



Impact Evaluation of *12 for Life*: Better Lives Through Education and Employment

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12 for Life

Final Impact Evaluation Report

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1. ABSTRACT

12 for Life is an Investing in Innovation (i3) development grant funded by the Office of Innovation and Improvement, U.S. Department of Education. *12 for Life* provides a rigorous STEM curriculum, combined with on-the-job-training, work/life skills development, mentoring, and employment opportunities to high school students who are at high risk of dropping out of school. The impact evaluation used a quasi-experimental design (QED) to examine the effect of *12 for Life* on grade point average (GPA), number of suspensions, and incidence of dropping out of school. *12 for Life* students who enrolled in the program during the 2014-15 school year were followed for three years. Outcomes for *12 for Life* students were compared to a matched sample of students with similar risk factors for dropping out of school who started 10th grade in fall 2014 and who participate in business-as-usual, traditional academic instruction in the high school environment. Comparison students were followed for three years. Results showed no statistically significant impact on grade point average (GPA) at the end of 12th grade, number of suspensions, or incidence of dropping out of school.

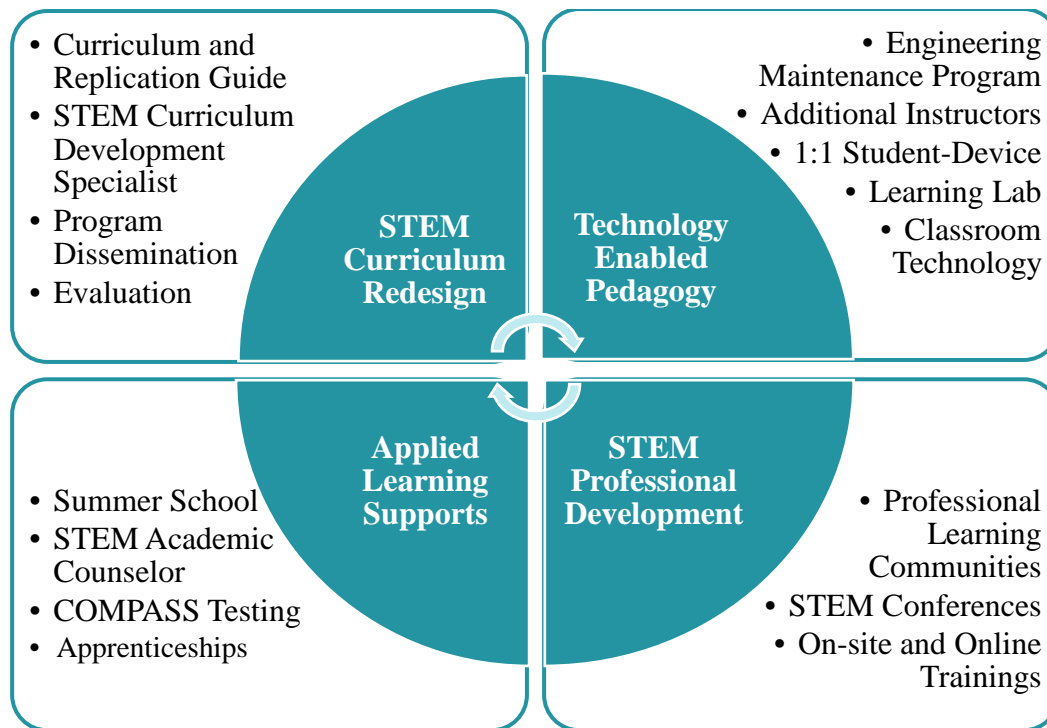
2. INTRODUCTION

Research indicates that the most effective STEM education models infuse classroom instruction, based on a rigorous curriculum, with frequent exposure to applied learning experiences through lab work, workplace activities, and supportive technology (Hanover, 2011). Further, continuous exposure to real-world STEM activities increases STEM engagement and learning (Bayer, 2010), and facilitates the development of real-world skills that are essential for success throughout work and life (Dynarski, et al., 2008). Students who participate in career-focused programs that relate schooling to careers achieve higher levels of educational attainment and better labor market outcomes (Bridgeland, Balfanz, Moore, & Friant, 2010). In 2014, Carroll County Schools (CCS) was awarded an Investing in Innovation (i3) grant for *12 for Life*, a program for students at high risk of dropping out of school that provides the type of STEM programming that has been shown to be effective in engaging students, improving STEM skills, and preparing students for STEM careers.

2.1 Program Description

CCS serves over 14,000 students in 24 schools in rural and suburban Georgia. Like many districts across the nation, CCS has a history of low graduation rates (67.5%), high dropout rates (4.8%), and a high percentage of students who are economically disadvantaged (61%). In 2004, seeing this high level of need, a local business, Southwire—a leading manufacturer of electrical wire and cable in the Southeast—developed the *12 for Life* program in partnership with CCS as a novel approach to applied, work-based learning. Unlike traditional school settings, *12 for Life* provides high school students with daily access to applied learning activities, aligned with a rigorous STEM curriculum, through state-of-the-art labs and workplace technology, supervised and supported by professionals working in STEM fields. After a three-year research, planning, and construction period, the *12 for Life* facility, a modern, fully-equipped manufacturing plant and learning community, began serving students in 2007. The hallmark of the program is the opportunity for students to hold paid apprenticeships while continuing their education. This unique facility features both a STEM-focused secondary school program and a student-staffed Southwire satellite plant where students work part-time. *12 for Life's* classes and apprenticeships feature low teacher-student (1:10) and supervisor-student (1:12) ratios. The *12 for Life* model is summarized in Figure 1.

Figure 1. The 12 for Life Program Model



Although work-based learning occurs in many settings across the country, the *12 for Life* model offers a novel approach with national significance for four reasons:

- *12 for Life* offers a high frequency of exposure to STEM coursework and career training through multiple classroom and work shift options, centralized at a single facility from 8 AM to 9:30 PM, five days per week, year-round;
- The curriculum and coursework are directly linked to hands-on duties within the manufacturing plant, enabling students to experience STEM applied learning in a real-world setting;
- The program provides support services, including tutoring, mentoring, and work supervision, using a strengths-based approach to address high-need students' academic and interpersonal barriers; and
- *12 for Life* targets students with the highest degree of risk for dropping out, who often face extraordinary personal challenges (parental abandonment, adolescent parenthood, behavior and/or learning difficulties).

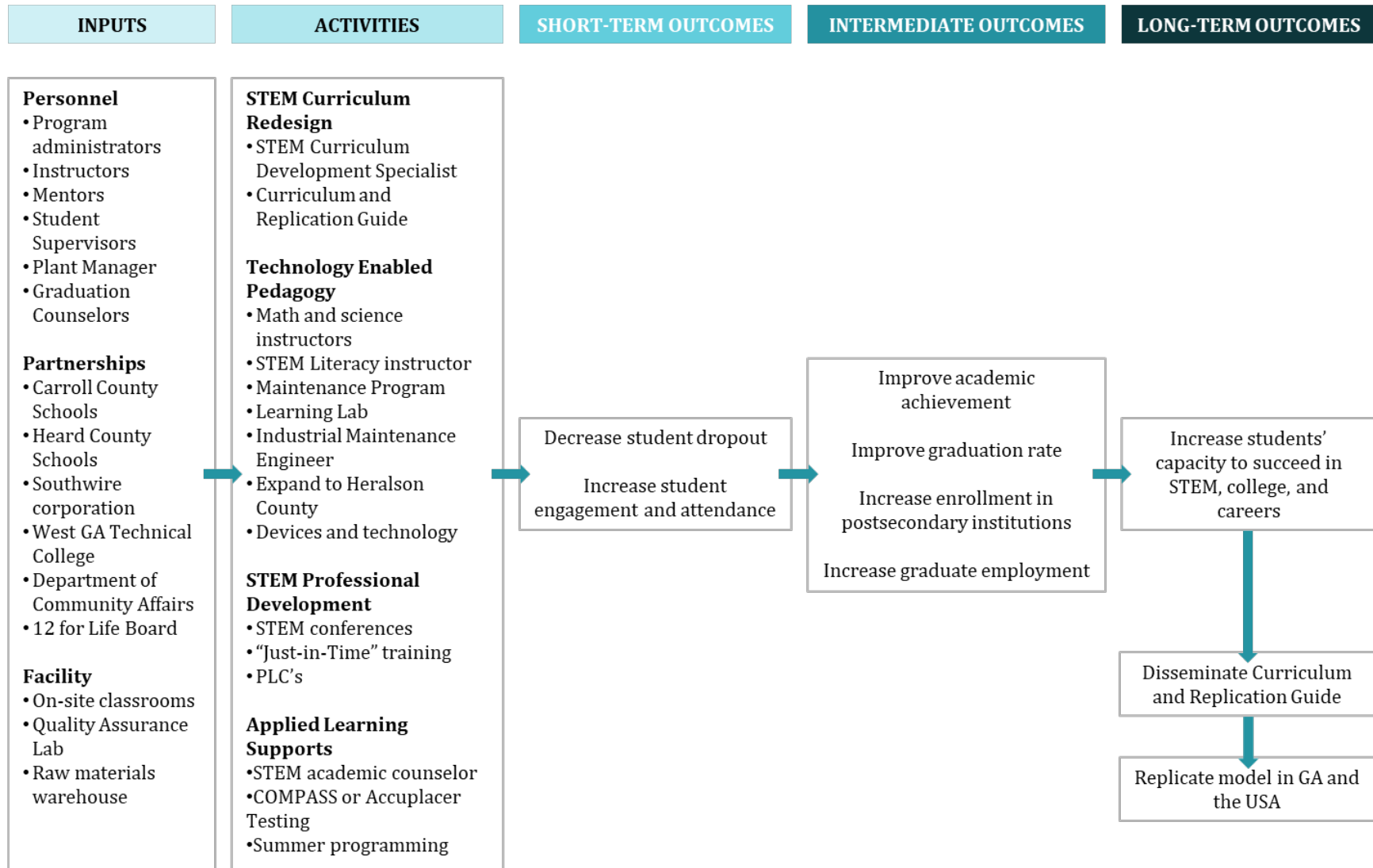
To address the challenges of serving the highest-risk students, *12 for Life* implements specific program components that accommodate the exceptional needs and individual circumstances of the students; details of these components are presented in Table 1.

Table 1. Key Components of the 12 for Life i3 Program

Component	Principles and Best Practices	Associated 12 for Life Activities
Strengths-Based Education (Lopez & Louis, 2009; Lopez, 2011)	1. Measurement of student strengths using personal, academic, and behavioral data	<ul style="list-style-type: none"> • 12 for Life enrollment rubric • COMPASS/Accuplacer testing • Program evaluation
	2. Personalized learning using a strengths-based approach	<ul style="list-style-type: none"> • All activities
	3. Access to individuals who affirm student strengths (supportive adults, peer networking)	<ul style="list-style-type: none"> • STEM Academic Counselor • Shift supervisors, instructors, and staff • Mentors/tutors • Fellow participants
	4. Opportunities to apply strengths within the classroom and real-world settings to foster new behaviors and improved outcomes	<ul style="list-style-type: none"> • In-classroom applied learning • Apprenticeships • Engineering Maintenance Program • Extrusion Line Learning Lab
	5. Opportunities to seek new ways to learn and apply knowledge to further develop personal strengths	<ul style="list-style-type: none"> • Professional development • Tablets and digital content • Engineering Maintenance Program • Extrusion Line Learning Lab
STEM Applied Learning (Roth & Van Eijck, 2010)	1. STEM content and pedagogy that treats STEM learning as a life-long process	<ul style="list-style-type: none"> • STEM curriculum development • Professional development • PLCs and work-based trainings
	2. Delivery of STEM content in a “real world” context, focused on useable skills	<ul style="list-style-type: none"> • Apprenticeships • Engineering Maintenance Program • Extrusion Line Learning Lab
	3. Focus on issues of access related to socioeconomic inequality	<ul style="list-style-type: none"> • Targeting of high-need students • Paid apprenticeships • Community liaison
	4. Inclusion of practitioners with experience in real-world applications in STEM learning research	<ul style="list-style-type: none"> • Program evaluation • Industrial Maintenance Engineer • Engineering Maintenance Program • Plant manager & shift supervisors
Purposeful Design and Inquiry (Sanders, 2009)	1. Combining technology and scientific inquiry	<ul style="list-style-type: none"> • Supportive technology • Extrusion Line Learning Lab
	2. Emphasis on the importance of problem-based learning, using engineering solutions	<ul style="list-style-type: none"> • Engineering Maintenance Program • In-classroom applied learning • Extrusion Line Learning Lab
	3. Access to experiences outside of the classroom	<ul style="list-style-type: none"> • Apprenticeships • Engineering Maintenance Program
	4. Purposeful integration of two or more STEM or STEM-related subject areas	<ul style="list-style-type: none"> • Curriculum redesign • In-classroom applied learning • STEM Literacy Instructor

The 12 for Life logic model is shown in Figure 2.

Figure 2. 12 for Life Logic Model



2.2 Identification and Enrollment of High-Risk Students

Students who are at least 16 years old, have earned sufficient credits to enter the 10th grade, and pass a drug screen are eligible to apply for enrollment in *12 for Life*. Applicants who demonstrate the greatest level of need, based on a selection rubric (see Appendix A) that assesses individual risk for dropout (based on attendance, behavior, financial need, age, and credits needed to graduate), are invited to enroll. Rubric scores range from 4 to 20; students who score 15-20 are accepted into the program. Under extenuating circumstances, such as exceptional need (i.e., financial), a student obtaining a score of 10-14 may be considered for admission into the *12 for Life* program.

The program's rolling admissions structure allows for a fluid model which ensures that the students with the greatest need will have the flexibility to start or finish the program at any time during the year, depending on their own unique circumstances. All students served are economically disadvantaged and 50% are financially self-supported, with little or no assistance from guardians with the costs necessary for daily subsistence (food, shelter, etc.).

3. IMPACT STUDY DESIGN

The *12 for Life* i3 impact study used a quasi-experimental design (QED) to examine the effect of *12 for Life* on academic performance, behavior, and dropping out of school. Outcomes for *12 for Life* students were compared to a matched sample of comparison (business as usual) students who did not have access to the real-world, paid work apprenticeships that form the centerpiece of the *12 for Life* intervention. In addition, comparison group students did not have access to other supportive aspects of the program including low teacher-student and supervisor-student ratios; assistance with non-academic needs (e.g., housing, healthcare, childcare, basic needs); and access to an Academic Counselor who provided individualized assistance in selecting courses and career pathways that fit the needs and strengths of each student. Comparison group students received traditional academic instruction in the high school environment, as well as any traditional dropout prevention strategies instituted by the high schools they attended.

3.1 Samples

The Carroll County School district was chosen as a convenience sample because of its *12 for Life* program. The *12 for Life* facility was the only site involved in the implementation of the i3 intervention, and all new *12 for Life* students who enrolled in the program during the 2014-15 school year (N=251) were included in the treatment sample. All treatment students were from CCS.

Comparison students were selected from CCS and Haralson County School district. Selection of comparison group students during the 2014-15 school year matched the selection criteria for the *12 for Life* students, as stipulated in the selection rubric: attendance, behavior, financial need, age, and credits needed to graduate. A total of 356 students with rubric scores between 15-20, as well as some lower scores above 10 where necessary (i.e., to identify an adequate size pool of comparison students who met the same rubric criteria of the treatment students), were identified as comparison students. Propensity score matching (PSM) was conducted to select the 251 comparison group participants who most closely resembled the 251 treatment students.

The 251 *12 for Life* students who comprise the treatment group were tracked for three years (through the end of 12th grade). The length of enrollment varied for each *12 for Life* student based on their individual credit deficiencies at entry and credit earning pace as they participated in the program. Some students were only in the program for a few months, while others were in the program for up to three years. The 251 comparison students were tracked from Year 1 (10th grade) through Year 3 (12th grade). Comparison students had three years of a traditional, business-as-usual high school education.

3.2 Study Questions

Table 2 presents the research questions, hypotheses, and outcomes that are associated with the *12 for Life* impact study.

Table 2. Confirmatory Research Questions, Hypotheses, and Outcomes		
Confirmatory Research Question	Hypothesis	Outcome
1. What is the impact of <i>12 for Life</i> on 12 th grade students' academic performance (i.e., GPA) for students three years after entering the <i>12 for Life</i> program in Fall 2014 compared to students in a traditional high school program without a work-based learning program who entered 10 th grade in Fall 2014?	Mean <i>12 for Life</i> students' GPA \neq Mean non- <i>12 for Life</i> students' GPA $H_0: X_{\text{non-12 for Life}} = X_{12 \text{ for Life}}$ $H_1: X_{\text{non-12 for Life}} \neq X_{12 \text{ for Life}}$	GPA
2. What is the impact of <i>12 for Life</i> on 12 th grade students' behavior (i.e., suspension) for students three years after entering the <i>12 for Life</i> program in Fall 2014 compared to students in a traditional high school program without a work-based learning program who entered 10 th grade in Fall 2014?	Mean <i>12 for Life</i> students' suspension incidents \neq Mean non- <i>12 for Life</i> students' suspension incidents $H_0: X_{12 \text{ for Life}} = X_{\text{non-12 for Life}}$ $H_1: X_{12 \text{ for Life}} \neq X_{\text{non-12 for Life}}$	# incidents of school suspension

Table 2. Confirmatory Research Questions, Hypotheses, and Outcomes		
Confirmatory Research Question	Hypothesis	Outcome
3. What is the impact of <i>12 for Life</i> on 12 th grade students staying in school (i.e., dropout) for students three years after entering the <i>12 for Life</i> program in Fall 2014 compared to students in a traditional high school program without a work-based learning program who entered 10 th grade in Fall 2014?	Prevalence of dropout in <i>12 for Life</i> ≠ prevalence of dropout among non- <i>12 for Life</i> students $H_0: X_{12 \text{ for Life}} = X_{\text{non-12 for Life}}$ $H_1: X_{12 \text{ for Life}} \neq X_{\text{non-12 for Life}}$	Dropout incidence

3.3 Data Elements

Table 3 summarizes the outcome data elements that were collected to answer each confirmatory research question. Data was collected for three school years — 2014-15 through 2016-17.

Table 3. <i>12 for Life</i> Impact Study Outcome Measures			
Confirmatory Question	Measure	Type	Source
1	GPA at end of 12 th grade	Continuous	District Administrative Records
2	Number of incidents of school suspension	Continuous	
3	School dropout	Binary 1=student dropped out 0=student did not drop out	

Table 4 describes the covariates included in each of the confirmatory analyses.

Table 4. <i>12 for Life</i> Impact Study Covariates			
Variable	Description	Type	Source
9 th grade GPA	GPA as of the end of the 9 th grade year	Continuous	District Administrative Records
Gender	Identified the student's gender	Binary 0=male 1=female	

Table 4. 12 for Life Impact Study Covariates			
Variable	Description	Type	Source
Minority Status	Identified whether a student was a minority	Binary 0=white 1=black, Hispanic, American Indian, multi-racial	
Single Parent	Identified whether the student came from a single parent household	Binary 0=no 1=yes	
Condition	Identified whether student was in the treatment or comparison group	Binary 0=comparison 1=treatment	

4. ANALYSIS AND RESULTS

4.1 Baseline Equivalence

Baseline Analytic Model

$$Y_i = \alpha + T_i\beta_1 + \varepsilon_i$$

Where:

Y_i = the baseline measurement for student i

α = intercept

$T_i\beta_1$ = impact of the *12 for life* condition (1 = treatment and 0 = comparison)

ε_i = a random error term for student i

Baseline Analytic Model Specifics

Baseline equivalence of the treatment and comparison samples was tested on 9th grade GPA (spring of 2013-14 school year), gender, minority status, and whether the student lived in a single parent home. The outcome variable is each student's 9th grade GPA, gender, minority status, and single parent status. Ordinary least squares regression was used for 9th grade GPA and logistic regression was used for binary outcomes (gender, minority status, and single parent home).

Initial baseline testing indicated that the treatment group included significantly more minority students than the comparison group. Therefore, to establish baseline equivalency, 50 randomly selected minority students were removed from the treatment group before

running the final PSM model. This left a final sample of 201 treatment students. One treatment student had missing outcome data for research question 1, so the final sample for that comparison was 200. Using 1:1 nearest neighbor PSM on minority status, baseline GPA, gender, and single parent status, 200 comparison students were identified for research question 1, and 201 comparison students were identified for research questions 2 and 3. Baseline equivalence testing on this new sample based on 9th grade GPA, gender, race, and single parent household status revealed no significant differences between the treatment and comparison students on these variables. The characteristics of the samples at baseline are presented in Table 5. In all cases, the standardized mean difference between treatment and comparison on baseline measures was less than 0.25, but these variables were still included in the confirmatory analyses.

Table 5. Characteristics of Treatment and Comparison Samples at Baseline							
Characteristic	12 for Life			Comparison			Effect Size
	Mean	N	Standard Deviation	Mean	N	Standard Deviation	
9 th Grade GPA	2.39	201	0.71	2.36	201	0.71	0.05
Gender	0.39	201	0.49	0.39	201	0.49	0.01
Minority	0.39	201	0.49	0.33	201	0.47	0.12
Single Parent Household	0.54	201	0.50	0.55	201	0.50	-0.01

4.2 Confirmatory Analytic Model

$$Y_i = \alpha + PreGPA_i\beta_1 + Condition_i\beta_2 + Gender_i\beta_4 + MinorityStatus_i\beta_5 + SingleParent_i\beta_6 + \varepsilon_i$$

Where:

Y_i = the outcome for student i

α = intercept

$PreGPA_i\beta_1$ = parameter estimate for the effect of the mean-centered student pretest (GPA)

$Condition_i\beta_2$ = covariate adjusted mean student outcome for comparison students or the difference in the mean student outcome for treatment group students minus the mean student outcome for comparison group students (1 = treatment and 0 = comparison)

$Gender_i\beta_4$ = effect of student gender (1 = female and 0 = male)

$MinorityStatus_i\beta_5$ = effect of student minority status (1 = minority and 0 = not a minority)

$SingleParent_i\beta_6$ = effect of whether a student comes from a single parent home (1 = single parent home and 0 = not single parent home)

ε_i = a random error term for student i

4.3 Analytic Model and Sample Specifics

The GPA, suspension, and dropout outcomes of 12th grade students in the treatment group were compared to the same outcomes of 12th grade students in the comparison group, after the *12 for Life* program had been in CCS for three years, controlling for baseline characteristics. The treatment and comparison conditions were designated at the student level, and the analysis used outcomes at the student level. Students were followed from the beginning of 10th grade (SY 2014-15) through the end of 12th grade (SY 2016-17).

Students who moved to another district and were not able to be tracked were not included in the final analytic sample. Additionally, students who left the comparison group to enter the treatment group were not included. Lastly, students who had missing pre-intervention or outcome data were not included in the analysis sample. There was no imputation of outcome or pre-intervention data; instead, listwise deletion was used.

Gender, minority status, and single parent home status were included in the model to control for demographic differences. Additionally, GPA was mean centered before being entered in the model. The regression equations were used to analyze the effect of *12 for Life* on both continuous outcomes (ordinary least squares; students' GPA and suspensions) and binary outcomes (logistic; dropouts). Of note — the suspensions data was slightly positively skewed, indicated by a skewness statistic of 2.78. The skewness statistic should equal zero for a normal distribution.

4.4 Results for Confirmatory Question 1: GPA

Results indicated no statistically significant difference between the *12 for Life* students and the business-as-usual comparison students on GPA at the end of 12th grade. The only statistically significant finding in our model was that higher pre-intervention, mean-centered GPA predicted higher outcome GPA. Table 6 presents the regression model output.

Table 6. <i>12 for Life</i> GPA Model				
Variable	Estimate	Standard Error	t-value	p-value
Intercept	2.37	0.04	67.27	< 0.001
Mean-centered 9 th grade GPA	0.77	0.03	29.67	< 0.001
Condition	0.01	0.04	0.18	0.860
Gender	0.06	0.04	1.55	0.122

Table 6. 12 for Life GPA Model				
Variable	Estimate	Standard Error	t-value	p-value
Minority status	0.01	0.04	0.13	0.898
Single parent home	-0.02	0.04	-0.49	0.628

4.5 Results for Confirmatory Question 2: Suspensions

Results indicated no statistically significant difference between the *12 for Life* students and the business-as-usual comparison students on number of suspensions. Two statistically significant findings in our model were: 1) males experienced more suspensions than females, and 2) higher pre-intervention, mean-centered GPA predicted lower suspension rates. Table 7 presents the regression model output.

Table 7. 12 for Life Suspension Model				
Variable	Estimate	Standard Error	t-value	p-value
Intercept	3.51	0.62	5.66	< 0.001
Mean-centered 9 th grade GPA	-2.33	0.45	-5.19	< 0.001
Condition	0.30	0.62	0.49	0.627
Gender	-1.56	0.65	-2.41	0.017
Minority status	1.01	0.67	1.52	0.129
Single parent home	0.19	0.64	0.29	0.769

4.6 Results for Confirmatory Question 3: School Dropout

Results indicated no statistically significant difference between the *12 for Life* students and the business-as-usual comparison students on incidence of school dropout. The only statistically significant finding in our model was that higher pre-intervention, mean-centered GPA predicted lower incidents of dropping out of school. Table 8 presents the regression model output.

Table 8. <i>12 for Life</i> School Dropout Model				
Variable	Estimate	Standard Error	<i>t</i>-value	<i>p</i>-value
Intercept	-1.47	0.28	-5.31	< 0.001
Mean-centered 9 th grade GPA	-1.62	0.23	-7.18	< 0.001
Condition	-0.03	0.27	-0.12	0.905
Gender	-0.05	0.28	-0.16	0.874
Minority status	-0.23	0.29	-0.80	0.422
Single parent home	0.02	0.27	0.05	0.957

5. DISCUSSION

The *12 for Life* impact study did not find positive effects for GPA, number of school suspensions, or dropping out of school. These findings suggest that *12 for Life* does not improve school-related outcomes for high school students who are at high risk of dropping out of school.

One limitation of the current study is that length of exposure to the treatment was not included in the analytic models. The impact of *12 for Life* likely varies depending on how long students participate in the program, but these differences were not accounted for in the study. Future studies should include length of the intervention when evaluating *12 for Life* or similar programs.

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Appendix A

12 for Life Selection Rubric

CATEGORY	POINTS				POINTS
	4	3	2	1	
Graduation Coach's Rating of Need	Priority	Serious Consideration	Standby	Ineligible	
Attendance	Student misses more than 12 days per semester and majority are unexcused	Student misses 8-12 days per semester and majority are unexcused	Student misses 8-12 days per semester but majority are excused	Student misses less than 8 days per semester	
Units of Credit	Credit deficient by 3.5 or more credits	Credit deficient by 1.5-3 credits	Credit deficient by 1 or fewer credits	Not credit deficient	
Financial Need	<p style="text-align: center;">SEVERE FINANCIAL NEED</p> 1. Student has one or more child dependents OR 2. Student is homeless OR 3. Student does not live with family and is completely self-supporting	<p style="text-align: center;">MODERATE FINANCIAL NEED</p> 1. Student is the only working member of the family OR 2. Student is on free lunch plan	<p style="text-align: center;">BASIC FINANCIAL NEED</p> 1. Student helps support family OR 2. Student is on reduced lunch plan	<p style="text-align: center;">NO EVIDENT FINANCIAL NEED</p> 1. Student has no real financial need at this time 2. Student pays for own lunch	
	4 Eligible		0 Ineligible		
Type of Discipline Referral	Student has no discipline referrals or has referrals that are non-violent and/or non-sexual		Student has a level 3 referral for sexual and/or violent behavior (automatic ineligibility)		
TOTAL POINTS					