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Check for updates

Efficacy of the Check & Connect Mentoring Program for At-Risk General Education High School Students

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ABSTRACT

Although graduation rates are rising, the high school dropout problem remains a national crisis, and evidence-based information about interventions for at-risk students is critically needed. Prior research shows that Check & Connect, an individualized mentoring program, has positive effects on school persistence and progression for students with disabilities. This study examined the efficacy of Check & Connect with general education students who showed early warning signs of risk for dropping out of high school in a large urban district. The sample included 553 students with the lowest predicted probabilities of on-time graduation based on attendance, behavior, and course performance in Grades 8 and 9. Students were randomly assigned to receive a Check & Connect mentor for three years, starting in the summer after Grade 9, or not. Findings suggest the program was implemented with fidelity, except with students who left district schools. Check & Connect did not have any statistically significant impacts on measures of engagement, academic progress, the likelihood of dropping out, or graduation. These results are discussed in the context of other literature on mentoring and dropout prevention.

KEYWORDS

dropout prevention
efficacy trials
at-risk students
mentoring

Although national graduation rates have been ticking upward in recent years, the high school dropout problem remains a national crisis. According to the latest statistics from the U.S. Department of Education's National Center for Education Statistics (NCES), 83% of public high school students graduate with a diploma within four years (U.S. Department of Education, 2016). Thus, nearly one in five students does not successfully graduate from high school on time. The problem is particularly pronounced among students of color, students who are economically disadvantaged, and students with disabilities (Greene & Winters, 2005; Stetser & Stillwell, 2014; U.S. Department of Education, 2006). The consequences of the dropout problem are serious; recent estimates suggest that, during the next decade, high school dropouts will cost the nation about $1.5 trillion in lost wages (Alliance for Excellent Education, 2011) and billions more in costs related to public health, crime and justice, and public assistance (Levin, Belfield, Muennig, & Rouse, 2007). High school dropouts earn, on

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average, $7,840 less per year than high school graduates, and their lifetime earnings are $1 million less than college graduates (Snyder & Dillow, 2012).

As of late 2016, the What Works Clearinghouse (WWC) has reviewed the evidence on 25 "path to graduation" programs, identifying a total of 15 with positive effects on student outcomes. One of those programs is Check & Connect, a program originally developed by the University of Minnesota's Institute on Community Integration in collaboration with Minneapolis Public Schools educators to address concerns about low high school completion rates among students with disabilities. Check & Connect pairs students with a trained mentor who closely monitors their progress in school, matches them with targeted academic and social supports, and engages with their families with the goal of increasing student engagement, performance in school, and school persistence.

Prior studies, including two randomized controlled trials that met WWC standards without reservations, demonstrate positive effects of Check & Connect on school persistence and progression among students with learning, emotional, or behavioral disabilities (Sinclair, Christenson, Evelo, & Hurley, 1998; Sinclair, Christenson, & Thurlow, 2005; What Works Clearinghouse, 2015). Although Check & Connect initially focused on students with disabilities, some school districts now use the program with general education students, and research with this broader population is beginning to emerge (e.g., Maynard, Kjellstrand, & Thompson, 2014; Guryan et al., 2016). However, prior to the study described in this paper, there had been no rigorous test of the efficacy of Check & Connect on high school completion for general education students.

The use of Check & Connect with general education students makes sense theoretically, due to research suggesting that the strategies that are component parts of the program can promote school completion and prevent dropout in a broader population. Prior research suggests that graduation outcomes may be improved by strengthening adult–student relationships (Balfanz & Legters, 2006) and embedding support for students into the regular school schedule (Dynarski & Wood, 1997). Relatedly, strategies operationalized by Check & Connect are consistent with several of the recommended strategies in the U.S. Department of Education's *Dropout Prevention Practice Guide*, namely using data to identify at-risk students (Recommendation 1), assigning adult advocates to students at risk of dropping out (Recommendation 2), and implementing personalized programs to improve students' classroom behavior and social skills (Recommendation 4) (Dynarski et al., 2008).[1]

The current study, funded by a grant from the Institute of Education Sciences, tested the impact of Check & Connect on student engagement, attendance, academic performance, and graduation outcomes among general education students at heightened risk of dropping out in a large, urban district. Using student risk indicators measured in Grade 8 and the first half of Grade 9, we identified a sample of students at risk of not graduating within four years. Within each of 10 participating high schools, we then randomly assigned students in the identified sample to participate in Check & Connect or to a business-as-usual control group for three years starting in the summer after Grade 9. The study was designed to address the following research questions:

[1]By linking students with targeted academic supports (e.g., tutoring), Check & Connect mentors also can operationalize another practice guide recommendation: Provide academic support and enrichment to improve academic performance (Recommendation 3).

1. How was Check & Connect implemented in an urban setting with general education students identified as being at risk of failing to graduate from high school?
2. What is the impact of Check & Connect on student outcomes including engagement (behavioral, affective, and cognitive), course-taking behavior and academic achievement, and likelihood of dropping out and graduating within four or five years?

In brief, we found that Check & Connect was implemented with fidelity, except with students who left district schools. Contrary to hypotheses and counter to the prior evidence, we found the program had no detectable impact on key student outcomes.

This paper begins by describing the Check & Connect program and then describes the identification of the sample of at-risk students, random assignment, and the data sources used. The results section addresses the two research questions as well as findings from analyses of uptake and service contrast, comparing treatment and control students' reported participation in programs and supports. The final section discusses study implications.

Description of the Intervention

Check & Connect is a targeted student intervention designed to encourage student engagement in school and learning. The program is focused on promoting positive outcomes (e.g., academic achievement, credit accrual, and high school graduation) through the provision of persistent student support by trained mentors. Check & Connect is designed to serve students in Grades K–12 who are at risk of disengagement or dropout. The program does not have strict or prescriptive recommendations for identifying target students for the intervention, but general guidelines include: (a) determining alterable indicators of student disengagement in the school or district (e.g., attendance, grades, credits earned, behavior) and (b) establishing criteria for the selected indicators of disengagement (e.g., attending less than 80%–90% of the time, having two Ds or one F, or three or more disciplinary referrals).

Mentors typically work with students for 11 months a year, for a minimum of two years, following mobile youth from school to school within a district. The mentor's primary goals are to promote regular school participation, to keep education a salient issue for students and parents, and to fuel motivation to learn through persistent support. In the *check* component of Check & Connect, mentors systematically utilize school data to monitor students' attendance (e.g., absences, tardiness, skips), social/behavior performance (e.g., suspensions, behavioral referrals, detentions), and academic performance (e.g., course grades, credits earned). In the *connect* component, mentors build relationships with students by meeting on both a formal (scheduled) and an informal (nonscheduled) basis. During formal meetings, mentors use check data along with their knowledge of the student to intervene in a timely manner. The interventions are intended to address obstacles related to student disengagement and reestablish and maintain students' connection to school and learning. Mentors work with school personnel to enhance students' academic and social competencies; mentors also are encouraged to establish connections with students' families to improve home–school communication and promote consistency in messages about the importance of education.

Check & Connect mentors are trained to offer two levels of intervention: basic and intensive. Basic intervention is provided to all students in the caseload and includes sharing check data with students, discussing the relevance of school for students' goals, fostering opportunities for participation in school and school activities, and practicing problem-solving

strategies to overcome barriers to school success. Students who continue to show high-risk behaviors or signs of disengagement receive intensive, individualized interventions. Intensive interventions may include arranging for alternatives to suspensions, facilitating participation in small-group instruction or tutoring, providing more frequent or intensive problem solving (and involving parents and school personnel in intensive problem solving when necessary), and linking students with community resources (e.g., mental health services, service learning opportunities, job programs). Check & Connect does not prescribe specific intensive interventions; the interventions are at the discretion of mentors and are based on the mentors' understanding of student needs as well as the availability of school- and community-based interventions in the local context.

Theoretical Framework

The foundational underpinnings of Check & Connect were drawn from research on resiliency, systems theory, cognitive-behavioral theory, and intrinsic motivation to address the complex social problems related to school dropout (see Christenson, Stout, & Pohl, 2012). The Check & Connect theory of action centers on student engagement—students' active participation in school and school-related activities as well as commitment to and investment in their learning. Engagement is viewed as a primary mediator for promoting school completion (Christenson et al., 2008; Finn, 1989; Grannis, 1994). Engagement is viewed as a multidimensional construct including behavioral engagement (e.g., attendance, work completion, participation in extracurricular activities, disciplinary referrals), affective engagement (e.g., sense of belonging, perceived connection with teachers and peers related to learning), and cognitive engagement (e.g., perceived relevance of school work, self-regulation toward goals).

Check & Connect mentors work one-on-one with students to improve these aspects of engagement. As the process of reengagement begins, mentors can provide and make available targeted and personalized supports and interventions that are aligned to students' personal needs that, in turn, can lead to improved interim academic outcomes including school persistence, course performance, credit accrual, and achievement on assessments (e.g., exit exams). Improvement in these interim outcomes then leads to a greater likelihood that students will successfully graduate on time. A visual depiction of this theory of action is presented in Figure 1. Although the process is shown to be linear, some of the interrelationships among components in the theory of action may be cyclical. For example, as students' interim academic outcomes improve (e.g., students receive higher grades), their engagement in school (shown as an earlier outcome in the process) may improve, thereby contributing to an increased likelihood of further academic success (depicted with a bidirectional arrow). (See Christenson et al., 2012, for an expanded theory of action used as part of the Check & Connect implementation manual.)

Method

This study was a three-year randomized controlled trial designed to test the efficacy of Check & Connect on outcomes for general education students identified in Grade 9 as being at risk for not graduating on time. The study took place in 10 comprehensive high schools, all within a large urban district in California that volunteered to participate. The student population in the study schools averaged 21% White, 14% African American, 48% Hispanic, and

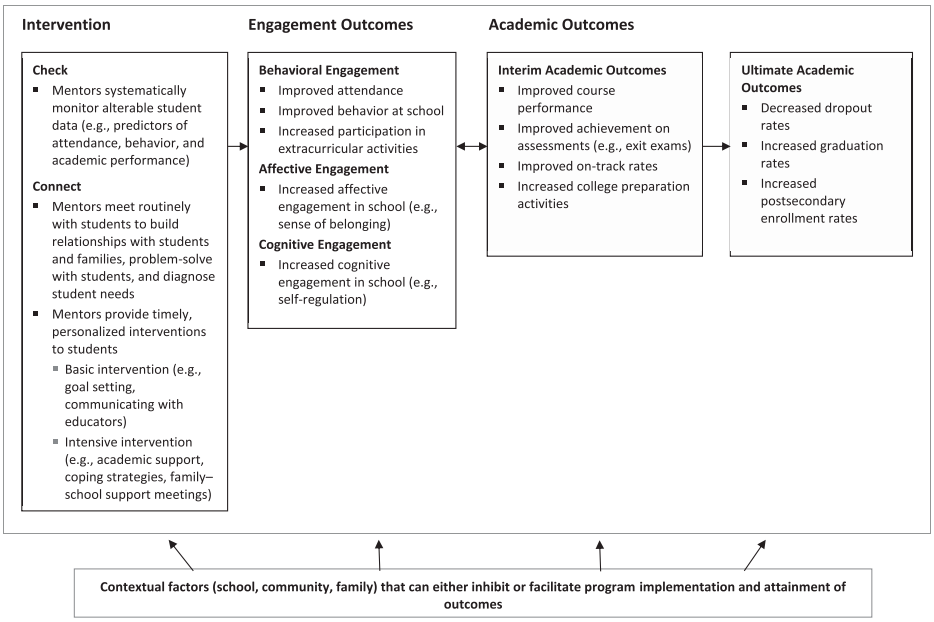

Figure 1. Check & Connect abridged theory of action.

15% Asian (see Table 1). Two thirds (67 percent) of students in these schools were eligible for free or reduced-price lunch, and 21% were English language learners.

Sample Selection

The goal of this study was to assess the impact of Check & Connect on general education students with low probabilities of on-time high school graduation as of the ninth grade. To determine students' probabilities of on-time graduation, we first identified indicators available within the district data system that were highly predictive of failure to graduate within four years. To determine which indicators predicted failure to graduate, we used data from Grades 8 and 9 for cohorts of students who entered the ninth grade in 2005–06 and 2006–07, for whom on-time graduation was known. We used logistic regression models to

Table 1. Characteristics of the 10 study schools, as of 2009–10 school year.

Characteristics	Average percent
Race/ethnicity	
White	21%
African American	14%
Hispanic	48%
Asian	15%
Native American	<1%
Eligible for free or reduced-price lunch	67%
English language learner	21%
Proficient on English Language Arts State Assessment (2010)	44%
Proficient on Mathematics State Assessment (2010)	16%

Source. District-provided school-level data from the 2009–10 academic year.

examine the relative predictive strength of several risk factors observed in Grades 8 and 9. In the participating study district, we identified the following early warning indicators as the risk factors most strongly associated with failure to graduate on time: (a) absent 10% or more of enrolled days in Grade 9; (b) had a failing grade in at least one course in Grade 9; (c) had a failing grade in Algebra I in Grade 8 or Grade 9; and (d) had at least one "Needs Improvement" or "Unsatisfactory" citizenship grade (indicating general behavior and participation in each class) in Grade 9 courses.[2]

We then applied the coefficients from this model to the data for students who entered Grade 9 in 2010–11 within the 10 participating schools and identified 100 general-education students in each of nine of the schools, and 150 in the tenth school, with the lowest predicted probability of on-time graduation as of spring 2011 (range 0.34 to 0.94).[3] Of the 1,050 students identified, a total of 553 agreed to participate and had parental/guardian consent.[4] We then randomly assigned the participating students to condition within school, resulting in 276 students in the treatment group and 277 students in the control group. The online supplemental material includes a diagram summarizing the sample selection process (Figure S1).

Treatment students were distributed among five Check & Connect mentors based on the school attended in Grade 9. The five mentors who were initially hired and trained for the study continued in their roles throughout the full three-year implementation period. Students in the control group were not assigned to a Check & Connect mentor at any time during the study, but they were not prevented from accessing other services available within the district.

Table 2 presents descriptive data on the student sample at baseline, including demographics and risk factors measured in Grades 8 and 9. Notably, more than 30% of students in the sample were English language learners; approximately 34% were previous English language learners who, prior to Grade 9, met state criteria to be reclassified as fluent English proficient; and 72% were Hispanic. The average predicted probability of on-time graduation was 0.55. Table 2 demonstrates that the random assignment procedure yielded two groups that were not statistically different on any of the baseline measures.

Data and Measures

Data collected for this study include implementation data, student administrative records, and student survey data. The study team worked with the program providers to collect implementation data from monitoring forms that mentors were expected to update weekly and submit monthly for each student in their caseload. The monitoring forms included three main sections that were used for implementation data: (a) a check data section in which mentors recorded student data such as grades, tardies, and suspensions and indicated whether the student was considered "high risk" on the basis of the check data and the

[2]The other possible grades are S (Satisfactory), G (Good), and E (Excellent).

[3]To identify at-risk students before the end of the Grade 9 year, we used attendance information from the first three months of high school and course grade information through April.

[4]Recruitment occurred during the summer and frequently involved going to students' homes. The recruiters did not report any active refusals; nonconsent was the result of lack of contact or response. The 553 students in the study did not differ significantly from the 497 nonconsented students in their probabilities of on-time graduation, gender composition, or percentage of students who were African American or Hispanic. Participants were, however, slightly less likely to be White than nonconsented students.

Table 2. Characteristics of study sample, by condition.

Student characteristic	Observed treatment	Adjusted control	*p* value
English language learner status ($n = 553$)			
Percent English language learner	31.2%	32.0%	0.830
Percent reclassified English learner	34.8%	34.3%	0.909
Percent initially fluent in English	34.1%	33.7%	0.923
Percent female ($n = 553$)	44.9%	50.9%	0.158
Percent racial/ethnic group ($n = 552$)			
Percent African American	12.0%	12.7%	0.800
Percent White	8.4%	6.7%	0.492
Percent Asian	5.5%	7.0%	0.476
Percent Hispanic	72.4%	71.7%	0.866
Percent students who were absent 10% or more of the enrolled days in Grade 9 ($n = 553$)	23.9%	22.4%	0.670
Percent students who had at least one Needs Improvement or Unsatisfactory citizenship (behavior) grade in Grade 9 ($n = 553$)	90.9%	89.0%	0.469
Percent students who failed any course in Grade 9 ($n = 553$)	98.6%	99.7%	0.197
Percent students who failed Algebra I ($n = 553$)	80.1%	79.4%	0.867
Average predicted probability of graduation ($n = 553$)	0.55	0.55	0.632
Average score on Grade 8 English language arts state assessment ($n = 547$)	319.06	318.23	0.828

Source. District administrative records.

Notes. Differences in student characteristics by condition were tested using a model that accounts for the clustered data structure (i.e., students nested within the schools they attended in Grade 9). The treatment group mean is the average value observed in the data. The adjusted control group mean was calculated by subtracting the estimated group difference from the observed treatment group mean to ensure that comparisons across groups accurately account for differences in student background characteristics.

mentor's judgment; (b) a student communications section in which mentors recorded the number of minutes they met with the student in formal and informal meetings and noted the mode of communication (in person, by phone, text, e-mail); and (c) a list of specific interventions that were being provided to students. We used the monitoring form data to construct four measures of implementation:

- **Fidelity of implementation of the check component**. We examined whether mentors recorded check data for their students at least once during each month of implementation during the academic year (September through June).
- **Frequency of mentor–student interactions**. We counted the number of unique days that mentors indicated they met (formally or informally) with students and calculated the average number of mentor–student interactions per month.
- **Amount of time mentors spent with students**. We summed the amount of time mentors reported spending with students in formal and informal interactions during each month and calculated the average number of minutes per month.
- **Match between student risk status and provision of basic and intensive interventions**. We examined whether mentors identified students as "high risk" and whether they indicated that they provided "basic" or "intensive" intervention.

The outcome measures for the study were derived from district administrative data and student survey data, and are described in Table 3. The district data included information about students' demographic characteristics and academic background characteristics (e.g., prior attendance, behavior and course performance grades, and achievement test scores), school enrollment in each academic year, attendance, course-level transcript data (including both academic and citizenship grades), exit exam pass/fail status, and graduation date and diploma type. Because a number of students left

Table 3. Student outcome measures, by outcome domain.

Measure	Description/coding	Source
Student engagement—Behavioral		
Attendance	Indicator of whether a student attended school for at least 90% of the days the student was enrolled during the 2013–14 school year	District administrative data (2013–14)[c]
Citizenship grades in academic courses[a]	Indicator of whether a student received an "unsatisfactory" in two or more courses during the 2013–14 school year	District administrative data (2013–14)[c]
Participation in extracurricular activities	Indicator of whether a student had participated in at least one extracurricular activity (e.g., school sports, arts or music group, school yearbook, or newspaper) since the beginning of summer 2013	Student survey (spring 2014)
Student engagement—Affective and cognitive		
Student Engagement Instrument (SEI) scale	The SEI (Appleton, Christenson, Kim, & Reschly, 2006) includes 33 survey items used to measure five subscales within two domains of student engagement: (a) affective engagement, including teacher–student relationships (Cronbach's alpha[b] = 0.89), peer support for learning (Cronbach's alpha = 0.88), and family support for learning (Cronbach's alpha = 0.83); and (b) cognitive engagement, including control and relevance of school work (Cronbach's alpha = 0.85) and future aspirations and goals (Cronbach's alpha = 0.85).	Student survey (spring 2014)
Student Engagement Questionnaire Scale (SEQ-C)	The SEQ (Steinberg, 1996) includes 12 survey items used to measure student engagement in school, reflecting perceived relevance of schoolwork, teacher–student relationships, teacher expectations, and satisfaction with school (Cronbach's alpha = 0.78).	Student survey (spring 2014)
Interim academic outcomes—Course performance		
Course failure in fourth year	Indicator of whether a student failed two or more classes during the 2013–14 school year	District administrative data (2013–14)[c]
Passed at least one summer school class	Indicator of whether a student passed at least one summer school class in summer 2013—measured among students with district administrative data during the second and third years of high school so that credit accumulation can be measured using the same sample of students	District administrative data (2011–12 and 2012–13)[d]
Interim academic outcomes—Achievement		
Passed the high school exit exam	Indicator of whether a student passed the California High School Exit Exam in both mathematics and English by the end of the third year of high school	District administrative data (2011–12 and 2012–13)[d]
Credit accumulation	Number of credits a student earned through the beginning of the fourth year of high school (including summer 2013)—students in the state were required to complete 44 semester credits to graduate from high school	District administrative data (2011–12 and 2012–13)[d]
Ultimate academic outcomes—Dropout and graduation		
Dropout	Indicator of whether a student had a record of dropping out of a high school in the state within five years of entering Grade 9	District administrative data, supplemented with state administrative data[e]
On-time (four-year) graduation	Indicator of whether a student graduated from a school in the state within four years of entering Grade 9	District administrative data, supplemented with state administrative data[e]

(*continued on next page*)

Table 3. (*Continued*)

Measure	Description/coding	Source
Five-year graduation	Indicator of whether a student graduated from a school in the state within five years of entering Grade 9	District administrative data, supplemented with state administrative data[e]

Note. Two outcomes in the program Theory of Action (Figure 1) that are not included as outcome measures in this paper are college preparation activities (interim academic outcome) and postsecondary enrollment (ultimate outcome), which will be examined in a subsequent paper.

[a]Citizenship grades indicate whether the teacher found the student's behavior and participation in the class to be satisfactory. Citizenship grades (Excellent, Good, Satisfactory, Needs Improvement, Unsatisfactory) are independent from course grades, and students receive both types of grades for most high school courses (with some exceptions, such as some credit recovery courses, physical education, and computer literacy). To identify the at-risk sample at the outset of the study, we used an indicator of whether students had one or more citizenship grades of Needs Improvement or Unsatisfactory; however, as an outcome measure, there was not enough variation in the sample as students moved through high school—nearly all students had at least one of these grades per year. Therefore, we raised the criterion to Unsatisfactory in two or more courses.

[b]The Cronbach's alphas reported in this table are based on the sample of students who participated in the spring 2014 student survey.

[c]To have data on these measures, students in the sample had to have been enrolled in schools that submitted transcript data to the district data system in the fall *and* spring of the third year of implementation (2013–14), corresponding to students' fourth year of high school.

[d]To have data on these measures, students in the sample had to have been enrolled in schools that submitted transcript data to the district data system in the fall *and* spring of the first *and* second years of implementation (2011–12 and 2012–13), corresponding to students' second and third years of high school.

[e]All students in the sample had data on these measures.

the district prior to the end of the study (see the next section on attrition and nonresponse), we also collected dropout and graduation information from the state longitudinal data system, allowing us to estimate the impact of Check & Connect on these outcomes for the full sample of treatment and control students. The state data system includes students who graduated from high school from any public school in the state, but it does not allow us to differentiate between nongraduates and students who graduated from a high school outside of the state.[5]

The study team administered surveys to treatment and control students in the spring of 2012, 2013, and 2014. These surveys asked students about their participation in social and academic activities and contained items from preexisting measures of affective and cognitive engagement (see Table 3). To create engagement scale scores, we used partial credit Rasch models and standardized the resulting Rasch scores within the analytic samples. We examined student reports of having a mentor and involvement in targeted academic supports, including tutoring, online credit recovery programs, and college preparatory programs, to measure service contrast (i.e., the extent to which control students accessed interventions similar to those accessed by treatment students).

For the sake of brevity, only service contrast measures and interim outcomes that occurred during the fourth year of high school (as well as credit accumulation and passing the high school exit exam by the beginning of the fourth year of high school) are included in this paper. These findings demonstrate the impact of Check & Connect on the interim outcomes after two full years of implementation. (Earlier interim outcomes are included in the online supplemental material.)

[5]Seven percent of both the treatment and control groups left the state permanently at some point following the summer of 2011 (without first having graduated).

Weighting for Attrition and Nonresponse

Our main impact analyses estimate intent-to-treat effects, meaning the analyses assess the impact of the program on outcomes for all students who were randomly assigned, not just for students who actually participated in the program. However, many of the interim student outcomes were derived from district administrative data, and approximately half of the study students did not remain in the data system throughout the full duration of the study. In addition to moving out of the district and dropping out of high school, many students transferred to local charter schools that did not submit detailed transcript data to the district. Figure 2 shows the percentages of treatment and control students in different school settings across the three years of program implementation. Although these percentages were similar by condition, attrition bias in the analysis of some of the study outcome measures is possible.

In particular, interim outcomes (see Table 3) based on multiple years of administrative data were subject to possible attrition bias. We measured students' credit accumulation, performance in summer school, and completion of the high school exit exam by the beginning of students' fourth year of high school. To have data on these measures, students in the sample had to have been enrolled in schools that submitted course-level transcript data to the district data system during the first two years of implementation (2011–12 and 2012–13), corresponding to students' second and third years of high school; 40.2% of treatment students and 40.4% of control students were missing administrative data during at least one of these years. We examined course failures, attendance rates, and citizenship grades during students' fourth year of high school. To have data on these measures, students in the sample had to have been enrolled in schools that submitted course-level transcript data to the district data system in the fall and spring of students' fourth year (2013–14, the third year of implementation); 46.4% of treatment students and 47.3% of control students were missing administrative data for at least one semester of the year. Interim outcomes based on survey data, however, were less subject to attrition bias because data collectors followed up with

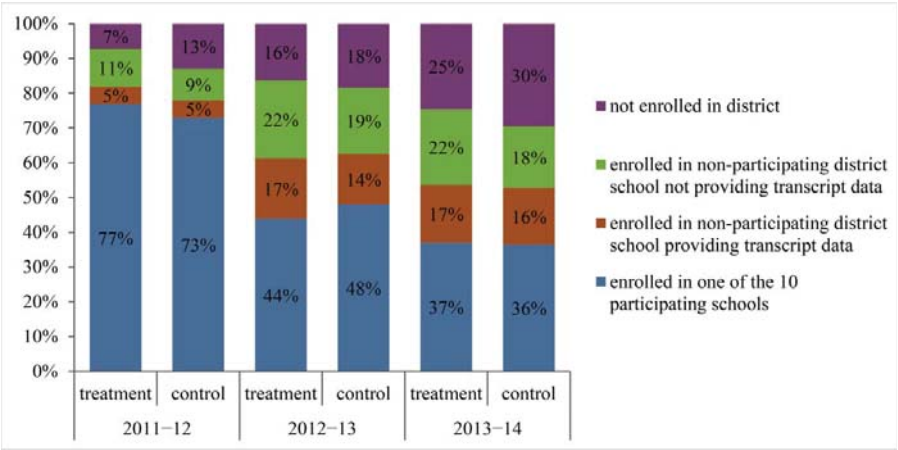

Figure 2. Percentage of treatment and control students in different settings during each year of implementation. The "enrolled in non-participating district school not providing transcript data" category includes district-authorized charter schools that are not required to submit transcript data to the district. The "not enrolled in district" category includes students who transferred outside of the district and students who dropped out of high school. *Source*. District administrative records.

students who had left district schools. Rates of missing data for interim outcomes measured by the spring 2014 student survey were 19.9% for treatment students and 19.5% for control students; thus about 80% of both groups were included in the analysis of engagement outcomes and service contrast measures. Figure S2 in the online supplemental material provides the numbers of treatment and control students in the analytic sample for each outcome. Although overall attrition rates were high in this study of at-risk, highly mobile students, differences in attrition rates between treatment and control students (i.e., differential attrition) were below 2 percentage points at each period of follow-up.[6]

We excluded students with missing outcome data from analyses of the interim outcomes but took attrition and nonresponse into account by applying inverse probability weights (IPWs; see Wooldridge, 2007). We applied the IPWs under the assumption that outcome data are not missing completely at random but that outcome data are missing at random once we account for observed student characteristics such as prior achievement and demographic information. Assuming that the observed student characteristics in the IPW model accurately account for students' probabilities of having nonmissing outcome data, applying these weights allows us to generalize our findings to the original sample. However, while IPWs are calculated based on observed demographic and achievement characteristics, IPWs cannot account for differences in unobservable characteristics such as student dispositions. Even after applying IPWs, the treatment and control students in the analysis samples for the interim outcomes may differ on these unobservable characteristics.

We estimated weights by first predicting students' probabilities of having nonmissing outcome data based on observed student demographic and academic background characteristics in Grades 8 and 9. To estimate predicted probabilities, we used a generalized boosted logistic regression technique implemented in the *twang* package in R (Ridgeway et al., 2013). Probabilities of having nonmissing data were estimated separately for treatment and control students. We used the inverse of these probabilities as weights in our analyses. We calculated three separate IPWs to account for: (a) students with missing administrative data during the third year of implementation; (b) students with missing administrative data for at least one semester during the first two years of implementation; and (c) students who did not respond to the spring 2014 survey. Thus, students with higher probabilities of having missing data (i.e., lower probabilities of having nonmissing data) are given more weight in analyses because their characteristics are more similar to the characteristics of students who were not included in the sample due to attrition (transferring to a school that did not submit transcript data to the district data system, transferring out of the district, or dropping out of high school) and nonresponse.

To assess the performance of the attrition and nonresponse weights, we examined the characteristics of all students in the original sample, the unweighted background characteristics of our analytic samples (i.e., students with nonmissing outcome data), and the weighted background characteristics of our analytic samples to observe the extent to which IPWs reduced differences between the unweighted analytic sample and the original sample. In general, we observed that higher risk students were more likely to have missing data due to mobility or survey nonresponse. Students in the unweighted analytic samples tended to have

[6]For both treatment and control groups, the primary source of attrition was transfer. Only six treatment students and eight control students dropped out directly from district schools in their second, third, or fourth year of high school; most transferred out of the district first (e.g., to a charter school) or did not drop out until after their fourth year.

higher prior achievement test scores and probabilities of on-time high school graduation, were less likely to be English language learners, and were less likely to exhibit individual academic risk indicators than students in the original sample. After applying IPWs, the weighted student background characteristics of the analytic samples were more similar to the observable characteristics of the original sample. (See Table S1 in the online supplemental material.) Nevertheless, analyses of interim outcomes based on district data may be considered as nonexperimental due to the substantial amount of missing data associated with administrative records, and the possibility that the IPWs do not account for differences in unmeasured characteristics between treatment and control students who remained in district schools. Analyses of graduation and dropout outcomes were based on the full original sample of students randomly assigned to condition.

Analytic Methods

Following an intent-to-treat (ITT) approach, the main impact analyses compared outcomes for students assigned to the treatment group to outcomes for students assigned to the control group after controlling for student demographic and academic background characteristics that were measured prior to treatment assignment. The main impact analyses estimated weighted multiple regression models as follows:

$$Y_i = \alpha + \beta_0 T_i + \sum_{1}^{x} \beta_x X_{xi} + \varepsilon_i \quad (1)$$

where Y_i represents an outcome for student i, T_i is the treatment indicator (0 for control and 1 for treatment), β_0 is the estimated program effect, and X_{xi} is a vector of pre-random-assignment background characteristics whose accompanying regression coefficients are β_x. X_{xi} includes student race and ethnicity, gender, predicted probability of on-time graduation (based on attendance and course performance in Grades 8 and 9 and used for sample selection), and a vector of school fixed effects identifying the schools from which the participating students were sampled. These school fixed effects indicators remain unchanged even if students moved to a different school during the study. Finally, ε_i is a random error term. When Y_i is binary (e.g., on-time graduation), we estimate Equation 1 with a logit link function.

To supplement the ITT analyses, we used an instrumental-variables approach to estimate the impact of Check & Connect for treatment group students who actually received the treatment (i.e., a treatment-on-the-treated or TOT analysis). A full description of these analyses can be found in the online supplemental material.

Results

This section begins by presenting results for analyses related to implementation of Check & Connect. It then examines overall levels of uptake among treatment students as well as service contrast to consider whether program impacts could be attenuated due to low uptake or control students' participation in activities similar to those of Check & Connect. The section concludes by presenting results on the impact of the program on the outcomes listed in Table 3.

Implementation of Check & Connect

Our findings regarding how the program was implemented in the study follow a description of the mentor hiring and training processes, which were crucial to implementation.

Mentor Hiring and Training

Mentors were hired by the district and trained for their role by the program developers from the University of Minnesota's Institute on Community Integration. The district first identified a coordinator, who was the district's existing Dropout Prevention Program Manager. The coordinator and other district staff and leaders conducted a search for the mentors in spring 2011, and the pool of applicants was narrowed based on input from the program developers. Five mentors were hired as district employees in summer 2011. They all had previous experience working with at-risk youth (e.g., as a counselor or parole officer), three were bilingual, and at the time of hire, all had at least a bachelor's degree and two had a master's degree in social work or counseling.

Prior to implementation, the mentors received a Check & Connect manual and attended a two-day training session provided by the program developers in summer 2011. Topics of the training included the context of the dropout problem, evidence of prior effectiveness of Check & Connect, the role of the mentor, the criteria mentors should use to classify students as needing basic or intensive intervention based on the check data, and types of interventions that mentors could provide (see Christenson et al., 2012, for more information about mentor training). Each year of the study, the program developers provided ongoing professional development to the coordinator and the five mentors on strategies to enhance students' intrinsic motivation and engagement and challenges raised by the mentors. In addition, the program developers held biweekly phone calls with the coordinator to provide ongoing support for implementation, and the coordinator held weekly in-person meetings with the mentors.[7]

For the study, the five mentors were each assigned a caseload of between 50 and 60 students.[8] Each mentor's caseload was spread across 2 of the 10 high schools that agreed to participate in the study at the outset.[9] The five mentors remained in their roles throughout the three years of implementation (with the exception of two maternity leaves, which were covered by substitute mentors identified by the district).

Implementation Findings

The expectation for mentors was to check student progress weekly using the monitoring form and to meet with students at least twice per month (or more frequently if

[7] The coordinator also met one-on-one with mentors on an as-needed basis if mentors faced issues serving the students or if the coordinator's review of the monitoring forms suggested that additional meetings were necessary.

[8] According to the Check & Connect manual, the assumption is that each mentor will spend approximately 0.8 hours per student each week. Because the mentors in this study were employed full time, program developers determined that mentors could manage a caseload of 50 students (40 hours/0.8 hours per student). Although this might seem high by the standards of well-known mentoring programs such as Big Brothers Big Sisters of America (Tierney, Grossman, & Resch, 1995), it is low compared to typical caseloads for high school guidance counselors, which nationally average above 300 (College Board, 2012).

[9] To limit the number of schools to which mentors needed to travel to meet with students, mentors were matched with students based on the high school students attended in the ninth grade. However, the coordinator carefully considered mentor and student characteristics in placing the mentors; all of them lived in the communities they served and had ethnic backgrounds resembling those of many of the students they served. Approximately 50% of students were matched to a mentor of the same gender and 58% were matched to a mentor of the same race/ethnicity.

determined necessary through check data) beginning in fall 2011. Initially, mentors also were expected to maintain relationships with students who remained in the general geographic area of the district even if the students enrolled in a charter school or were no longer enrolled in school. However, it was not possible, in most cases, for mentors to obtain check data for students who transferred to charter schools that did not submit transcript data to the district data system or left the district (see Figure 2 for percentages).

In the following subsections, we examine the extent to which mentors conducted the check component of the program and the frequency of mentor–student interactions as measures of fidelity. We also examine, for descriptive purposes, the amount of time treatment students spent in formal and informal mentor–student meetings during the three years of implementation. Because of the high rates of mobility among study participants, we present implementation findings (a) for the full sample of treatment students and (b) separately for nontransfer students (defined as students who were enrolled in the 10 participating schools as well as in other district schools that submitted course-level transcript data to the district data system) and transfer students (defined as students who were enrolled outside of the district or in district-authorized charter schools that did not submit student-level transcript data to the district data system, and students who were not enrolled in school).[10] For descriptive purposes, we also examine whether mentors' provision of basic and intensive services aligned with students' at-risk status.[11]

Check Data. Mentors were expected to record students' check data related to attendance, course failures, and behavioral issues weekly on their monitoring forms and then submit these forms to the coordinator monthly. The coordinator checked the submitted forms to identify issues for discussion in her weekly meetings with the mentors. We examined whether mentors recorded these data at least once every month during each academic year as a measure of fidelity of implementation of the check component of the program. As shown in Table 4, during the first school year after random assignment, mentors recorded check data each month for about 65% of the treatment students. In the second and third years of implementation, mentors recorded check data on monthly monitoring forms for successively smaller percentages of students.[12] As expected, the percentage of students with monthly check data was consistently higher for the nontransfer treatment students (i.e., those who maintained enrollment in a school that submitted student-level transcript data to the district data system during the academic year). However, only 60% of nontransfer treatment students had monthly check data during the third academic year of program

[10] Any student who was not enrolled in a transcript-data-providing school in the fall or spring of the academic year was classified as a transfer student within that school year.

[11] Another important aspect of implementation is the quality of the student–mentor relationship. In the spring 2014 survey, 73% of the 190 treatment students who responded to survey items related to student–mentor relationship quality agreed or strongly agreed with all 11 statements describing positive aspects of the relationship (e.g., "My mentor respects me," "My mentor really cares about me," "I could ask my mentor for help if I had a problem"). Detailed findings about relationship quality are not included in this article due to the limited variation in students' responses.

[12] Several factors may have prevented mentors from recording student data on at least a monthly basis, such as students moving to a school that did not submit transcript data to the district data system and technical difficulties accessing a new online data system that was initiated during the study. Therefore, we also examined the percentage of treatment students for whom check data were recorded on monitoring forms at least once in the fall and once in the spring of the academic year. Using this more lenient threshold, the percentage of students who experienced the check component of the program with fidelity was higher: 92%, 79%, and 63% during the first, second, and third year of implementation, respectively.

Table 4. Percentage of treatment students whose mentors recorded check data on each submitted monitoring form, by year.

	All students		Nontransfer students		Transfer students	
Academic year	Number of students	Percent of students with monthly check data	Number of students	Percent of students with monthly check data	Number of students	Percent of students with monthly check data
2011–12	276	64.9%	226	73.9%	50	24.0%
2012–13	276	45.7%	169	71.6%	107	4.7%
2013–14	276	32.6%	148	60.1%	128	0.8%

Source. Monthly mentor monitoring forms.
Notes. Academic year is defined as September through June. Students with missing monitoring forms during the academic year were classified as having monthly check data, or not, based on whether check data were recorded on all submitted monitoring forms. Students for whom no monitoring forms were submitted within the academic year were classified as not having check data.

implementation. It is possible that mentors monitored students' academic progress without recording the check data onto the form.

Frequency of Mentor–Student Interactions. The monitoring form data indicate that, on average, mentors interacted with the students in their caseload about as frequently as recommended for faithful implementation of the program (twice per month) during the academic year, with fewer meetings during the summer months. Frequency of interactions differed by students' transfer status. On average, nontransfer students interacted with their mentors twice per month during the first academic year of implementation and three times per month during the second and third academic years. In addition, nontransfer students averaged 0.8 interactions per month during the first summer and 1.9 interactions per month during the second summer (see Table 5). Mentors met less frequently with transfer students, averaging one or fewer meetings per month during each academic year and summer. This lower frequency would be expected, particularly in the second and third years, when the program developer and implementation team revised the expectation for frequency of meetings with transfer students to once per month, and not necessarily in person, due to the time required for traveling to meet with students who had transferred to other schools.

Table 5. Average number of meetings per month for mentors and their students between September 2011 and June 2014.

	All Students			Nontransfer Students			Transfer Students		
Time period	Number of students	Average number of meetings per month	Standard deviation	Number of students	Average number of meetings per month	Standard deviation	Number of students	Average number of meetings per month	Standard deviation
AY 2011–12	276	2.0	0.9	226	2.2	0.8	50	1.1	0.9
Summer 2012	276	0.7	0.8	226	0.8	0.9	50	0.4	0.5
AY 2012–13	276	2.2	1.3	169	3.0	0.9	107	0.9	09
Summer 2013	276	1.3	1.4	169	1.9	1.4	107	0.4	0.7
AY 2013–14	276	2.0	1.6	148	3.2	1.1	128	0.7	1.0

Source. Monthly mentor monitoring forms.
Notes. Academic year (AY) is defined as September through June; summer as July and August.

Table 6. Average number of minutes per month in formal and informal mentor–student meetings between September 2011 and June 2014.

	All students			Nontransfer students			Transfer students		
Time period	Number of students	Average number of minutes per month	Standard deviation	Number of students	Average number of minutes per month	Standard deviation	Number of students	Average number of minutes per month	Standard deviation
AY 2011–12	276	34.6	15.0	226	36.8	12.8	50	24.4	19.3
Summer 2012	276	14.3	22.4	226	15.8	23.8	50	7.4	12.6
AY 2012–13	276	37.9	21.8	169	49.5	14.8	107	19.5	18.0
Summer 2013	276	16.9	17.9	169	23.4	17.9	107	6.7	12.2
AY 2013–14	276	39.3	32.5	148	60.9	24.4	128	14.2	20.6

Source. Monthly mentor monitoring forms.
Notes. Academic year (AY) is defined as September through June; summer as July and August.

Amount of Mentor–Student Meeting Time. Table 6 shows that, among nontransfer students, formal and informal meeting time averaged about 37 minutes per month during the first academic year of implementation, 50 minutes per month during the second year, and 61 minutes per month during the third year (plus, on average, 16 minutes per month during the first summer and 23 minutes per month during the second summer). The average number of minutes per month mentors spent with transfer students was lower during all time periods.

Not shown in Table 6, on average, across the three academic years and two summers of implementation, students in the treatment sample met with their mentor for a total of 1,180 minutes, or about 20 hours. Among the 136 students who maintained enrollment in data-providing schools during this time frame, total meeting time averaged 1,565 minutes, or 26 hours per student over the full three years.

The data on amount of meeting time are presented as descriptive implementation analyses, not fidelity analyses, because the Check & Connect program is not prescriptive about how much time mentors should spend with each student. Rather, mentors are encouraged to use their judgment in allocating time across their caseload, based on their sense of students' individual needs and circumstances.

Student Risk Status and Basic Versus Intensive Interventions. The monitoring form asked mentors to indicate, based on the check data and their own judgment, whether students were at "high risk." Mentors could provide or recommend intensive interventions based on their judgment, and they were trained to factor students' risk designation into intervention decisions. We used the monitoring forms to examine the alignment between mentors' designation of students' high-risk status and the level of intervention they provided or recommended. As shown in Table 7, mentors provided intensive services to a majority of the students they identified as high risk (66% of treatment students in Year 1, 85% in Year 2, and 80% in Year 3), but they also provided intensive intervention to a majority of their students who were not designated as high risk (53% in Year 1, 68% in Year 2, and 70% in Year 3). Provision of intensive intervention to lower risk students may have been appropriate given that mentors were instructed to tailor the intervention to students based on student needs that may not have been captured solely in recorded check data.

Table 7. Percentage of monitoring forms indicating provision of intensive services, by mentor-designated student risk status between September 2011 and June 2014.

		Identified by mentors as high risk		Identified by mentors as not high risk	
Academic year	Total number of monitoring forms	Number of monitoring forms	Percentage receiving intensive services	Number of monitoring forms	Percentage receiving intensive services
2011–12	2,723	1,610	66%	1,113	53%
2012–13	2,831	2,132	85%	699	68%
2013–14	2,210	1,707	80%	503	70%

Source. Monthly mentor monitoring forms.

Summary of Implementation Findings. Overall, Check & Connect was implemented with fidelity for treatment students who remained in district schools, except for documentation of the check component. On average, we observed increases over time in both the frequency of mentor–student interactions and the amount of meeting time among nontransfer students, suggesting improvement in mentoring relationships throughout the study. Findings also indicate that, although mentors attempted to contact transfer students and obtain information about their academic behaviors, enrollment in a nondistrict school or movement outside of the district created structural barriers that substantially lowered the level of implementation for these students. Finally, mentors largely provided intensive interventions to most of their students regardless of whether students were identified as high risk.

Overall Program Uptake and Service Contrast

To set a context for the impact findings, it is important to understand the extent to which the students in the treatment group received the "full" treatment (that is, both the "check" and the "connect" components) during the three-year study. It is also important to examine the service contrast, that is, the extent to which the experiences of control students may have resembled or differed from the experiences of treatment students.

Rates of Treatment Receipt

We defined "receiving the treatment" as (a) meeting with a mentor at least 20 times during the year and (b) having check data on all monitoring forms during the school year. Approximately 59% of students in our treatment group sample received the treatment for at least one year, 34% received the treatment for at least two years, and 14% received the treatment for all three years of implementation. Paradoxically, the 14% of students who received Check & Connect for all three years may have been the students least in need of it; their average predicted probability of on-time graduation was 0.66, compared with 0.53 for the rest of the treatment group students. This speaks to the difficulty of fully implementing Check & Connect with a population for whom high risk and high mobility are closely intertwined.[13]

[13] If we relax the "check" requirement to having check data at least once in the fall and once in the spring, 75% of the treatment group received the treatment for at least one year, 59% of the treatment group received the treatment for at least two years, and 34% of the treatment group received the treatment for all three years of implementation. Even with this more lenient definition, students who received the treatment for two or three years still had higher average predicted probabilities of on-time graduation than did the remaining treatment students.

Table 8. Comparison of treatment and control students' participation in targeted academic supports, spring 2014.

Outcome	Treatment observed mean	Control adjusted mean	Estimated difference	*p* value	*N*
Reported having a mentor	88.4%	32.6%	55.8%	0.000	443
Reported participating in targeted academic supports					
Tutoring	13.8%	17.2%	−3.4%	0.352	425
Online credit recovery	47.1%	48.5%	−1.4%	0.787	426
(e.g., AVID)	16.2%	17.4%	−1.2%	0.741	426

Source. Spring 2014 student survey.

Notes. IPWs are applied to all analyses to account for missing outcome data. The treatment group mean is the average value observed in the data. The adjusted control group mean was calculated by subtracting the estimated group difference from the observed treatment group mean to ensure that comparisons across groups accurately account for differences in student background characteristics.

Service Contrast

In this study, treatment students were assigned a Check & Connect mentor, but control students were not prevented from meeting with mentors or from receiving services that were not part of the Check & Connect program. On the spring survey, treatment and control students were asked to report whether they had someone in their life they considered to be a mentor to them (however, the survey did not provide a definition of *mentor*). In spring 2014, after the third year of the intervention, 89% of treatment students reported having a mentor compared with 33% of control students (see Table 8), indicating that treatment students were, in fact, significantly more likely than control students to report having a mentor.

One way in which Check & Connect mentors could influence student outcomes is by facilitating students' access to targeted academic supports available within the school. Treatment students should theoretically have been more likely than control students to participate in targeted academic support activities due to mentors' systematic monitoring of academic progress, holding regular meetings with their students, and connecting students with these types of supports and resources. However, control students also may have had access to these same supports. To compare participation in targeted academic supports by condition, we examined students' self-reported rates of participation in tutoring, online credit recovery, and college preparatory programs such as AVID and GEAR UP. As shown in Table 8, treatment and control students did not differ in their rates of participation in these activities. Given that access to targeted academic support is a key mechanism through which Check & Connect should have an impact on student outcomes, control students' participation in these types of academic supports could attenuate the impact of Check & Connect.

Program Impacts

The goal of the Check & Connect program is to improve students' engagement in school so that they are more likely to make academic progress and persist in high school. The program's theory of action assumes that students' academic outcomes can be improved by improving various aspects of their engagement with school.

Panel A of Table 9 shows the results of analyses testing the impact of Check & Connect on the behavioral engagement measures: attendance, citizenship (behavior and participation) grades, and participation in extracurricular activities. Counter to our hypotheses, Check &

Table 9. Comparison of treatment and control students' outcomes.

Outcome	Treatment observed mean	Control adjusted mean	Estimated difference	*p* value	*N*
Panel A: Behavioral engagement (participation), spring 2014					
Attended school for at least 90% of days enrolled	81.6%	73.1%	8.6%	0.120	292
Had fewer than two Unsatisfactory citizenship grades	70.1%	68.3%	1.8%	0.767	293
Participated in at least one extracurricular activity	53.3%	50.7%	2.6%	0.617	421
Panel B: Affective engagement, spring 2014					
(SEI) Teacher–student relationships	−0.04	0.02	−0.06	0.562	429
(SEI) Peer support for learning	−0.05	0.02	−0.07	0.452	427
(SEI) Family support for learning	0.00	0.00	0.00	0.982	428
Panel C: Cognitive engagement, spring 2014					
(SEI) Future aspirations and goals	−0.07	0.03	−0.10	0.327	428
(SEI) Control and relevance of school work	−0.04	0.03	−0.06	0.509	429
Student engagement scale (SEQ-C)	−0.06	0.04	−0.10	0.269	429
Panel D: Course performance and academic achievement					
Successful completion of at least one summer course	57.4%	33.6%	23.8%	0.000	329
Fewer than two course failures in fourth year	65.7%	69.2%	−3.5%	0.564	290
Ever passed high school exit exam	73.3%	75.9%	−2.6%	0.666	329
Credit accumulation	34.4	34.1	0.2	0.801	329
Panel E: Dropout, on-time, and five-year graduation					
Dropped out of a high school within the state	22.1%	18.9%	3.2%	0.400	552
On-time graduation within the state	52.2%	52.6%	−0.5%	0.921	552
Five-year graduation within the state	59.4%	58.0%	1.4%	0.762	552

Sources. District administrative records (first and second rows of Panel A; all rows of Panel D); spring 2014 student survey (third row of Panel A; all rows of Panels B and C); district and state administrative records (all rows of Panel E).

Notes for all panels. IPWs are applied to all analyses except in Panel E to account for missing outcome data. The treatment group mean is the average value observed in the data. The adjusted control group mean was calculated by subtracting the estimated group difference from the observed treatment group mean to ensure that comparisons across groups accurately account for differences in student background characteristics.

Panel A notes. Attendance and citizenship grades are measured among all students who were in district transcript data for both semesters of the 2013–14 academic year.

Panels B and C notes. Differences between treatment and control students are presented as effect sizes.

Panel D notes. Course failures are measured among all students who were in district transcript data for both semesters of the 2013–14 academic year. Summer course completion, passing of the exit examination, and credit accumulation are measured among all students who were in district transcript data for both semesters of the 2011–12 and 2012–13 academic years.

Connect did not have an impact on any of these measures of behavioral engagement. The effect on student attendance was notable in magnitude (and in the hypothesized direction), but not statistically significant—82% of treatment students, versus 73% of control students, attended at least 90% of enrolled days during the 2013–14 academic year ($p = 0.12$). These results should be interpreted with caution because, as noted earlier, inclusion in the analysis sample for attendance and citizenship grades required that students were enrolled in a district school during the third year of implementation. Therefore, many students in the original random assignment sample were excluded due to missing outcome data, and while IPWs were calculated based on observed student characteristics, it is possible that the treatment students and control students included in the analysis of these outcomes differed in unobservable ways.

Also contrary to our hypotheses, Check & Connect did not have an impact on students' affective or cognitive engagement with school (see Table 9, Panels B and C). After three years of program implementation, treatment and control students did not significantly differ on scales measuring teacher–student relationships, peer support for learning, family support for

learning, future aspirations and goals, or control and relevance of school work. Check & Connect also had no statistically significant impact on students' SEQ-C scores, another measure of affective and cognitive engagement.

To examine the impact of Check & Connect on academic outcomes, we focused on outcomes observed immediately before and during students' fourth year of high school. First, because we observed that a majority of students in our study were credit deficient in earlier academic years, we examined students' likelihood of passing courses during the summer before the fourth year of high school as an interim outcome measure related to course performance. As shown in Panel D of Table 9, treatment students were significantly more likely than control students to pass at least one summer course in the summer prior to their fourth year of high school.[14] However, we did not observe statistically significant differences between treatment and control students in the number of credits students accumulated from the start of high school through the summer of 2013.[15] Check & Connect also had no significant impact on students' likelihood of failing fewer than two courses during the fourth year of high school or passing the state high school exit exams in mathematics and English language arts. Again, applying IPWs to statistical models attempts to address the fact that students who were not enrolled in transcript-data-submitting schools during the first two years of the study (for the credit accumulation and exit exam outcomes) or the third year of the study (for the course failures outcome) had missing outcome data and therefore were not included in analyses. Nevertheless, these results should be interpreted with caution because the treatment and control students who were included may have differed in unobservable ways for which IPWs could not account.

Table 9, Panel E displays results testing the impact of Check & Connect on students' likelihood of dropping out of high school and their likelihood of graduating within four or five years. Unlike the interim outcomes, these results are based on data for the full original experimental groups of treatment and control students regardless of whether they remained enrolled in district schools throughout the study. We found that the likelihood of dropping out of high school within the state did not significantly differ for treatment and control students (22% versus 19%). Likewise, there were no statistically significant differences between treatment and control students' likelihood of graduating. Fifty-two percent of treatment students and 53% of control students graduated within four years of high school entry. Fifty-nine percent of treatment students and 58% of control students graduated within five years.

In summary, Check & Connect did not increase students' likelihood of graduating high school (or decrease their likelihood of dropping out), as hypothesized, perhaps because the program did not have a measurable impact on key interim outcomes, including student engagement and academic performance.[16] On average, students in both the treatment and control groups continued to be academically at risk throughout the study. The one possible

[14] Treatment students also were more likely than control students to take courses that summer before their fourth year of high school (60.1% versus 36.8%, $p < 0.001$).

[15] We also conducted alternative unweighted analyses using the full sample of treatment and control students that compared the number of credits students accumulated *in the school district* by the end of the 2012–13 school year regardless of whether students left the school district (or transferred to a school that did not submit transcript data to the district data system). Although these analyses showed a lower average number of credits accumulated during the first three years of high school (due to the inclusion of transfer students in the analytic sample), differences between treatment and control students were not statistically significant.

[16] Analyses of engagement data and course performance data from the first two years of implementation were similar, indicating no significant program impact (see the online supplemental material).

sign of program impact was the successful completion of credit recovery courses during summer 2013, the summer before students' fourth year of high school, but this did not translate into an increased likelihood of graduating within four or five years after high school entry.

Treatment-on-the-Treated Effects

We also performed TOT analyses that investigated the effect of treatment among students who received the treatment. As noted in the section above on program uptake, our definition of "receiving the treatment" was based on a combination of the "check" and "connect" components of the program (specifically, meeting with mentors at least 20 times during the year and having check data recorded on every submitted monitoring form during the school year). Similar to the ITT results, the only outcome showing a significant impact was successful completion of summer school courses; this result was significant regardless of the number of years (one, two, or three) students had received the treatment. The TOT analysis revealed no measurable impact on any of the other outcomes for treatment students who received the treatment during at least one, at least two, or all three years of implementation. We observed these same results with an alternative, relaxed definition of receiving the treatment (meeting with mentors at least 20 times during the year and having check data on monitoring forms once during the fall and once during the spring). Further detail is available in the online appendix.

Discussion

Although matching children and young adults with adult mentors has long been a popular method of youth development, the efficacy of mentoring has only been seriously studied within the last 25 years (Blakeslee & Keller, 2012). From the first major experimental study of the Big Brothers Big Sisters of America program (Tierney et al., 1995), a robust and growing body of evidence suggests that mentoring programs can yield positive outcomes to youth in such areas as academics, behavior, attitudes and motivation, and physical health (Biggs, Musewe, & Harvey, 2014; DuBois, Portillo, Rhodes, Silverthorn, & Valentine, 2011). However, the impact of mentoring on these outcomes tends to be modest in magnitude—typically about two tenths of a standard deviation (DuBois et al., 2011), and can sometimes be described as a slowing of negative trajectories rather than outright improvements (Rhodes & DuBois, 2008). In addition, not every mentoring program shows a clear improvement in outcomes, and few studies of the effects of mentoring have examined educational attainment as an outcome (DuBois et al., 2011).

The current study was designed to address a gap in the literature regarding the impact of Check & Connect on general education students not eligible for special education services who displayed early warning risk signs in their first year of high school. Contrary to previously published experimental studies demonstrating a positive impact on school persistence and progression (Sinclair et al., 1998; Sinclair et al., 2005), this study found that Check & Connect had no detectable impact on the key study outcomes during or following three years of implementation. These outcomes include measures of engagement (attendance, behavior, participation in school activities, and affective and cognitive engagement with school) and academics (course grades and passing exit exams required for graduation). On all of these

measures, treatment students' outcomes were not significantly different from control students' outcomes. Most notably, Check & Connect did not have a measurable impact on students' likelihood of dropping out of or graduating within four or five years of entering high school.

As noted in the analysis and results sections, some of the outcomes reported in this paper were based on treatment-control group comparisons that differed from the original randomly assigned groups due to missing outcome data. The interim outcomes based on district records required that students were enrolled in a given year (or across years) for inclusion in the analysis; students who were not enrolled at the relevant times had missing data. We observed that mobility rates were similar by condition, despite the fact that one might expect Check & Connect to help students persist in district schools. It is possible that the treatment and control students who were included in analyses of interim outcomes based on district records differed in unobservable ways that were not revealed by our descriptive analysis of mobility rates nor accounted for by our weighting strategy for handling missing data. Thus, we again encourage caution in interpreting the results for the interim outcomes. Nevertheless, the pattern of results across all outcomes, including those with lower potential attrition bias (survey measures of engagement) and those that used the full experimental sample (dropout and graduation), is consistent and indicates that Check & Connect did not have a measurable positive impact for students in the study.

A number of noteworthy differences exist between the current study and the previous experimental studies of Check & Connect that may account for the difference in findings. The first difference is that, unlike the current study, the two previously published studies focused on students with learning, emotional, or behavioral disabilities. This difference is notable because students receiving special education supports have access to guidance and resources that general education students do not (e.g., a case manager, separate from the Check & Connect mentor, who monitors their progress, checks in with them regularly, assists with modifications and accommodations, and communicates with families; academic support within or outside of the general education class; and explicit instruction in study skills, social skills, self-management, and decision-making). Check & Connect mentors of special education students thus have a network of individuals with whom to connect and collaborate regarding the students' school performance. In contrast, the mentors in the current study found that they did not have an extensive network of resources for the general education students they served at the beginning of the study, and they had to work to build this network throughout the study.

A second difference between this study and the two previously published experimental studies is the grade level of the students targeted. The earlier studies targeted ninth graders who started receiving Check & Connect in Grades 7 and 8 (Sinclair et al., 1998) and ninth graders who received Check & Connect from December of their first year of high school through four and sometimes five years of intervention (Sinclair et al., 2005). The intervention for the current study began after students completed ninth grade, mainly because the study was designed to test the effect of the program on outcomes through graduation for students identified as at risk based on indicators from Grades 8 and 9. Due to the amount of time required to collect and analyze Grade 9 student data, obtain parental consent, and conduct random assignment (approximately three months), the study design did not allow us to assign students to mentors until the summer following ninth grade. Moreover, we designed the timing of this study to resemble, as closely as possible, the approach that high schools

are being encouraged to implement using early warning systems, which is to identify off-track students based on early (first-semester) academic behavior and intervene by the latter part or at the end of Grade 9 (e.g., Dynarski et al., 2008; Therriault, O'Cummings, Heppen, Yerhot, & Scala, 2013). Nevertheless, it is possible that beginning intervention at the end of Grade 9 was simply too late, as students were already credit deficient by the time they began meeting with their mentor.

Another important difference between the current study and previous studies of Check & Connect concerns the high rate of mobility in our student sample. We found that Check & Connect was delivered with fidelity for students who stayed in district schools (with the exception of documentation of the check component), but students who did not stay in district high schools generally did not receive Check & Connect as intended. On average, mentors interacted with students in the treatment group who stayed in the district about twice per month or more, which is the minimum number of meetings recommended by the program developers. Mentors interacted less frequently with students who left the district schools. In addition, mentors were more likely to report check data for nontransfer students, and they spent more time per month interacting with nontransfer students relative to transfer students. The relatively large size of the mentors' caseloads, as well as the fact that some charter schools did not provide mentors with student data or allow mentors to meet with students during the school day, contributed to the challenges that student mobility posed for the mentors implementing the program.

The findings of the current study should also be considered in light of other emerging investigations of Check & Connect with general education students in different settings. These include two randomized trials for which full details are still emerging, but initial results suggest mixed findings. Maynard et al. (2014) tested the impact of Check & Connect in a Texas district and report small positive effects for middle and high school students on academic performance and discipline, but not on attendance. Guryan et al. (2016) examined the impact of Check & Connect on students in Grades 1–8 in Chicago and report a positive impact on middle school students' attendance and course performance. However, there were no significant positive impacts on test scores and GPA for middle school students, and there were no significant impacts on any of the outcomes for elementary students. As these and other studies produce full results and details about Check & Connect program implementation, setting, and methods, it will be important to synthesize findings across investigations to better understand the conditions under which this popular program might have maximal positive effects on students.

The current study findings suggest several considerations for districts implementing intensive one-on-one mentoring programs over multiple years with at-risk, highly mobile students. First, perhaps districts should consider starting intensive interventions when students enter high school or earlier, before students have had a chance to fall far behind. Second, districts should consider the types of resources and supports that are available for all students (i.e., at the universal level, or Tier 1, in response-to-intervention terms) within the school or community. In the current study, similar percentages of treatment and control students participated in tutoring, online credit recovery, and college preparatory programs. For Check & Connect to be more effective, mentors may need an established network of supports that go beyond those that are currently available. Third, districts should carefully consider caseloads for one-on-one interventions. Particularly for highly mobile students, large caseloads may prevent mentors from being able to track down and spend an adequate

amount of time working with all of their students. Mentors in this study attempted to connect with students who left district schools, but they found this process difficult and time consuming and were concerned that it was taking time away from other students on their caseload. In response, the program developers and implementation team decided during the study to prioritize delivery to the nontransfer students.

These considerations are similar to those noted in a recent systematic review of interventions aimed at reducing high school dropout rates or increasing school completion rates (Freeman & Simonsen, 2015). The authors reviewed a total of 32 peer-reviewed studies that used experimental or quasi-experimental designs. Although some interventions had positive effects on high school completion rates or negative effects on dropout rates, those that had an impact did not share a clearly identifiable set of common features. The authors suggested that many types of strategies frequently recommended by theory have not been sufficiently tested empirically. These strategies—resembling the considerations we noted above—include early intervention, attention to the school organizational structure, integration of reform efforts, and attention to the differing needs and responses of different student subgroups. Urging the field to acknowledge and confront the complexity of the dropout issue, Freeman and Simonsen (2015) argue for the importance of addressing multiple risk factors and the need for early intervention, with a corresponding move away from single-component, individual, and small-group interventions.

In the current study, it is not clear whether putting more emphasis on implementation of Check & Connect with transfer students would have yielded different results. In our sample, only about half of both treatment and control students remained in district schools during the three-year period of implementation. Although Check & Connect might be hypothesized to have the largest effect with these more stable students because they had greater access to their mentors, our TOT analyses indicate that the program did not have an impact on students who received more of the treatment. But perhaps those more stable students—who were less at risk than students who transferred—were less in need of intervention. Perhaps to have an overall impact, the program needed to reduce the likelihood of transfer, or find more ways to provide services to the transfer students, such as by employing more mentors. However, the latter may be simply impractical, particularly if mentors are district employees and resources are limited. In general, school district leaders and researchers should place more emphasis on how to address student mobility when implementing school-based interventions.

It is also worth noting the distinctions between school-based mentoring and community-based mentoring; each may have advantages. School-based mentoring can be integrated into the school environment, which aids mentors in advocating on their students' behalf. Also, school-based programs may be better able to reach at-risk youth (Rhodes, 2002), as long as students come to school. In contrast, community-based mentoring may allow for mentors and mentees to meet more frequently or for longer periods of time, and to focus on broader needs of youth, such as exploring job-readiness skills and career opportunities. In addition, community-based mentoring may allow more opportunities for mentors and mentees to engage in social activities that facilitate relationship building (Langhout, Rhodes, & Osborne, 2004; Rhodes, 2002). Another advantage of community-based mentoring over school-based mentoring is that the relationship does not terminate if the student transfers to another school (Rhodes, 2002), a key challenge in the current study. In the current study, Check & Connect was mainly implemented as school-based. It is possible that the highly mobile

students in the sample could have benefited from a more community-based mentoring approach; however, this would have limited mentors' ability to track students' academic progress and form close ties with school personnel.

This three-year evaluation of Check & Connect focused on general education students at high risk of school dropout. Program delivery began in the summer before tenth grade, when students were already significantly behind. As a targeted intervention, the program had no observable impact for at-risk general education students on the key outcome measures used in the study, which varied from engagement in school to graduation and dropout. Future research might combine Check & Connect with universal practices (multicomponent efforts) for students at high risk of continued disengagement. Given the recent literature and the results of the current study, there is clear urgency to identify and continuously improve interventions that engage at-risk students in school and improve the likelihood of their academic success.

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