

Evaluation Report of the Impact of Post-Exit Progress Monitoring on Literacy Outcomes in the Reading Corps Program

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Executive Summary

According to the 2019 National Assessment of Educational Progress, approximately 65% of fourth grade students in the United States read at a level considered “not proficient.” Only 36% of fourth grade students say that they “definitely can” explain the meaning of something they have read. The impact of literacy skills acquired in elementary grades on success in middle school, high school, and post-secondary settings has been documented for decades. The value of early intervention services in preventing the onset of later difficulties and ultimately improving student outcomes long-term is also well known. Yet, the systematic and strategic implementation of large scale supplemental preventive reading interventions still eludes many schools, particularly in areas that persistently experience economic hardship. The Reading Corps model is one approach that has demonstrated success in “scaling-up” the delivery of supplemental literacy interventions for at-risk students in schools, particularly in settings with limited resources.

There are a number of evidence based interventions with robust findings targeting foundational early reading skills, reading fluency, and reading comprehension. However, there is much less information available in regards to the achievement levels of students after those supports are *discontinued*. In schools that have limited resources, it is likely, and prudent, to discontinue supplemental supports after students have shown significant progress and closed the gap with their peers. This is done so that other students in need are able to receive help. Acknowledging this reality, Reading Corps trains tutors to engage in frequent progress monitoring and data-based decision making to continually evaluate student performance. When students show exceptional progress, and have closed the gap with their peers, they are exited from the program so that other students at-risk for academic difficulties can participate in the program.

Tutors and researchers in Reading Corps noticed that a number of students that showed substantial growth and ultimately exited the program went on to fail to reach proficiency on end of year assessments. In response, three studies were undertaken to (1) quantify the probability that students whom met exit criteria for the program would go on to achieve proficiency after supports were removed, (2) precisely measure the rate in which students typically regress after exiting the program, and (3) evaluate the impact of a brief low-cost program modification to prevent the regression of literacy skills after students exit the program. The main findings from each study are presented in this executive summary and discussed in more detail in the body of the report.

To better understand the impact of the Reading Corps program among students that have shown significant improvement, and were exited from the program, an extant analysis was conducted (Study 1) using outcomes from the 2015-2016 and 2016-2017 school years. The probability that students who met exit criteria from the Reading Corps intervention during the 2015-2016 school year and went on to achieve proficiency on end of year 2016

benchmark literacy assessments and beginning of year 2016 benchmark literacy assessments was compared to students that did not meet exit criteria for the program in 2014-2015. Across kindergarten ($n = 1,824$), first grade ($n = 2,523$) and second grade ($n = 2,481$) students, those that met exit criteria for Reading Corps program had, on average, a higher probability of meeting grade level benchmarks at the end of year and beginning of the following year. However, even amongst students that met exit criteria for the program, the probability that kindergarten students *did not* meet grade level expectations was equal 39% and 58% in the Spring and Fall, respectively. Amongst first grade students, probabilities of not meeting grade level benchmarks were equal to 40% and 45% in the Spring and Fall, respectively. Finally, the average probability of not meeting grade level benchmarks was equal to 38% in the Spring and 59% in the Fall amongst second grade students.

To gain a more precise estimate of the rate in which students regressed in reading skills after exiting the program, a second study was undertaken (Study 2). In this study, a subset of students ($n = 91$) during the 2017-2018 school year that meet exit criteria for the program were assessed once a week for one min using curriculum-based measurement (CBM) procedures after leaving the program. Growth (number of correct response improvement per week) while students participated in the program was then compared to growth after students exited the program. Of the 91 students, 75 (82%) experienced decelerated growth after the intervention stopped. Across second and third grade students, the average rate of weekly improvement in words read correct per minute (WRCM) scores was equal to 3.50 ($SD = 1.65$) during receipt of intervention and 0.09 ($SD = 1.63$) after exiting the intervention.

A final study was conducted during the 2018-2019 program year to determine whether engaging in progress monitoring after students exited the program (i.e., post-exit progress monitoring; Study 3) offset the regression of skills acquired in Reading Corps program after interventions ceased. School sites were randomly assigned to a condition in which students were assessed once a week with CBM after meeting exit criteria ($n = 261$) or business as usual ($n = 269$) in which students were not assessed weekly after exiting. Students that participated in the post-exit progress monitoring condition relative to the business as usual group demonstrated greater growth, on average, between Winter and Spring benchmark assessments. In addition, more students that participated in post-exit progress monitoring achieved proficiency on end of year CBM benchmark assessments. Amongst grade three students, more students that participated in the post-exit progress monitoring condition achieved proficiency on the end of year state achievement tests than those participated in the business as usual condition. Collectively, the results from Study 3 support programmatic implementation of post-exit progress monitoring.

Overall, there seems to be promise in engaging in post-exit progress monitoring to prevent the regression of academic skills. However, more work is proposed to better pinpoint the classroom environmental factors as well as underlying student skill deficits that are likely to predict the acquisition and ultimate retention of literacy skills built through the program.

Reading Corps

Background¹

Reading Corps was founded in 2003 and is the largest AmeriCorps tutoring program in the country. The program trains and places AmeriCorps members that serve as tutors in their local community school-based settings. Tutors deliver research-based literacy interventions for students at-risk of reading failure in pre-kindergarten through third grade. Tutors are supported by internal or site-based coaches as well as external master coaches. As of 2020, the Reading Corps model has been replicated in 12 states as well as Washington D.C. Over 210,000 students and 8,834 tutors have participated in the program. An abbreviated logic model of Reading Corps program is presented below.

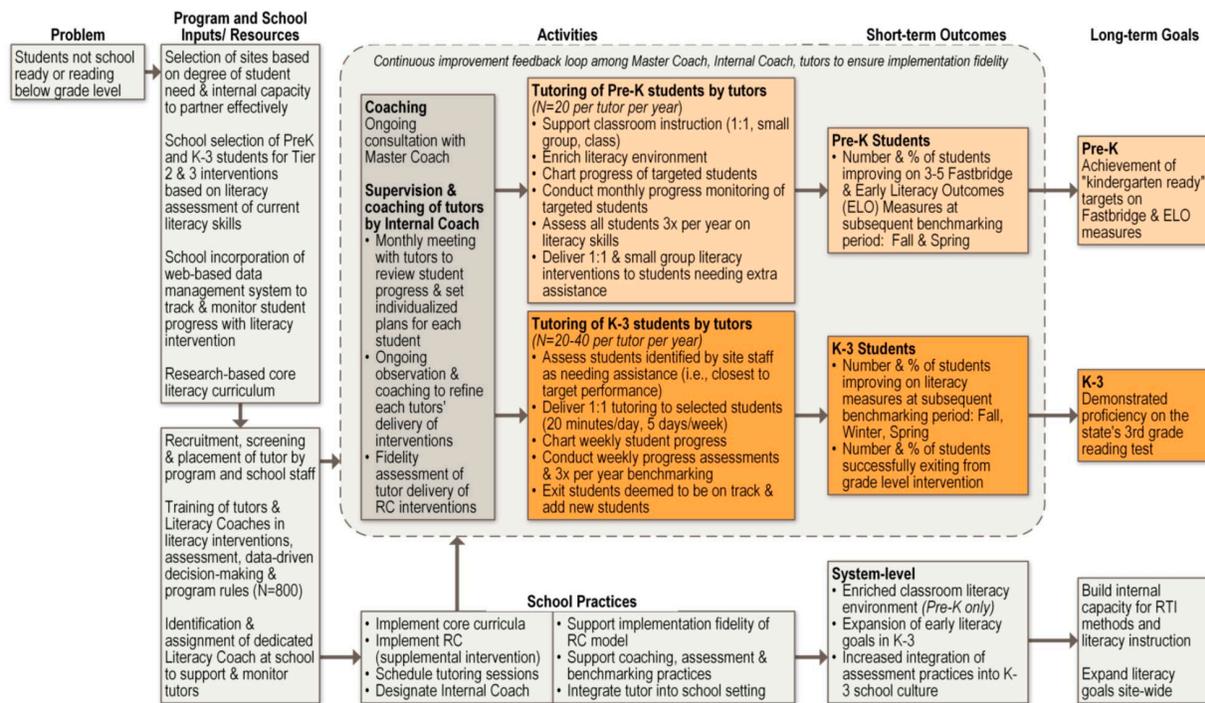


Figure 1. Reading Corps Logic Model²

The Reading Corps program is consistent with a response to intervention (RtI) or multi-tiered systems of support (MTSS) delivery model. Within the Reading Corps program, an emphasis is placed on the early identification and delivery of supplemental preventive support to struggling readers. Consistent with best practices associated with MTSS and RtI, Reading Corps:

¹ A general overview of the Reading Corps program is provided here. More information about the program is available at their website: <https://minnesotareadingcorps.org/>

² Logic model taken from Impact Evaluation of the Minnesota Reading Corps Program (2017-2018).

- Engages in universal screening at least three times a year and identifies students whose performance falls below clearly defined grade level benchmarks
- Uses evidence-based literacy interventions to provide supplemental support (1:1 tutoring 20 mins per day 5 days per week)
- Collects brief measures of academic performance at least once a week
- Makes treatment decisions to continue, intensify, or terminate interventions based upon student progress on weekly assessments
- Ensures intervention and assessment fidelity through high quality training, frequent coaching, and on-site observations

The use of assessment data within Reading Corps program is important to highlight for the present report. CBMs are used to make screening and progress monitoring decisions. CBMs are brief, standardized, indicators of academic performance. A typical CBM asks a student to complete a task that they would normally be asked to do in a classroom (e.g., read aloud from a grade level passage) and the number of correct responses per unit of time (e.g., words read correct per minute; WRCM) is the primary datum of interest. Drawing upon automaticity theory, the ability to fluently perform the critical academic behaviors identified by CBMs is highly predictive of broader academic skills. As such, CBM has a robust research base as a means to both identify students in need of additional help as well as an outcome measure to monitor the effects of interventions across time.

Universal Screening / Benchmark Assessment: As stated above, a large pool of students in a participating school engage in universal screening at the beginning of the school year (Fall), immediately around winter break (Winter), and at the conclusion of the school year (Spring). Tutors administer three grade level CBM probes distributed by FastBridge Learning, and calculate the number of correct responses in one minute on each probe. Students that earn a median score below pre-determined thresholds, or benchmarks, (see below) are considered at-risk for reading difficulties and are invited to participate in the program.

Table 1. Reading Corps Universal Screening Overview

Grade	CBM	Metric	Fall	Winter	Spring
Kindergarten	Letter Sound Fluency	Correct Letter Sounds per min	8	27	48
Grade 1	Nonsense Word Fluency	Correct Letter Sequences per min	36	63	
Grade 1	Oral Reading Fluency	Words Read		52	82
Grade 2		Correct per min	63	97	116
Grade 3			100	122	135

Progress Monitoring: After obtaining parental consent, students begin receiving supplemental support, and tutors collect at least one CBM score per week. As data are collected they are plotted and compared to a weekly rate of improvement, or goal line, to evaluate progress. The goal line is drawn from the student’s baseline score to the end of year target and quantifies the expected rate of improvement a student needs to make per week to reach the end of year target. In all circumstances, performance that exceeds the goal line is desirable. Tutors, with support from internal and external coaches, engage in ongoing evaluation to make treatment decisions for individual students. Of relevance to this report, explicit exit criteria have been established by Reading Corps. To be exited from the program, 3 of the most recent 5 consecutive data points must be above the goal line *and* two of those scores must be above the upcoming seasonal benchmark. The figure below demonstrates instances in which both students showed substantial progress. The top student showed improvement, but not enough to warrant exiting the intervention. The other student (bottom) showed substantial progress and two of those observations exceed the next seasonal benchmark. Upon verification from the tutor and coaches, the student would be exited from the Reading Corps program.

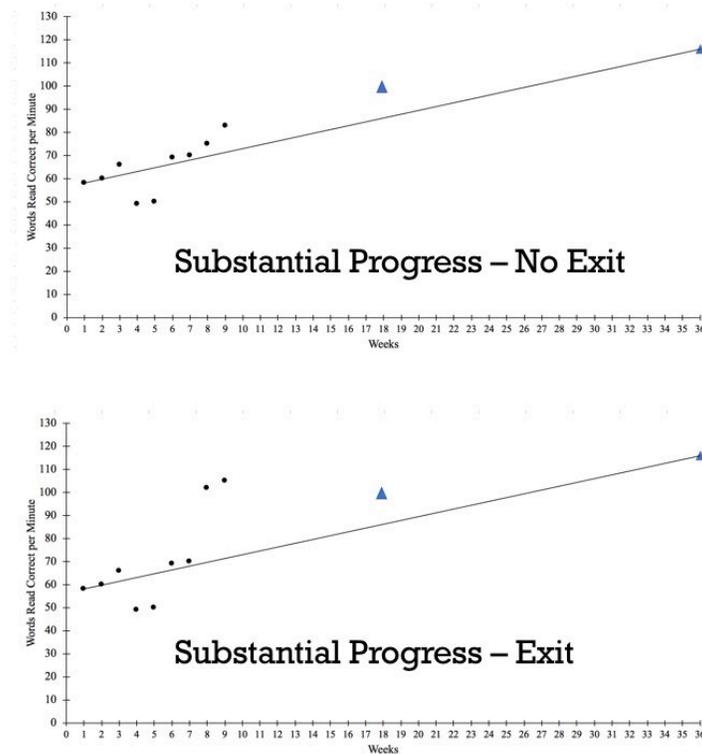


Figure 2. Example Application of Exit Decisions for Reading Corps

Theory of Change (Present Project)

Delivering educational interventions on a large scale is a deceptively complex process. Previous impact evaluations have demonstrated the effectiveness and scalability of the Reading Corps model. However, a key assumption with most intervention research is that students will continue on their assumed upward trajectory of academic performance once initial skill deficits are remediated and interventions end. Unfortunately, efforts to remediate academic skill deficits may prove to be futile if students are unlikely to retain these newly acquired skills. The figure below summarizes the conceptualization of factors that may influence long-term intervention outcomes.

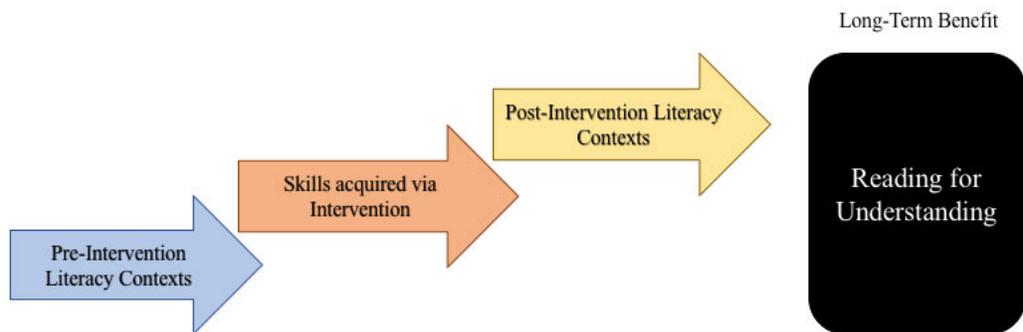


Figure 3. Theory of Change Post-Exit Progress Monitoring

Here pre-intervention literacy contexts refers to the exposure students have had cumulatively up until the point in which they enter the Reading Corps program. The student's access to literacy at home, the quality of core instruction in their classroom, and any other supplemental literacy activities the student is exposed to would constitute pre-intervention literacy contexts. In addition, persistent skill deficits that students bring with them to the Reading Corps program would fall within this realm. The next arrow, skills acquired via intervention, constitute the historical focus of evaluations of the Reading Corps program. That is, the main mechanism in which Reading Corps has helped students toward their path of reading for understanding, has been through the delivery of supplemental evidence based literacy interventions. The purpose of this report is to both explore and intervene upon the last arrow, post-intervention literacy contexts. Specifically, it is hypothesized that if the Reading Corps program can better understand and ultimately intervene upon and improve the contexts in which students access literacy after they have acquired skills to remediate initial deficits, the probability that they will successfully continue on the path towards reading for understanding will greatly improve.

Purpose of Evaluation

The purpose of this evaluation is to summarize three research studies undertaken to (1) better understand the performance of students following an exit from the Reading Corps intervention, (2) precisely measure the rate in which students that exit Reading Corps regress in academic skills, and (3) determine the effectiveness of a low-cost brief follow-up program modification to prevent the regression of academic skills.

It should be noted that in Study 1 and Study 3, a key emphasis is placed on the proficiency status of students on CBM benchmark assessments and end of year state tests where appropriate. Much of the research that has evaluated the long-term impact of literacy interventions have done so using metrics such as group-based effect sizes (which shed light on the standardized difference between average performance of the intervention group and the comparison group) or follow-up performance from single-case experimental designs, often a few weeks after the conclusion of the intervention. In reality, an intermediary measure of student performance is more meaningful to help educators make decisions in schools. It is argued that establishing whether students are likely to achieve proficiency at the end of the school year, after removing supplemental supports, is an extremely meaningful outcome inform resource allocation decisions in schools. The point is especially relevant for Reading Corps and schools as both are able to serve a limited number of students at a given time.

Study 1 – Initial Observations of Regression of Literacy Skills

Rationale

For the purposes of the current report, Reading Corps researchers and staff noticed that many students whom participated in the intervention program, and were ultimately exited from the program, went on to not pass subsequent universal screening assessments. To better understand the likelihood, or probability, that students that did or did not meet exit criteria would go on to pass subsequent universal screening assessments, an analysis of extant data was undertaken.

Description of Dataset & Method

Data were available from 1,824 kindergarten 2,532 first grade and 2,481 second grade students for the study. All students participated in the Reading Corps program during the 2016-2017 school year. Across grades the demographic breakdown of the sample was 51% female, 67% White, 14% Black, 10% Hispanic, 5% Asian, 2% American Indian, and 2% identified as belonging to more than one race. All states participating in the Reading Corps program were included in the study.

Universal screening data were available from the Spring of 2017 and Fall of 2017 (see Table 1). Kindergarten students in the sample read on average 66.63 ($SD = 24.50$) letter sounds per min in Spring 2017 and 31.01 ($SD = 18.13$) correct letter sounds per minute on measures of nonsense word fluency in Fall 2017. First grade students read on average 66.63 ($SD = 24.50$) WRCM in Spring 2017 and 51.44 ($SD = 25.73$) in Fall 2017. Second grade students read on average 101.84 ($SD = 20.87$) WRCM in Spring 2017 and 83.77 ($SD = 21.30$) in Fall 2017.

Kindergarten, first grade, and second grade students spent on average 13.83 ($SD = 9.42$), 18.61 ($SD = 11.59$), and 20.56 ($SD = 11.44$), weeks enrolled in the program, respectively.

To estimate the likelihood that students would go on to meet Spring and Fall benchmarks after participating in the Reading Corps program, generalized linear mixed modeling (GLMM) was used to estimate the log-odds of achieving proficiency on subsequent universal screening assessments as a function of relevant predictors. The primary predictors of interest in the present study included: grade level, whether the student met exit criteria for the Reading Corps program, the number of weeks the student was enrolled in the Reading Corps program, and the interaction of number of weeks in the program and whether the student met exit criteria. Separate models were estimated to predict proficiency status on Spring and Fall assessments. Outcomes from GLMM analyses are converted to probabilities to aid in interpretation.

Results

The percentage of kindergarten students in the entire sample that were proficient on Spring and Fall benchmark assessments was equal to 44% and 31%, respectively. In first grade the percentages were equal to 28% and 22%, and in second grade they were equal to 26% and 32%, respectively.

The table below shows the results of the GLMMs predicting proficiency on Spring and Fall benchmark assessments.

Table 2. Results of Generalized Linear Mixed Modeling for Spring and Fall Proficiency Statuses

Fixed Effects	Spring Benchmark		Fall Benchmark	
	Log-Odds	SE	Log-Odds	SE
<i>Intercept</i>	-2.08***	0.14	-2.14***	0.13
<i>Grade 1</i>	-0.33***	0.09	0.61***	
<i>Grade 2</i>	-0.23**	0.09	0.03	0.08
<i>Met Exit Criteria</i>	2.80***	0.15	1.94***	0.13
<i>Weeks in RC</i>	-0.02***	<0.01	-0.01**	<0.01
<i>Exit x Weeks</i>	0.00	<0.01	0.00	<0.01

Random Effects	Variance	Variance
<i>Intercept</i>	0.46	0.45
Deviance	6212.93	6914.56

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

Note. The intercept condition in this scenario reflected kindergarten students, who did not meet exit criteria for Reading Corps program and had received 0 weeks of intervention. Grade 1, Grade 2, and Met Exit Criteria were all dummy coded covariates.

For interpretability, the outcomes of the GLMMs are converted to probabilities in the following figures. In the plot, the average number of weeks students participated in the Reading Corps program for a given grade is used to estimate probabilities. It should be noted however, that the small, but statistically significant effect of duration suggests that the longer students participated in the program, perhaps because they have more severe skill deficits that take time to remediate, the lower the likelihood they would eventually go on to pass the subsequent benchmark assessment.

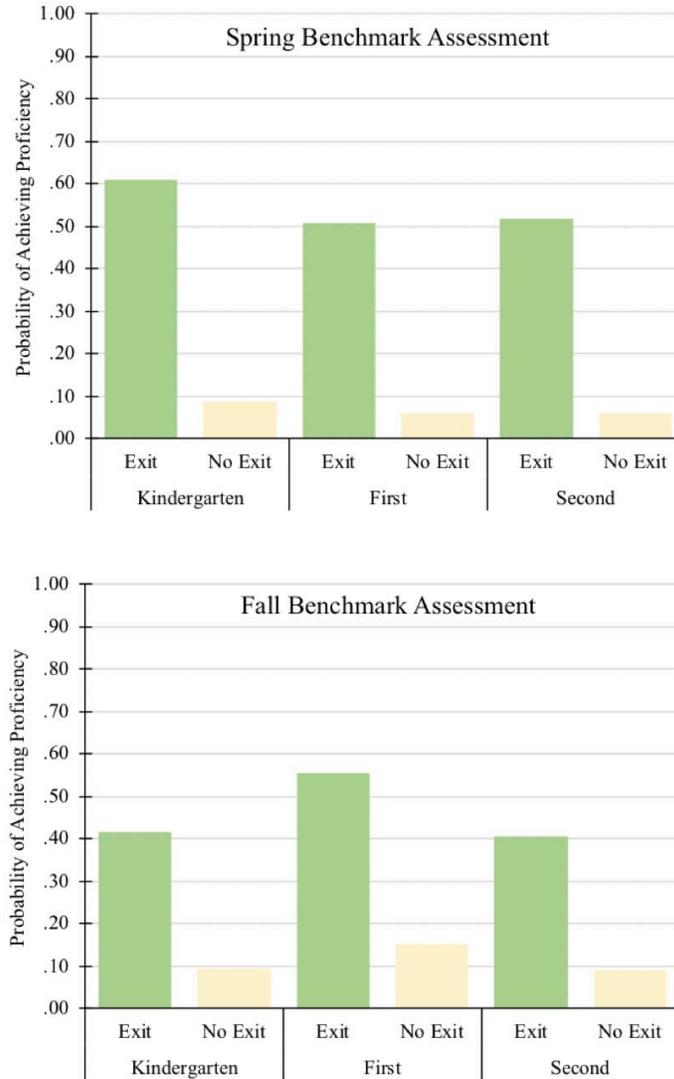


Figure 4. Probability of Meeting Future Benchmark Proficiency Targets as a Function of Grade and Exit Status from Reading Corps

Conclusions

Several findings are apparent from this study. First, students that meet exit criteria for Reading Corps program have a higher probability of going on to pass future benchmark assessments.

Second, a large number of students that meet exit criteria for Reading Corps program did not achieve proficiency on future benchmark assessments. For instance, kindergarten

students had a 39% and 58% chance of not meeting benchmark in the Spring and Fall, respectively, even after successfully exiting Reading Corps program. Amongst first grade students, probabilities of not meeting grade level benchmarks were equal to 40% and 45% the Spring and Fall, respectively after successfully exiting the Reading Corps program. Finally, the average probability of not meeting grade level benchmarks in the Spring was equal to 38% and was equal to 59% in the Fall amongst second grade students that exited Reading Corps program.

The outcomes of this study suggest that it cannot be assumed that a student's upward trajectory of performance will continue after they stop participating in Reading Corps program and only receive typical classroom instruction. Based upon the exit criteria utilized by Reading Corps program, if this assumption held true, all students that exit the program would far exceed the end of year benchmark target.

The results of this study confirm suspicions held by Reading Corps researchers and staff members. However, limitations associated with the extant dataset, namely the limitation of only having access to Spring and Fall benchmark data, preclude a more thorough understanding of the nature of student regression in academic skills. It would be helpful to better understand the rate in which students grow, week-to-week after exiting Reading Corps program. In addition, it would be helpful to understand whether the timing in which students exited the program was related to the rate in which students acquired as well as retained academic skills. Study 2 builds upon the study described here to address those concerns.

Study 2 – Quantifying Typical Rates of Regression of Student Skills after Exiting the Reading Corps Program

Rationale

The purpose of Study 2 was to gain a better understanding of the typical rate in which students improve (or do not improve) after exiting Reading Corps. Information regarding week-to-week progress of students was not available in Study 1. Per program guidelines, after student's successfully exit the intervention, they are not assessed on a weekly basis. This is understandable as students are not receiving intervention and thus typical treatment decisions (i.e., whether to change the intervention) do not have to be made.

However, with the information from Study 1 in hand, it was decided that more frequent assessment, in the absence of interventions, would need to occur to get a more psychometrically sound estimate of student growth during and after the intervention. As such, a subset of students were recruited to be assessed after successfully exiting Reading Corps during the 2017-2018 school year.

Method

Sixteen schools agreed to allow tutors to progress monitor students after they had exited Reading Corps program. A total of 91 second and third grade students were eligible to participate in the study. To be included in the present analysis, students had to (1) have met exit criteria for the intervention and (2) have at least three CBM observations prior to, and after meeting exit criteria for Reading Corps.

Of the 91 students, 34 were in second grade and 57 were in third grade. In second grade, 53% of students were female, 53% were White, 29% Black, 12% Hispanic, 3% Asian, and 3% identified as belonging to more than one racial group. In third grade, 51% of students were female, 39% were White, 28% were Black, 25% were Hispanic, and 9% were Asian. In second grade 18% of students received services as English Learners whereas 28% of students in third grade received services as English Learners.

For the purposes of the present analyses, and consistent with previous CBM progress monitoring research, outcomes from second and third grade students were combined.

To estimate student growth during and after participating in Reading Corps, separate piecewise regression models were estimated for each student:

$$y_i = \beta_0 + \beta_1 x_1 + \beta_2 \max(x_i - a, 0) + \varepsilon$$

Where y_i is a WRCM score for a student at week i . β_0 and β_1 are the intercept and weekly rate of improvement in WRCM the student demonstrated while participating in the program, respectively. β_2 is a dummy variable that captures the difference in the weekly rate of

improvement in WRCM after the week the student exited Reading Corps (a) compared to before the student exited the program. If week (x) is less than a (the WRCM score was collected during the intervention), the term defaults to 0. If x is greater than a (the WRCM score was collected after the student exited the intervention) the product of β_2 and x was added to the regression equation. In this instance, a statistically significant β_2 would suggest that the difference in growth during and post intervention was not equal to 0. In turn, weekly growth during the intervention is captured via β_1 and growth after the student exited the intervention is equal to $\beta_1 + \beta_2$.

Of the 91 students included in the sample, 75, or roughly 82%, demonstrated growth patterns better explained by the segmented regression model described above compared to a single monotonic rate of improvement across all WRCM scores. In addition, 37 students met exit criteria during the Fall semester, whereas 38 students met exit criteria during the Spring semester. Information regarding baseline performance and time spent in Reading Corps are presented in the table below for each group.

Table 3. Descriptive Intervention and Baseline Information for Study Sample

	All Students		Fall Exit		Spring Exit	
	M	SD	M	SD	M	SD
Observations pre-exit	12.85	5.78	9.49	2.23	16.13	6.32
Observations post-exit	10.53	5.37	11.78	6.25	9.32	4.07
Weeks pre-exit	16.13	7.54	10.49	2.46	21.63	6.72
Weeks post-exit	17.56	6.88	23.57	2.37	11.72	4.27
Baseline WRCM score	75.61	17.12	77.06	17.80	75.21	17.55
Intervention Sessions	30.83	16.57	19.63	10.94	36.50	19.12

Results

The table below presents growth in WRCM per week amongst all students in the sample, those that met exit criteria during the Fall semester and those that met exit criteria during the Spring semester during and after participation in Reading Corps.

Table 4. Descriptive Growth Information for Study Sample

	All Students		Fall Exit		Spring Exit	
	M	SD	M	SD	M	SD
Growth pre-exit	3.50	1.65	4.32	1.75	2.69	1.05
Growth post-exit	0.09	1.63	0.54	0.44	-0.35	1.30

Students, on average, improved at a rate of 3.50 (SD = 1.65) WRCM per week while participating in the intervention. However, after exiting Reading Corps, growth was much less (M = 0.09, SD = 1.63). In addition, the difference in the weekly rate of improvement during the intervention between students that met exit criteria in the Fall (M = 4.32, SD =

1.75) was much greater than students that met criteria in the Spring ($M = 2.69$, $SD = 1.05$; $t[58.51] = 4.87$, $p < .001$). The average difference in post-intervention growth ($M = 0.54$, $SD = 0.44$ vs. $M = -0.35$, $SD = 1.30$) was also statistically significant ($t[64.23] = -1.98$, $p < .001$).

Conclusions

Several findings are apparent from this study. First, all students that participated in Reading Corps demonstrated weekly growth rates that far exceeded students that were not considered at-risk for reading difficulties based upon normative information provided by FastBridge Learning.

Second, a rapid deceleration in growth was observed amongst all students after exiting Reading Corps. This pattern tended to be exacerbated if students were exited from the program in the Spring relative to the Fall. Students that exited in the Fall demonstrated a decelerated rate of improvement that was just below average based upon national normative information. However, students that exited in the Spring demonstrated, on average a steeper deceleration.

Differences in baseline performance between the two groups may partially explain differences observed in the time taken to meet exit criteria and growth afterwards. However, students in each group did not display significantly different baseline scores during Fall screening (Fall Exit: $M = 76.03$, $SD = 16.89$; Spring Exit: $M = 75.21$, $SD = 17.55$). Although students scored similarly on measures of oral reading rate, follow-up investigations may be warranted to determine whether students differed in their profiles of foundational literacy skills that subsume oral reading rate, which may explain the differential response to interventions targeted the overarching skill.

Considering students that exited the intervention in the Fall, it is unclear whether the act of engaging in weekly progress monitoring had some net positive effect. That is, compared to students enrolled in the broader Reading Corps program, it is unclear whether the observed rate of regression would have been *worse* if students were not assessed weekly after meeting exit criteria. Although the observed rates of growth after exiting Reading Corps program are not optimal, it is unclear whether there is any relative value in engaging said progress monitoring to maintain newly acquired skills. To answer this question a cluster randomized control trial was carried out (Study 3).

Study 3 – Randomized Control Trial of the Effects of Post-Exit Progress Monitoring on Preventing the Regression of Student Skills

Rationale

Taken together, the results of Study 1 and Study 2 suggest that students that participate in Reading Corps show exceptional growth while in the program, but that they do not continue on as steep of an upward trajectory after supports cease. Although it is not feasible, nor appropriate, to continue delivering interventions throughout the entire school year to all students, a key question becomes, what can be done to promote the maintenance of these newly acquired skills? Several options may be possible, including delivering less intense interventions (e.g., 3 times per week or for 10 mins rather than 20 mins per session). As a baseline, the current study sought to determine what the net impact was when using an extremely brief (1 min once per week) intervention. If positive results are observed here, the rationale of scaling up or building upon said intervention would be supported.

Method

A cluster-based randomized control trial design was used for Study 3. During the 2018-2019 school year 50 schools from the broader Reading Corps program ($N = 480$) were randomly assigned to the treatment group and 50 were assigned to a business as usual condition. Schools that were assigned to the treatment group were instructed to engage in post-exit progress monitoring (collecting 1 CBM assessment per week) of all students that met exit criteria during the Fall semester for the remainder of the school year. Schools in the business as usual condition did not engage in post-exit progress monitoring consistent with current program protocol.

In addition to being randomly assigned, baseline equivalence of schools was tested, and confirmed on the following criteria: total enrollment, student race/ethnicity, percentage of students eligible for special education services, percentage of students eligible for English Learner services, percentage of students eligible for free or reduced priced lunch, and percentage of students in third grade achieving proficiency on state-wide achievement tests in reading.

Student level inclusion criteria included (1) being enrolled in Reading Corps and meeting exit criteria during the Fall semester and (2) being enrolled in kindergarten, second or third grade. First grade students were excluded from the present study as the measures used for universal screening and progress monitoring switch mid-year from nonsense word fluency to CBM of oral reading.

A total of 530 students across 76 schools (10 treatment and 14 business as usual schools did not have students meet exit criteria during the Fall semester) participated in the study. Demographic information for the students in each sample is presented in the table below.

Table 5. Demographic Information for Business as Usual and Post-Exit Progress Monitoring Groups

Grade	Business as Usual (n = 269)	Treatment (n = 261)
Kindergarten	34%	33%
Second	27%	29%
Third	39%	38%
Gender		
Female	55%	47%
Race		
White	77%	80%
Black	6%	6%
Hispanic	6%	6%
Asian	3%	4%
Hawaiian or Pacific Islander	<1%	<1%
American Indian	1%	<1%
Multi	2%	1%

The outcomes of interest in the present study included: average rates of weekly growth on CBM outcomes between Winter and Spring benchmark assessments (the span in which program supports were not being delivered), proficiency rates on end of year CBM benchmark assessments, and proficiency rates on end of year achievement tests in third grade. Descriptive results are presented here and the outcomes of three-level multilevel modeling inferential outcomes are available in the appendix.

Results

Table 6. Study Outcomes for Business as Usual and Post-Exit Progress Monitoring Groups

Grade	Outcome	Business as Usual		Treatment	
		M	SD	M	SD
Kindergarten	Winter to Spring Growth	0.19	0.61	0.59	0.72
Second		0.82	0.68	0.84	0.68
Third		0.51	0.67	0.60	0.59
Kindergarten	Met CBM Spring Benchmark	68%	-	85%	-
Second		55%	-	57%	-
Third		57%	-	72%	-
Third	Met State Test Proficiency	59%	-	69%	-

Conclusions

Several findings are apparent from this study. First, kindergarten students that engaged in post-exit progress monitoring demonstrated higher weekly rates of improvement between Winter and Spring benchmark assessments, and were more likely to achieve proficiency on end of year state tests, relative to students in the business as usual condition.

Second grade students in the post-exit progress monitoring group showed slightly greater growth after exiting the intervention on average, relative to students in the business as usual group. Similarly, second grade students in the post-exit progress monitoring group had slightly more students achieve proficiency on the end of year CBM benchmark assessment.

Amongst third grade students, growth, on average, between Winter and Spring benchmark assessments was slightly higher in the post-exit progress monitoring group compared to the business as usual group. The percentage of students that passed the end of year CBM benchmark assessment was substantially higher in the post-exit group relative to the business as usual group. Finally, more students that engaged in post-exit progress monitoring passed the end of year state achievement test relative to students in the business as usual group.

Overall, post-exit progress monitoring appears to have variable impact across grades and student outcomes. Generally, most students that participate in post-exit progress monitoring have a higher likelihood of going on to achieve proficiency on end of year universal screening assessments than if they were not to engage in post-exit progress monitoring. Similarly, most students that engage in post-exit progress monitoring experience less regression in academic skills across the school year.

The results of Study 3 suggest that there is some relative value in engaging in follow-up assessment, as a means of a low intensity intervention, after students have exited Reading Corps. Given this, it would be worthwhile to follow-up to better understand the individual student factors (e.g., pre-existing literacy skills) as well as ecological factors (e.g., quality of classroom instruction) that predict maintenance of intervention effects.

Future Directions

Recommendations for Reading Corps

Based upon the results of the three studies described in this report, it is recommended that Reading Corps continue to engage in post-exit progress monitoring and consider implementing it with more school sites. It may even behoove the organization to adopt it as standard practice.

Outcomes suggest that expending less than 2 mins per week has a net positive effect for most students and at the very least confers no negative consequences. Further, in addition to improving student outcomes, the program may consider using post-exit progress monitoring data to further engage in data-based decision making. That is, with further research, Reading Corps may identify a point in which student's may be re-enrolled in the program if their performance drops below a certain level after a pre-determined number of weeks.

Although this may pose logistical complications with Reading Corps in enrolling and re-enrolling students, those students that initially meet exit criteria for the program may be treated differently than those that are enrolling for the first time. Given that students who were exited showed positive response to intervention initially, it may be that those students do not need the same intensity (e.g., two days a week vs. five days a week), or type (comprehension intervention vs. reading fluency intervention), of supports they received previously.

Although this model presents its own logistical issues, the net benefit of preventing students from engaging in intensive interventions only to re-enroll after showing initial success, similar to the fabled Sisyphus, will likely promote greater student outcomes and more effective resource allocation in the long run.

Points for Advancement

In addition to considering or expanding their model of post-intervention surveillance and intervention programming, it may benefit Reading Corps to further explore aspects of the proposed theory of change in the current report. Namely, it is likely that there are other post-intervention contexts that influence the maintenance of newly acquired intervention skills and ultimately impact the capacity for those students to read for understanding. The most apparent in school-based settings is the quality of regular education instruction. After students exit Reading Corps, for many the only other time in the school day dedicated to structured literacy instruction occurs in the regular education classroom.

It would be beneficial to understand whether key indicators of high quality instruction as well as the frequency of active student engagement in reading in regular education classroom settings predict the maintenance of literacy skills acquired through participating in Reading Corps. Better understanding the interplay between intervention programming and classroom instruction may enable the development of more nuanced intervention packages and follow-up supports to promote maintenance of literacy skills. In addition, supports provided by Reading Corps tutors could be expanded to help classroom teachers deliver more effective literacy instruction.

Similarly, there are characteristics of students that may contribute to pre-intervention contexts that predict the maintenance of literacy skills after exiting Reading Corps. Primary outcomes used to identify students for participation in the program and monitor intervention effectiveness are considered general outcome measures. More specifically, the data used to make instructional decisions in Reading Corps program are composed of many lower and higher order skills that are not directly assessed. For instance, if a student struggles with oral reading fluency, they may struggle with issues related to phonological processing or even comprehension—both of which are not directly assessed on CBM oral reading probes. Thus, if a student receives interventions directly targeting oral reading rate, the underlying component skill causing the deficit may not have been fully remediated, which in turn may lead to renewed difficulties as classwork becomes more challenging.

It may be worthwhile for Reading Corps to administer additional measures of reading performance before and after students are exited from the program, even on a small-scale experimental basis at first. This would in turn allow for the development of specific skill profiles that may help customize intervention programs (e.g., multi-component reading interventions) for specific students. Presumably, if the intervention better targets all facets of what are causing the underlying reading difficulty, the more likely students will retain their newly acquired literacy skills as demands for completing academic tasks continue to increase.

Appendix³

Table 7. Multilevel Longitudinal Modeling Results

Fixed Effects	Kindergarten				Grade Two				Grade Three			
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Intercept	6.71***	0.70	6.72***	0.70	56.98***	0.88	56.98***	0.88	89.73***	1.03	89.73***	1.03
FW Growth	2.59***	0.04	2.59***	0.04	2.63***	0.06	2.63***	0.06	2.26***	0.05	2.26***	0.05
WS Growth	0.47***	0.08	0.27**	0.10	0.88***	0.07	0.88***	0.10	0.58***	0.07	0.51***	0.09
Treatment			0.39**	0.14			0.01	0.13			0.16	0.12
Random Effects	<i>SD</i>	<i>SD</i>	<i>SD</i>	<i>SD</i>	<i>SD</i>	<i>SD</i>	<i>SD</i>	<i>SD</i>	<i>SD</i>	<i>SD</i>	<i>SD</i>	<i>SD</i>
Intercept (Student)	2.78	2.81	2.91	2.91	6.03	6.02						
Intercept (Site)	2.28	2.29	3.35	3.35	4.96	4.96						
WS Growth (Student)	0.49	0.50	0.50	0.50	0.36	0.36						
WS Growth (Site)	0.36	0.29	0.18	0.18	0.27	0.25						
Residual	7.08	7.06	8.28	8.28	8.86	8.86						
Model Fit												
AIC	3920	3915	3347	3350	4720	4721						
BIC	3954	3954	3380	3387	4755	4761						
Deviance	3904	3897	3332	3332	4704	4703						
Chi-Square (<i>df</i>)		7 (1)*		0 (1)		1 (1)						

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

Note. FW Growth is the rate of weekly improvement between Fall and Winter benchmark assessments. WS Growth is the rate of weekly improvement between Winter and Spring benchmark assessments. Treatment is a dummy covariate indicating whether sites were part of the post-exit monitoring group (1) or business as usual (0). AIC – Akaike information criterion. BIC – Bayesian information criterion.

³ Versions of the tables in the Appendix also appear in a manuscript currently under review for publication (Nelson, Klingbeil, Van Norman, & Parker, 2020: *A Cluster Randomized Control Trial of Brief Follow-up Practice Sessions on Intervention Maintenance*).

Table 8. Generalized Linear Mixed Modeling Results Predicting Proficiency Status on End of Year Assessments

Spring Benchmark	Kindergarten				Grade Two				Grade Three			
Fixed Effects	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Intercept	1.43***	0.30	0.89***	0.32	0.26	0.22	0.25	0.32	0.63***	0.18	0.30	0.23
Treatment			0.91**	0.44			0.03	0.44			0.68*	0.34
Random Effects	<i>SD</i>		<i>SD</i>		<i>SD</i>		<i>SD</i>		<i>SD</i>		<i>SD</i>	
Intercept	0.84		0.53		0.80		0.79		0.60		0.46	
Model Fit												
AIC	197		195		204		206		266		264	
BIC	203		205		205		215		273		274	
Deviance	193		189		200		200		262		258	
Chi-Square (<i>df</i>)			4 (1)*				0 (1)				4 (1)*	
MCA-III												
Fixed Effects									<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Intercept									0.56***	0.17	0.36	0.22
Treatment											0.43	0.33
Random Effects									<i>SD</i>		<i>SD</i>	
Intercept									0.38		0.34	
Model Fit												
AIC									254		254	
BIC									260		264	
Deviance									250		248	
Chi-Square (<i>df</i>)											2 (1)	

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

Note. Outcomes modeled in Log-Odds. Spring Benchmark: Kindergarten – Letter Sound Fluency, Grade Two and Three – Curriculum-Based Measure of Reading, MCA III – Minnesota Comprehensive Assessment Third Edition. Treatment is a dummy covariate indicating whether sites were part of the post-exit monitoring group (1) or business as usual (0). AIC –Akaike information criterion. BIC – Bayesian information criterion.