges' *g*	Type of increased learning time	Grades	Domain
Absences (number of days—whole year)	0.1000	Out-of-school	High	Academic motivation
Relationships with adult authority figures	–0.0400	Out-of-school	High	Social-emotional skill development
Self-regulation scale	0.2100	Out-of-school	High	Social-emotional skill development
Sherer's self-efficacy scale	0.0900	Out-of-school	High	Social-emotional skill development
Occupational values scale	–0.0400	Out-of-school	High	Academic motivation
Youth self-report measure of problem behaviors	0.1900	Out-of-school	High	Social-emotional skill development

Source: Authors' calculations based on data obtained through the literature search and screening process.

At the time of the evaluation, After School Matters was located in 65 Chicago public high schools. Participants attended their assigned apprenticeship sites for 10 weeks in the fall and 10 weeks in the spring for nine hours per week and were paid stipends for their participation. Each apprenticeship session involved work in the designated area, learning and making use of relevant skills to accomplish a task. Instructors were present to provide information, guidance, and feedback and to introduce students to the standards, language, and culture of that line of work. The apprenticeship often culminated in a final product or performance. Two paid instructors direct each apprenticeship and receive training from After School Matters.

After-School program (Baltimore, Maryland)

Gottfredson, Cross, Wilson, Rorie, and Connell (2010) reported on the results of the implementation of an afterschool program in five middle schools in Baltimore, Maryland (table D3). All schools were low performing and served predominantly racial/ethnic minority students. The initiative was a partnership among the University of Maryland, the Baltimore County Local Management Board, the Baltimore County Department of Recreation and Parks, and Baltimore County Public Schools. The program operated for nine hours per week for 30 weeks and offered academic assistance and recreational activities. In addition, the program provided the All Stars prevention curriculum, which was designed to delay the onset of and prevent substance use and other high-risk behaviors. The program aimed to promote, among other things, a bond with school and a commitment to abstain

Table D3. Effect sizes for After-School program (Baltimore, Maryland)

Outcome	Hedges' *g*	Type of increased learning time	Grades	Domain
Conduct problems	–0.0100	Out-of-school	Middle	Social-emotional skill development
Maryland School Assessment math	0.0000	Out-of-school	Middle	Math achievement
Maryland School Assessment reading	–0.0399	Out-of-school	Middle	Literacy achievement
Positive peer influence	–0.0499	Out-of-school	Middle	Social-emotional skill development
Prosocial/drug use attitude	0.0299	Out-of-school	Middle	Social-emotional skill development
School attendance	–0.0499	Out-of-school	Middle	Academic motivation
School bonding	0.0100	Out-of-school	Middle	Social-emotional skill development
Social competency	0.0100	Out-of-school	Middle	Social-emotional skill development

Source: Authors' calculations based on data obtained through the literature search and screening process.

from drugs. A county-level government agency hired and supervised all program staff and carried out all instruction activities.

AfterZone

Kauh (2011) evaluated AfterZone, an afterschool initiative in Providence, Rhode Island, a city whose youth face significant economic and educational challenges (table D4). The initiative was developed by the Providence After School Alliance, a partnership of local public agencies and nonprofit organizations. The alliance provides training and ongoing support to program instructors. Afterschool programs for middle school students are offered for approximately 2.5 hours a day, four days a week, and include arts activities, including studio arts, writing, design and performance art; skill enhancement activities that expose youth to academic enrichment opportunities separate from the regular school day curricula; and sports.

Challenging Horizons Program

Four studies (Evans, Schultz, DeMars, & Davis, 2011; Langberg, Epstein, Urbanowicz, Simon, & Graham, 2008; Langberg et al., 2006; Molina et al., 2008) examined the effects of one program (Challenging Horizons Program) on middle school students with ADHD (table D5). Two of these studies were coauthored by the program developer. The Challenging Horizons Program was designed to teach students with ADHD the skills necessary to successfully navigate the school environment, including self-management, note taking, summarization, and homework management. In all four studies graduate and undergraduate students supervised by a doctoral-level clinician implemented the program using a treatment manual that outlined all intervention procedures.

The program duration varied from 8 to 20 weeks. Two or three times a week, students participated in 55 minute group instruction sessions, which included homework completion, math worksheets, outlining chapters in school textbooks, and recreation time. In addition, they had individual or small group sessions with mentors about study skills and behavior management skills. The program included a point system for rewarding students who met organizational and behavior goals. Two sessions for parents were provided to discuss how they could monitor and reward continued use of the organization and homework-management interventions at home.

Table D4. Effect sizes for AfterZone

Outcome	Hedges' *g*	Type of increased learning time	Grades	Domain
Absenteeism	0.1500	Out-of-school	Middle	Academic motivation
Conflict management	–0.0100	Out-of-school	Middle	Social-emotional skill development
Emotional self-efficacy	0.0700	Out-of-school	Middle	Social-emotional skill development
Future connectedness	0.0900	Out-of-school	Middle	Social-emotional skill development
Misconduct	0.0900	Out-of-school	Middle	Social-emotional skill development
Prosocial behavior	0.1200	Out-of-school	Middle	Social-emotional skill development
School connectedness	0.1400	Out-of-school	Middle	Social-emotional skill development
Social self-efficacy/social skills	0.1300	Out-of-school	Middle	Social-emotional skill development
Tardiness	0.1500	Out-of-school	Middle	Academic motivation

Source: Authors' calculations based on data obtained through the literature search and screening process.

Table D5. Effect sizes for the Challenging Horizons Program

Study	Outcome	Hedges' *g*	Type of increased learning time	Grades	Domain
Evans, Schultz, DeMars, & Davis, 2011	Classroom Performance Survey, teacher rated	0.270	Out-of-school	Middle	Academic motivation
	Disruptive Behavior Disorders, hyperactive-impulsive, teacher rated	0.210	Out-of-school	Middle	Social-emotional skill development
	Disruptive Behavior Disorders, hyperactive-impulsive, parent rated	0.860	Out-of-school	Middle	Social-emotional skill development
	Disruptive Behavior Disorders, inattentive, teacher rated	0.190	Out-of-school	Middle	Social-emotional skill development
	Disruptive Behavior Disorders, inattentive, parent rated	0.300	Out-of-school	Middle	Academic motivation
	Impairment Rating Scale, social, parent rated	0.250	Out-of-school	Middle	Social-emotional skill development
	Impairment Rating Scale, academic, teacher rated	0.240	Out-of-school	Middle	Social-emotional skill development
	Impairment Rating Scale, social, teacher rated	0.370	Out-of-school	Middle	Social-emotional skill development
Langberg, Epstein, Urbanowicz, Simon, & Graham, 2008	Academic performance rating scale, total score	0.510	Out-of-school	Elementary, middle	Study skills
	Homework Problem Checklist, total score	0.950	Out-of-school	Elementary, middle	Study skills
Langberg et al., 2006	Conners Abbreviated Parent Organization Symptom Organization, parent rated	0.677	Out-of-school	Middle	Study skills
	Conners Abbreviated Parent Organization Symptom Organization	1.571	Out-of-school	Middle	Study skills
	Conners Global Index, parent rated	0.670	Out-of-school	Middle	Study skills
	Impairment Rating Scale, academic, parent rated	0.974	Out-of-school	Middle	Study skills
	Impairment Rating Scale, self-esteem, parent rated	0.553	Out-of-school	Middle	Social-emotional skill development
Molina et al., 2008	Aggression and Conduct Problems Scale, adolescent report, delinquency	0.610	Out-of-school	Middle	Social-emotional skill development
	Behavior Assessment Scale, adolescent report, emotional symptoms	0.700	Out-of-school	Middle	Social-emotional skill development
	Behavior Assessment Scale, adolescent report, school maladjustment	0.750	Out-of-school	Middle	Social-emotional skill development
	Behavior Assessment Scale, parent report, externalizing	0.210	Out-of-school	Middle	Social-emotional skill development
	Behavior Assessment Scale, parent report, internalizing	0.450	Out-of-school	Middle	Social-emotional skill development
	Impairment Rating Scale, parent report, need for treatment	0.240	Out-of-school	Middle	Social-emotional skill development

Source: Authors' calculations based on data obtained through the literature search and screening process.

District summer literacy program

Zvoch and Stevens (2013) conducted an evaluation of a district-sponsored summer school in a medium-size city in the Pacific Northwest (table D6). The program was designed to close the performance gap between strong and struggling readers in the primary grade levels by developing early literacy skills as a way to address and prevent initial reading difficulties from progressing to long-term reading failure. The district saw summer as an opportunity to provide lengthy periods of instruction and practice, unlike the academic year, where a range of subjects is covered in shorter daily periods. The five-week program provided instruction for 3.5 hours a day, four mornings a week. Students received a minimum of two hours of teacher-directed daily literacy instruction in phonemic awareness (oral blending and segmentation) and alphabetic understanding (letter sounds, decoding, phonic analysis, and fluency/automaticity [speed and accuracy in reading connected text]). They then practiced those skills primarily in small groups (three to five students).

Early Risers' Skills for Success

August, Realmuto, Hektner, and Bloomquist (2001) reported on the results of the Early Risers' Skills for Success program for elementary school students who are at high risk for early development of conduct problems (table D7). Early Risers was founded by Gerald August at the University of Minnesota Medical School and is currently offered by the Child Development and Family Science Department at North Dakota State University. One component of the program (referred to as "CORE") included a summer day camp, which was offered four days a week for six weeks and consisted of social-emotional skills education and training, reading enrichment, and creative arts as well as biweekly family nights, where students participated in fun activities while their parents met in small groups for parenting-focused

Table D6. Effect sizes for District summer literacy program

Outcome	Hedges' *g*	Type of increased learning time	Grades	Domain
Dynamic Indicators of Basic Early Literacy Skills, nonword fluency (kindergarten)	0.750	Summer school	Elementary	Literacy achievement
Test of Reading Fluency (grade 1)	0.590	Summer school	Elementary	Literacy achievement

Source: Authors' calculations based on data obtained through the literature search and screening process.

Table D7. Effect sizes for Early Risers' Skills for Success

Outcome	Hedges' *g*	Type of increased learning time	Grades	Domain
Academic competence	0.1367	Summer school	Elementary	Study skills
Adaptability	0.0136	Summer school	Elementary	Social-emotional skill development
Aggression	0.1577	Summer school	Elementary	Social-emotional skill development
Hyperactivity	0.0096	Summer school	Elementary	Social-emotional skill development
Impulsivity	0.1594	Summer school	Elementary	Social-emotional skill development
Self-regulation problems	0.1422	Summer school	Elementary	Social-emotional skill development
Social competence	0.1931	Summer school	Elementary	Social-emotional skill development
Social skills	0.1850	Summer school	Elementary	Social-emotional skill development

Source: Authors' calculations based on data obtained through the literature search and screening process.

education and skills training. During the regular school year these students had access to friendship groups offered during or after school, which aimed to advance and maintain skills learned over the summer. Another program component (referred to as "FLEX") included visits to family homes to provide further consultation to families. Through case management some of the students may have received additional accommodations during the school year.

Extended Learning Opportunities

Sunmonu, Larson, Van Horn, Cooper-Martin, and Nielsen (2002) studied the effects of the Summer Extended Learning Opportunities program in Montgomery County (Maryland) Public Schools (table D8). This summer program aimed to enhance student achievement in the 18 elementary schools receiving federal Title I funds, which have the highest concentration of students participating in the free and reduced-price meals and English language learner programs. The program provided elementary school students with additional instruction in reading, language arts, and math. Certified teachers, instruction assistants, and English language learner teachers received three day of training prior to the program. The program's curriculum was directly connected to the Montgomery County Public Schools core curriculum in that it was based on the district's reading, language arts, and math curriculum frameworks and performance indicators.

Full-day kindergarten

Two studies of the effects of full-day kindergarten used data collected through the U.S. Department of Education National Center for Education Statistics Early Childhood Longitudinal Study–Kindergarten, which was designed in part to assess the value added of kindergarten. The students in the study came from diverse socioeconomic and racial/ethnic backgrounds. DeCicca (2007) included 714 public schools in his study, whereas Lee, Burkam, Ready, Honigman, and Meisels (2006) included 504 public schools (table D9). Information about the type of academic instruction included in the expanded part of the school day was not included in the studies.

KindergARTen Summer Camp

Borman, Goetz, and Dowling (2008) conducted an evaluation of the KindergARTen Summer Camp program, which was designed to boost reading achievement among low-income students in Baltimore, Maryland (table D10). The program, which was funded by a Maryland State Department of Education 21st Century Community Learning Centers grant, was developed by the Center for Art. Students participated in daily literacy activities that included word study, shared reading, interactive writing, guided reading, and independent writing. During the rest of the day, students participated in physical activity and science and art classes. The art classes were designed with the input of an art teacher and a community artist. The instructors were a certified teacher and college student interns.

Table D8. Effect size for Extended Learning Opportunities

Outcome	Hedges' *g*	Type of increased learning time	Grades	Domain
Reading level	0.042	Summer school	Elementary	Literacy achievement

Source: Authors' calculations based on data obtained through the literature search and screening process.

Table D9. Effect sizes for full-day kindergarten

Study	Outcome	Hedges' g	Type of increased learning time	Grades	Domain
DeCicca, 2007	ECLS-K math, Black students	0.1200	Expanded	Elementary	Math achievement
	ECLS-K math, White students	0.1700	Expanded	Elementary	Math achievement
	ECLS-K math, Hispanic students	0.1600	Expanded	Elementary	Math achievement
	ECLS-K reading, Black students	0.1100	Expanded	Elementary	Literacy achievement
	ECLS-K reading, Hispanic students	0.2400	Expanded	Elementary	Literacy achievement
	ECLS-K reading, White students	0.1900	Expanded	Elementary	Literacy achievement
Lee, Burkam, Ready, Honigman, & Meisel, 2006	ECLS-K math	0.0900	Expanded	Elementary	Literacy achievement
	ECLS-K reading	0.0900	Expanded	Elementary	Math achievement

ECLS-K is Early Childhood Longitudinal Survey–Kindergarten.

Source: Authors' calculations based on data obtained through the literature search and screening process.

Table D10. Effect sizes for KindergARTen Summer Camp

Outcome	Hedges' g	Type of increased learning time	Grades	Domain
Developmental Reading Assessment	0.3963	Summer school	Elementary	Literacy achievement
Dynamic Indicators of Basic Early Literacy Skills, letter naming fluency	–0.2183	Summer school	Elementary	Literacy achievement
Dynamic Indicators of Basic Early Literacy Skills, phoneme segmentation fluency	–0.0099	Summer school	Elementary	Literacy achievement
Dictation	–0.0992	Summer school	Elementary	Literacy achievement
Word lists	0.2679	Summer school	Elementary	Literacy achievement

Source: Authors' calculations based on data obtained through the literature search and screening process.

Los Angeles' Better Educated Students for Tomorrow

Goldschmidt, Huang, and Chinen (2007) evaluated the implementation of Los Angeles' Better Educated Students for Tomorrow (LA's BEST), an afterschool program operating under the auspices of the mayor of Los Angeles, the superintendent of the Los Angeles Unified School District, a board of directors, and an advisory board consisting of leaders from business, labor, government, education, and the community (table D11). Each of the LA's BEST sites may be autonomous in how it structures its specific programs as long as the site coordinators and staff members adhere to the foundational principles of the program. The afterschool sites offer academic support in the form of homework time, tutoring, academic incentive programs, math and science activities, reading and writing activities, and computer activities. Additional program activities may include performing and visual arts, sports, health and nutrition programs, community and cultural activities, and events with parental involvement.

Table D11. Effect sizes for Los Angeles' Better Educated Students for Tomorrow

Outcome	Hedges' g	Type of increased learning time	Grades	Domain
Comprehensive Test of Basic Skills-Math	0.0184	Out-of-school	Elementary	Math achievement
Comprehensive Test of Basic Skills-Reading	0.0164	Out-of-school	Elementary	Literacy achievement

Source: Authors' calculations based on data obtained through the literature search and screening process.

National Aeronautics and Space Administration's Science, Engineering, Mathematics, and Aerospace Academy

Martinez and Cosentino de Cohen (2010) evaluated the National Aeronautics and Space Administration's Science, Engineering, Mathematics, and Aerospace Academy project, a science enrichment program aimed at inspiring, engaging, and educating the nation's K–12 students in science, technology, engineering, and math (table D12). The evaluation included students in grades 4–8 and their parents or caregivers and involved six sites. Institutions hosting academies encompass a wide range of institutions, including historically Black colleges and universities, Hispanic-serving institutions, tribal colleges and universities, predominantly White institutions of higher education, science centers and museums, and elementary and secondary school districts.

Reading clubs

Berninger, Abbott, Vermeulen, and Fulton (2006) investigated the effects of before- and after-school reading clubs on grade 2 students who were identified at the beginning of the school year as at risk for failing to meet state standards in reading (table D13). This study was conducted as a partnership between the University of Washington–Seattle and Seattle

Table D12. Effect sizes for the National Aeronautics and Space Administration's Science, Engineering, Mathematics, and Aerospace Academy

Outcome	Hedges' *g*	Type of increased learning time	Grades	Domain
Anxiety toward science	–0.0779	Out-of-school	Elementary, middle	Academic motivation
Desire science	–0.0419	Out-of-school	Elementary, middle	Academic motivation
Engagement in science, technology, engineering, and math activities	0.0693	Out-of-school	Elementary, middle	Academic motivation
Interest in formal science	0.1153	Out-of-school	Elementary, middle	Academic motivation
Interest in science, technology, engineering, and math career	0.0497	Out-of-school	Elementary, middle	Academic motivation
Interest in science, technology, engineering, and math in college	0.1231	Out-of-school	Elementary, middle	Academic motivation
Interest in science, technology, engineering, and math in high school	0.0000	Out-of-school	Elementary, middle	Academic motivation
Participation in science	0.1304	Out-of-school	Elementary, middle	Academic motivation
Science activities	–0.0136	Out-of-school	Elementary, middle	Academic motivation
Self-confidence in science	0.0978	Out-of-school	Elementary, middle	Academic motivation
Value of science	–0.0435	Out-of-school	Elementary, middle	Academic motivation

Source: Authors' calculations based on data obtained through the literature search and screening process.

Table D13. Effect sizes for reading clubs

Outcome	Hedges' *g*	Type of increased learning time	Grades	Domain
Woodcock Reading Mastery Test–Revised Word Attack subtest, phonological decoding	0.3500	Out-of-school	Elementary	Literacy achievement
Developmental Reading Assessment	0.5200	Out-of-school	Elementary	Literacy achievement

Source: Authors' calculations based on data obtained through the literature search and screening process.

Public Schools. The school district asked the university research partners to implement comprehensive research-supported reading and writing instruction programs and evaluate whether it increased the number of students who passed the state's high-stakes tests. The programs were implemented by district teachers and graduate research assistants from the university's school psychology program. The instruction teams participated in training sessions prior to initiating the clubs. To motivate the students to spend extra time on reading before or after school, the intervention was presented to them as a club. Students had to whisper the secret password chosen by each club and have their hand stamped with a special club stamp to gain entrance each time the club met. The schedule for each club included initial word play (with riddles and jokes, sounds, and letters), word work (accuracy and automaticity of the alphabetic principle and its application to word context), story reading, and final word play (bingo for structure words and search for long words).

Read to Achieve

Schachter and Jo (2005) reported on the outcomes of the Read to Achieve Summer Literacy Day Camp in south Los Angeles, California, which was developed by Schachter (table D14). The program, originally funded by the Milken Family Foundation, received a grant from the U.S. Department of Education's 21st Century Community Learner Centers program. Read to Achieve was designed to prevent economically disadvantaged students from losing academic ground in reading when school was not in session. The summer reading day camp was implemented for seven weeks, five days a week, for nine hours a day. Students participated in two hours of daily reading instruction, with the remainder of the day being dedicated to summer camp activities. Reading was taught by credentialed teachers using a commercially available curriculum (such as Open Court Reading series, 2000), and additional basal readers. Students were grouped to match their skill level during reading groups and paired reading instruction.

Skill Building Summer School

Ellers (2009) studied the effects of a large school district's remediation summer program for middle school students (table D15). The program covered topics in reading, writing, and math. The district coordinated the curriculum, programs, and daily schedules so that all program components were consistent across all sites and classrooms. This type

Table D14. Effect sizes for Read to Achieve

Outcome	Hedges' *g*	Type of increased learning time	Grades	Domain
Comprehension	0.6207	Summer school	Elementary	Literacy achievement
Decoding	0.8128	Summer school	Elementary	Literacy achievement

Source: Authors' calculations based on data obtained through the literature search and screening process.

Table D15. Effect sizes for Skill Building Summer School

Outcome	Hedges' *g*	Type of increased learning time	Grades	Domain
Alaska Standardized Literacy Assessment	–0.2000	Summer school	Middle	Literacy achievement
Alaska Standardized Math Assessment	–0.2300	Summer school	Middle	Math achievement

Source: Authors' calculations based on data obtained through the literature search and screening process.

of coordination reduces individual teacher planning time needed during the summer months. Daily schedules incorporate fitness and physical activity into the program. The program was open to all students who wanted to participate. The district provided teachers with two days of preparation and training, teaching materials and resources, and ongoing curriculum support throughout the six-week program.

Small group tutoring by Intervention Services, Inc.

Lightner (2010) reported on the results of a short-term afterschool reading program for middle school students who attended the same waiver school after expulsion (table D16). All students who had been expelled chose to serve their expulsion at this school. Most of these students were expelled because of behavioral issues. From January to June the students attended an afterschool program funded by a supplemental educational services state grant.[12] Instruction was provided twice a week for 90 minutes through small group instruction by trained reading tutors. No information about the lesson plans used was reported except that the objective of the sessions was to increase the reading achievement of at-risk students in a short period of time.

Teach Baltimore Summer Academy

Borman and Dowling (2006) examined the effects of Teach Baltimore Summer Academy, a program designed to create high-quality summer learning opportunities for students from high-poverty communities and to improve teacher recruitment and retention in Baltimore (table D17). The program instructors were college students for whom this was a first-time teaching experience. Therefore, they were selected through an intensive process and received comprehensive training through the Teach Baltimore Summer Academy. The seven-week summer program provided elementary grade students with 2.5 hours a day of intensive reading and writing instruction, physical activities, hands-on math and science projects, educational games, arts and crafts, and enrichment activities. Students also learned new skills and knowledge through weekly field trips to museums and participation in cultural events offered throughout the Baltimore community. Instructors integrated these outings with classroom activities.

Table D16. Effect size for small group tutoring by Intervention Services, Inc.

Outcome	Hedges' *g*	Type of increased learning time	Grades	Domain
Reading comprehension	–0.7800	Out-of-school	Middle	Literacy achievement

Source: Authors' calculations based on data obtained through the literature search and screening process.

Table D17. Effect size for Teach Baltimore Summer Academy

Outcome	Hedges' *g*	Type of increased learning time	Grades	Domain
Total reading	0.0601	Summer school	Elementary	Literacy achievement

Source: Authors' calculations based on data obtained through the literature search and screening process.

The Higher Achievement Program

Linden, Herrera, and Grossman (2011) reported on the effects of the Higher Achievement afterschool program, which operates six achievement centers across the Washington, DC, metropolitan area for middle school students (table D18). The program is time intensive, offering approximately 650 hours a year of academic instruction, enrichment activities, and mentoring during afterschool and summer hours. Three days a week, participants (referred to as "scholars") attend the Afterschool Academy, which includes homework help, dinner, an elective, and two hours of small group academic instruction in math, technology, or English language arts. Volunteer mentors lead these groups as well as monthly field trips and community service projects. During the summer the six-week Summer Academy includes four classes a day, taught by trained faculty, in math, science, social studies, and literature as well as two electives. The summer program includes weekly field trips and a three-day university trip to experience college life.

The Investigators' Club

Grolnick, Farkas, Sohmer, Michaels, and Valsiner (2007) assessed an afterschool program for middle school students called the Investigators' Club, which was developed by education professor Sarah Michaels and her colleagues at Clark University (table D19). The program was designed to promote motivation in middle school students from an urban, predominantly low-income neighborhood. This intervention focused on science but was designed to build skills and attitudes that would transfer to the larger school context. The Investigators' Club was developed as a manual-based set of curricular units, each with a particular content focused on science (for example, air pressure, sinking and floating, and mass and motion) that did not overlap with that of the science class curriculum and each with a set of common activities. Each unit began with a scientific question and students' predictions, followed by an experiment. Participants attended the program three times a week for 15 weeks and were taught by one of the developers and education students.

Writing clubs

Berninger, Rutberg, et al. (2006) studied the effects of before- and after-school writing clubs for grade 4 students with weak writing skills who might benefit from Tier 2 special instruction in writing (table D20). The curriculum included lessons about planning, generating

Table D18. Effect sizes for the Higher Achievement Program

Outcome	Hedges' *g*	Type of increased learning time	Grades	Domain
Ability to change the future, year 2	0.0799	Combined	Middle	Academic motivation
Self-perceptions of academic ability, year 2	–0.0100	Combined	Middle	Academic motivation
Stanford Achievement Test, problem-solving, year 2	0.1199	Combined	Middle	Math achievement
Stanford Achievement Test, reading comprehension, year 2	0.0899	Combined	Middle	Literacy achievement
VIA Institute of Character Youth Survey, enjoyment of learning, year 2	–0.1099	Combined	Middle	Academic motivation
VIA Institute of Character Youth Survey, industry and persistence, year 2	–0.0599	Combined	Middle	Academic motivation

Source: Authors' calculations based on data obtained through the literature search and screening process.

Table D19. Effect sizes for the Investigators' Club

Outcome	Hedges' *g*	Type of increased learning time	Grades	Domain
Cognitive self-worth	0.1159	Out-of-school	Middle	Social-emotional skill development
Fixed view of intelligence[a]	–0.2112	Out-of-school	Middle	Social-emotional skill development
General self-worth	0.2075	Out-of-school	Middle	Social-emotional skill development
Malleable view of intelligence	0.7360	Out-of-school	Middle	Social-emotional skill development
Regulation external[a]	–0.6834	Out-of-school	Middle	Social-emotional skill development
Regulation identified	0.2864	Out-of-school	Middle	Social-emotional skill development
Regulation introjected[a]	–0.0972	Out-of-school	Middle	Social-emotional skill development
School engagement	0.7172	Out-of-school	Middle	Academic motivation

a. Negative scores indicate more positive outcomes.

Source: Authors' calculations based on data obtained through the literature search and screening process.

written text, reviewing, and revising. Throughout the project students revised their favorite compositions and chose their best writing for publication in a newspaper titled *Kids Writing for Kids*. The students had also been encouraged to illustrate their writing throughout the club sessions, and some of these drawings were selected for publication.

Youth Services–Child Care, Academic Assistance, Recreation, and Enrichment

Bissell, Dugan, Ford-Johnson, and Jones (2002) evaluated Youth Services–Child Care, Academic Assistance, Recreation, and Enrichment, a California program designed to offer a safe environment after school and during the summer in supervised school sites for students in the Los Angeles Unified School District (table D21). Trained personnel supervised by credentialed teachers provided participants with academic assistance and language development activities for 40 minutes a day. Academic instruction included reading, math, science, and social studies. In addition, students participated in nonacademic enrichment activities such as games, character education, leadership skills building, and arts.

Table D20. Effect size for writing clubs

Outcome	Hedges' *g*	Type of increased learning time	Grades	Domain
Woodcock-Johnson–Revised, writing	0.6300	Out-of-school	Elementary	Literacy achievement

Source: Authors' calculations based on data obtained through the literature search and screening process.

Table D21. Effect sizes for Youth Services–Child Care, Academic Assistance, Recreation, and Enrichment

Outcome	Hedges' *g*	Type of increased learning time	Grades	Domain
Stanford Achievement Test, Ninth Edition, math	0.041	Combined	Elementary	Math achievement
Stanford Achievement Test, Ninth Edition, reading	0.093	Combined	Elementary	Literacy achievement

Source: Authors' calculations based on data obtained through the literature search and screening process.

Notes

1. This review follows the guidelines suggested by Cohen (1988): an effect size of 0.01–0.49 is a small effect, an effect size of 0.50–0.79 is a medium effect, and an effect size of 0.80 or larger is a large effect.
2. As discussed in appendix A, findings were subjected to adjustments to the tails of effect size distributions as a means of sensitivity testing. The summary effect sizes presented in this and the following sections do not change when those adjustments are made.
3. All studies that included students with ADHD evaluated the same afterschool program, the Challenging Horizons Program.
4. The exact number of unique reports is difficult to determine given the numerous duplicates that appeared in multiple databases and the practice among some researchers to have multiple reports on the same study or multiple reports using the same independent sample.
5. This review aimed to assess the benefits of adding time for learning beyond the regular school day, so a comparison group was defined as "students who did not receive additional academic instruction beyond the regular school day."
6. "Published" was defined as made available through a publication vehicle that is mass disseminated, such as a book, book chapter, academic journal, newspaper, magazine, or collateral material widely disseminated by foundations or professional organizations. Unpublished reports are those that summarize a research study but have not been submitted to one of the above mentioned publication vehicles (examples include doctoral dissertations, conference presentations, reports on organizations' websites, or reports written by researchers but never submitted for publication).
7. The WWC is a repository of studies regarding education-related topics that meet certain standards of evidence. The U.S. Department of Education's Institute of Education Sciences uses a competitive bidding process to choose a contractor to establish and refine research standards and to oversee topic area reviews of studies. The contractor releases numerous products every year. For more information about WWC, see www.whatworks.ed.gov.
8. It is not possible to combine studies that assigned schools to conditions and analyzed data at the school level with studies that assigned students to conditions and analyzed the data at the student level or at multiple levels. The standard deviations in studies that analyzed student-level data tend to be larger than the standard deviations in studies that analyzed school-level data. Consequently, effect sizes based on school-level data tend to be larger than effect sizes based on student-level data. Therefore, studies involving school-level assignment and analyses were omitted from this review.
9. For methods of converting other types of statistics into Hedges' *g*, see What Works Clearinghouse (2010), pages 37–41.
10. All analyses were conducted using Comprehensive Meta-Analysis software, Version 2 (Borenstein et al., 2005).
11. Hedges (2009) provides additional equations that accommodate for the hierarchical nature of data often found in education settings (such as when classrooms are assigned to conditions but data analysis is conducted at the student level). None of the studies in this increased learning time review used multiple units of analysis.
12. Supplemental education services is a program funded by the U.S. Department of Education that appropriates money to state education agencies to support extra academic instruction through before- or after-school, weekend, or summer tutoring and remediation programs (http://www2.ed.gov/nclb/choice/help/ses/description.html).

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