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Executive Summary

Since the fall semester of 2014, Florida's Senate Bill 1720 (SB 1720) initiated a major statewide developmental education reform in the Florida College System (FCS). Now that the reform has been underway for a few years, we use first-time-in-college (FTIC) students to examine three sets of indicators of student progress to understand the impacts of SB 1720: developmental education enrollment and passing rates, introductory college-level course enrollment and passing rates, and college-level credit hours attempted and earned during the first year of enrollment. For introductory college-level course passing rates, we present our results in two different ways. The first is a course-based passing rate, which is the number of students passing English or math courses divided by the total number of students enrolled in the course. The second measure is a cohort-based passing rate—the number of individuals passing the English or math courses divided by the total number of students in that cohort.

We use data from Florida's K-20 Education Data Warehouse (EDW), which tracks all Florida public school students remaining in-state from Kindergarten to postsecondary education. We include six-cohorts (fall 2011 to fall 2016) of FTIC student data from all 28 public state colleges in Florida.

The key findings include:

- Enrollment rates in developmental reading, writing, and math declined sharply following the reform.
- Passing rates in developmental education courses remained relatively constant.
- Enrollment rates in introductory college-level courses increased following the reform, most notably in math courses.
- Course-based passing rates in English remained relatively stable over time, while course-based passing rates in intermediate algebra declined.
- Cohort-based passing rates in English and math courses increased following the reform from a cohort-by-cohort comparative perspective.
- Cohort-based passing rates for Black and Hispanic students increased at greater rates than White students.
- Total first-year credit hours attempted and earned increased for all students following the reform.
- Black and Hispanic students experienced a greater increase in college-level credits earned following the reform, compared to White students.

In sum, since the implementation of the developmental education reform in Florida in fall of 2014, there has been an increase of student success as measured by introductory college-level course passing rates as measured as the share of students of each cohort who passed the courses and college-level credit hours attempted and earned during the first year of enrollment. The findings also point to the narrowing gaps in those measures for students of different racial/ethnic backgrounds. Overall, the developmental education redesign in Florida appears to have led to increased success and improved equity in the Florida College System.

Increasing Momentum for Student Success:
Developmental Education Redesign and Student Progress in Florida

Introduction

The traditional developmental education model has been under close examination in empirical studies for over a decade. There is some evidence showing a potential negative impact of taking developmental courses on college success. Additional time and costs associated with remediation, for example, discourage students and increase their time to gateway course completion (Scott-Clayton & Rodriguez, 2012). The delaying effect was also empirically tested using the outcome of credit hour accumulation. Martorell and McFarlin's (2011) study shows that by the end of the first year, remediation reduced its participants' credit accumulation by 2.4 and 1.5 hours at two-year and four-year colleges, respectively. By the end of the third year, according to a study by Boatman and Long (2010), remedial math students scoring just below the placement cut-off point earned fewer total college credits compared to their non-remediated peers by a pronounced difference of 8.3 hours at community colleges alone.

In 2014, Florida's Senate Bill 1720 initiated a major statewide developmental education reform in state and community colleges in the Florida College System (FCS). The majority of students at FCS institutions became exempt from developmental education, colleges were required to offer developmental education courses using different instructional modalities, and colleges also had to develop enhanced advising and academic support services.

Now that the reform has been underway for four years, we examine how student performance has changed by comparing three key sets of measures of student progress before and after the reform. They include: developmental education enrollment and passing rates, introductory college-level course enrollment and passing rates, and college-level credit hours attempted and earned during the first year of enrollment.

We first provide background information on Florida's developmental education reform and how the various components of the reform may affect student success. Next, we explain the interrupted time series design and the analytical models used to make comparisons among outcomes before and after the reform for the population of public two-year college students who are first-time in college (FTIC). We then describe our data, and how we define our analytical samples to address each research question. In the result section, we first present descriptive findings on the overall patterns of the outcomes of interest before and after the reform, followed by subgroup analyses disaggregated by race/ethnicity. We conclude by presenting regression-adjusted findings that make a stronger approximation of the potential causal effects of the reform, per se, on the outcomes of interests.

The results vary based on the type of measures used in analyses. In general, we find some evidence of the overall positive effects of the reform. Students from all racial/ethnic backgrounds experienced increased success during the post-reform period. In particular, increased success occurred at greater rates among Black and Hispanic students, compared to White students. This pattern remains consistent across both descriptive findings and regression analyses, with the

latter showing the degree of increased success across outcomes is at statistically significant levels.

Background

Prior to Florida's developmental education reform, nearly 70 percent of FTIC students at FCS institutions tested below college-ready in at least one subject area, and almost half of these students failed to complete all of their developmental education requirements (Underhill, 2013). Even among those underprepared students who completed developmental requirements, only 15 percent earned an associate's degree within three years, compared to 30 percent for college-ready students. The theory of action for Florida's developmental education reform is that changing state policy directives, institutional programs and practices, and student decision making processes will increase student success on both short-term college outcomes, such as gateway courses completion and early credit accumulation, and long-term outcomes, such as credential completion. Our prior research has provided evidence for early cohorts that the reform has been effective at increasing the percent of incoming students who complete a college-level math and/or English course in their first year on the basis of a cohort-by-cohort comparison (Hu, Park, Woods, Tandberg, Richard, & Hankerson, 2016). The current analysis will continue to track changes in course completion rates over time, as well as examine whether these benefits continue to accrue to an additional college success indicator of credit accumulation.

The first major change under the reform was that students were exempt from college placement testing and developmental education courses if they entered a Florida public high school in 2003/04 or later and earned a standard Florida high school diploma, or are active duty military personnel. This change effectively made developmental education optional for the majority of students enrolled in state colleges. A meta-analysis of developmental education studies found that students scoring just below college-ready who were assigned to developmental education courses were about 1.5 percentage points less likely to complete a degree than students scoring just above college-ready (Valentine, Konstantopoulos, & Goldrick-Rab, 2017). While the authors did not explore why students narrowly assigned to developmental education perform worse, they suggest that one reason may be that these students face additional "roadblocks" due to the extra courses requirements that many are unable to complete.

The reform's second major change was that the remaining developmental education courses at state colleges were required to be offered using at least one of the following modalities: 1) modularized courses customized to students' skills gaps, 2) compressed course offered over a shorter duration, 3) contextualized courses related to students' meta-majors (or groups of similar programs of study), and 4) corequisite courses that allow students to concurrently enroll in gateway courses with developmental support. These modalities are intended to be more closely aligned with students' needs and to accelerate students' progression to gateway courses. There is some evidence that accelerated approaches to developmental education are associated with increases in gateway course enrollment and completion rates (Jaggars, Edgecombe, & Stacey, 2014). These improvements may be attributed to students having fewer opportunities to drop out, and improved alignment with college-level courses. While the effects on longer-term outcomes is largely unknown, there is some evidence that accelerated courses may help underprepared

students to accumulate credit more quickly and slightly increase the likelihood of degree completion (Hodara & Jaggars, 2014).

The reform's third major change required colleges to provide students with enhanced advising and academic support services. Once developmental education became optional, there was an influx of underprepared students enrolling in gateway courses. In order to help these students be successful, colleges made changes by providing additional tutoring services and implementing early alert systems to intervene before students fall too far behind in their courses. There is some evidence that these types of supports may help to improve student success on outcomes such as persistence and degree completion (Tampke, 2013).

Given the nature of the reform as described above, it is important to consider different measures to understand the impact of the reform on student progress and outcomes. In particular, because one of the most important features of the policy change is to allow exempt students to opt out of developmental education placement and instruction, it is important to differentiate two types of passing rates in college-level courses: the course-based passing rates that measures the passing for students who enrolled in those types of courses, and the cohort-based passing rates that measures the passing rates for each cohort of students. The course-based passing rate is the number of students passing English or math courses divided by the total number of students enrolled in the course, while the cohort-based passing rate is the number of individuals passing the English or math courses divided by the total number of students in that cohort.

While previous studies have looked at the impact of various changes to developmental education on students' postsecondary outcomes, ours examines a much more comprehensive reform that incorporates voluntary enrollment in developmental education, new instructional modalities, and enhanced support services. We anticipate that this combination of efforts might yield greater improvements to student outcomes than individual components implemented separately.

Research Questions

This study examines the impact of Florida's developmental education reform on developmental education enrollment and passing rates, introductory college-level course enrollment and passing rates, and college-level credit hour accumulation in the first year of enrollment. Specifically, we address the following research questions:

1. How have enrollment rates and course-based passing rates in developmental education courses changed following the developmental education reform among first-time-in-college (FTIC) students enrolled in the Florida College System (FCS) institutions? How did the change differ for students of different racial/ethnic backgrounds?

2. How have enrollment rates, course-based passing rates, and cohort-based passing rates in introductory college-level courses changed following the developmental education reform among FTIC students enrolled in the FCS institutions? How did the change differ for students of different racial/ethnic backgrounds?

3. How have the number of college-level credits attempted and earned in the first year of enrollment changed following the developmental education reform among FTIC students enrolled in the FCS institutions? How did the change differ for students of different racial/ethnic backgrounds?

Methods

Data Sources and Measures

We use data from Florida's K-20 Education Data Warehouse (EDW), which tracks all Florida public school students remaining in-state from Kindergarten to postsecondary education. For these analyses, we use data from college enrollment records, degree completion records, student background characteristics, and indicators of high school preparation.

We include data from all 28 FCS institutions in Florida. We include six cohorts of FTIC students; three cohorts who were enrolled prior to SB 1720 and three cohorts who were enrolled after.

For enrollment rates in developmental education courses and introductory college-level course, we calculated the percentage of students enrolled in these courses, disaggregated by subject, as the share of the cohort of FTC students who began their studies in FCS institutions in a given fall term.

For developmental education course passing rate, we calculated the percentage of students passing the courses as the share of the total number of students enrolled in these courses, disaggregated by subject. For introductory college-level course passing rates, we used two different measures. The first is a course-based passing rate, similar to the way that the developmental education course passing rate was calculated, that captures changes in student performance within each type of introductory course. The second measure is the cohort-based passing rate, which captures the overall effect of the policy and ascertains whether more students have been successful at taking and passing introductory college-level courses from the perspective of a cohort-by-cohort comparison.

For college-level credit hour accumulation, the outcomes of interest are the total college-level (non-developmental) credits attempted and total college-level credits earned over the first (fall-spring) year of enrollment.

All models include covariates for student characteristics (race/ethnicity, gender, and free or reduced-price lunch eligibility), high school academic preparation (indicators for whether a student received credit for honors math, dual enrollment math, AP/IB math, honors English, dual enrollment English, and AP/IB English), and controls for time (cohort) effects. Descriptive statistics, by cohort, are presented in Table 1.

Table 1. Cohort total breakdown by student background

	Pre-Policy			Post-Policy		
By Race/Ethnicity (Students of other racial/ethnic background not reported here)						
	2011	2012	2013	2014	2015	2016
White	29,757	27,069	27,124	26,261	25,673	23,522
Black	16,180	13,432	14,809	14,065	13,391	12,998
Hispanic	22,241	20,333	22,197	23,514	23,516	24,556
By Gender						
Male	34,396	30,947	32,894	32,374	32,123	32,212
Female	38,131	33,891	35,546	35,941	35,109	35,152
By FRL Status						
FRL-Eligible	22,392	20,641	25,385	27,128	27,973	27,945
Not FRL-Eligible	50,135	44,197	43,055	41,187	39,259	39,419
Total	72,527	64,838	68,440	68,315	67,232	67,364

Analytical Strategies

For the first research questions, we assess the likelihood that students would enroll in (or pass, depending on the model) a developmental education course. We hypothesize that enrollment rates in developmental education courses will decline in the post-reform period, as these courses are now optional for many students. Further, we hypothesize that with more institutional support in place and absence of potential delay by developmental courses post-reform, more students could be successful in these college-level courses. We model developmental reading, writing, and math separately.

For the second research question on enrolling and passing introductory college-level courses, we also model separately by subject area. In English, the first introductory college-level course is English Composition. In math, we examine results separately for Intermediate Algebra (MAT 1033), which counts for elective credit only, and gateway math courses that fulfill the transfer associate's degree requirements in math (MAC1105, MGF1106, MGF1107, and STA2023).

The sample includes a balanced panel with three years of data prior to the reform and three years after the reform. We use an interrupted time series design to examine whether there have been any changes in students' developmental education and introductory college-level course enrollment and passing rates before and after the reform.

To empirically investigate the overall impact of the reform on enrollment and passing rates, we estimate the model below for student i at college j in year (cohort) t:

$$\text{logit}(y_{ijt}) = \beta_0 + \beta_1(2014)_t + \beta_2(S)_{ijt} + \beta_3(HS)_{ijt} + \xi_j + \lambda_t + \varepsilon_{ijt}$$

In this specification, β_1 captures the change in the course enrollment/passing rate in the post-reform period, β_2 is a vector of student background characteristics, β_3 is a vector of high school academic preparation indicators, ξ_j is a college fixed effect to account for unobserved heterogeneity across institutions, and λ_t is a continuous year (cohort) indicator to account for any underlying temporal trends.

Further, in order to explore whether there were differential changes in enrollment/passing rates by race/ethnicity, in an additional set of analyses, we include indicators for Hispanic and Black students (White students form the comparison group; students of other race/ethnicity are excluded from these models) and interact these indicators with the post reform indicator. We estimate the following model for student i at college j in year (cohort) t:

$$logit(y_{ijt}) = \beta_0 + \beta_1(2014) + \beta_2(Black)_{ijt} + \beta_3(Hispanic)_{ijt} + \beta_4(2014*Black)_{ijt} + \beta_5(2014*Hispanic)_{ijt} + \beta_6(S)_{ijt} + \beta_7(HS)_{ijt} + \xi_j + \lambda_t$$

Under this specification, β_1 captures the change in course enrollment/passing rate in the post-reform period, β_2 and β_3 capture the overall difference in outcomes for Black and Hispanic students, respectively, β_4 and β_5 capture any differential changes in student outcomes for Black and Hispanic students, respectively, post-reform, β_6 is a vector of student background characteristics, β_7 is a vector of high school academic preparation indicators, ξ_j is a college fixed effect to account for unobserved heterogeneity across institutions, and λ_t is a continuous year (cohort) indicator to account for any underlying temporal trends. This model captures the base changes in overall student outcomes between the pre-reform period and the post-reform period, as well as whether there has been a differential change for Hispanic and Black students.

With particular regard to introductory college-level courses, we used students who enrolled in the college-level courses when examining the course-based outcomes, while we used all students in each cohort when examining cohort-based outcomes.

To address the third research question, we examine the total number of college-level credit hours attempted and completed in the first year of enrollment. We hypothesize that with the freedom to directly enroll in college-level courses and enhanced institutional support in place post reform, students could earn more credit hours after the reform than before the reform. The sample includes a balanced panel with three years of data prior to the reform and three years after the reform. We use an interrupted time series design to assess whether there have been any changes in the number of college-level credit hours completed after the reform relative to any pre-policy trends.

For the first part of the research question about the overall impact of the reform on credits attempted and completed, we estimate the model below for student i at college j in year (cohort) t:

$$y_{ijt} = \beta_0 + \beta_1(2014)_t + \beta_2(S)_{ijt} + \beta_3(HS)_{ijt} + \xi_j + \lambda_t + \varepsilon_{ijt}$$

In this specification, β_1 captures the change in the number of credits attempted and earned in the post-reform period, β_2 is a vector of student background characteristics, β_3 is a vector of high school academic preparation indicators, ξ_j is a college fixed effect to account for unobserved heterogeneity across institutions, and λ_t is a continuous year (cohort) indicator to account for any underlying temporal trends.

In order to explore whether there were differential changes in this outcome by student subgroups, in an additional set of analyses, we include indicators for Hispanic and Black students (White students form the comparison group; students of other race/ethnicity are excluded from these models) and interact these indicators with the post reform indicator. We estimate the following model for student i at college j in year (cohort) t:

$$y_{ijt} = \beta_0 + \beta_1(2014) + \beta_2(Black)_{ijt} + \beta_3(Hispanic)_{ijt} + \beta_4(2014*Black)_{ijt} + \beta_5(2014*Hispanic)_{ijt} + \beta_6(S)_{ijt} + \beta_7(HS)_{ijt} + \xi_j + \lambda_t$$

Under this specification, β_1 captures the change in credit attempt/accumulation in the post-reform period, β_2 and β_3 capture the overall difference in outcomes Black and Hispanic students, respectively, enrolled in developmental education, β_4 and β_5 capture any differential changes in student outcomes for Black and Hispanic students, respectively, post-reform, β_6 is a vector of student background characteristics, β_7 is a vector of high school academic preparation indicators, ξ_j is a college fixed effect to account for unobserved heterogeneity across institutions, and λ_t is a continuous year (cohort) indicator to account for any underlying temporal trends. This model captures the base changes in overall student outcomes between the pre-reform period and the post-reform period, as well as whether there has been a differential change for Hispanic and Black students.

We used all students who started in the fall semester to understand the patterns of college-level credits attempted and earned in the first year of college.

Findings Section 1: Developmental Course Enrollment Rates

Overall Pattern Related to Developmental Education Course Enrollment Rates

As shown in Table 2, enrollment rates in developmental courses declined following the implementation of the reform, particularly in developmental math which decreased by 17.36 percentage points from 2013 (pre-policy) to 2014 (post-policy) and has continued to decrease.

Table 2. Developmental education course enrollment rates, all students

|	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
Developmental Reading						
Enrollment Rate	25.39%	22.65%	22.77%	11.44%	8.49%	6.58%
Students Enrolled	18,412	14,687	15,586	7,816	5,709	4,433
Number in Cohort	72,527	64,838	68,440	68,315	67,232	67,364
Developmental Writing						
Enrollment Rate	22.81%	18.86%	18.54%	13.28%	10.98%	10.18%
Students Enrolled	16,540	12,227	12,691	9,071	7,380	6,859
Number in Cohort	72,527	64,838	68,440	68,315	67,232	67,364
Developmental Math						
Enrollment Rate	47.56%	47.86%	43.71%	26.35%	23.18%	21.44%
Students Enrolled	16,540	12,227	12,691	9,071	7,380	6,859
Number in Cohort	72,527	64,838	68,440	68,315	67,232	67,364

Figure 1 illustrates these patterns.
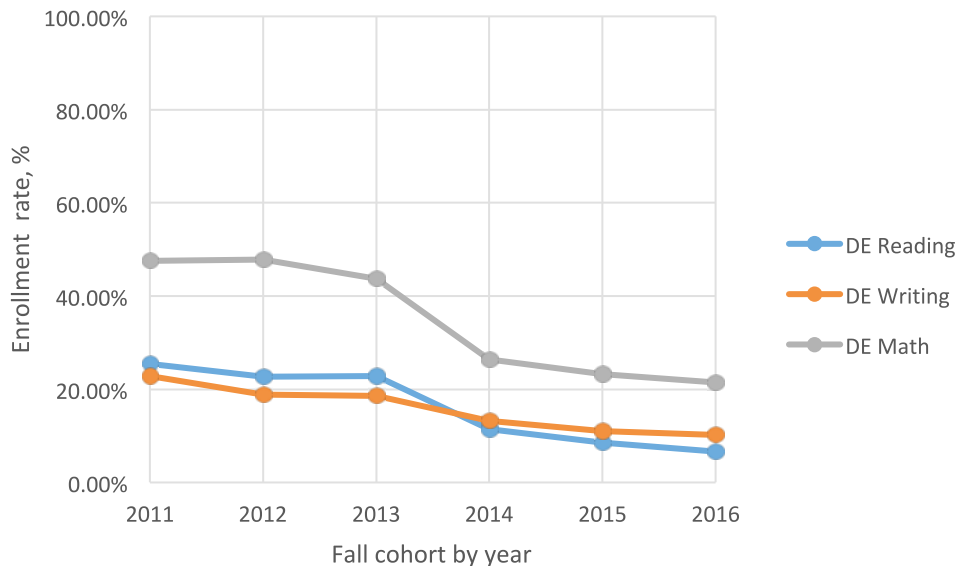
Figure 1. Developmental education course enrollment rates, all students

Patterns by Race/Ethnicity Related to Developmental Education Course Enrollment Rates

As shown in Table 3, developmental reading enrollment rates fell for all students, and particularly for Black students. While White students experienced an 8.63 percentage point decline in developmental reading enrollment rates from 2013 (pre-policy) to 2014 (post-policy), Black students experienced a 17.87 percentage point decline. Further, developmental reading enrollment rates continued to decline in the later years of the policy.

Table 3. Developmental reading course enrollment rates, by race/ethnicity

|	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
White Students						
Enrollment Rate	18.34%	16.79%	16.82%	8.19%	6.87%	5.93%
Students Enrolled	5,458	4,546	4,562	2,151	1,765	1,396
Number in Cohort	29,757	27,069	27,124	26,261	25,673	23,522
Black Students						
Enrollment Rate	41.18%	37.23%	36.34%	18.47%	12.98%	10.82%
Students Enrolled	6,663	5,001	5,382	2,598	1,738	1,406
Number in Cohort	16,180	13,432	14,809	14,065	13,391	12,998
Hispanic Students						
Enrollment Rate	23.98%	21.00%	21.66%	11.01%	7.71%	4.89%
Students Enrolled	5,333	4,270	4,807	2,589	1,814	1,200
Number in Cohort	22,241	20,333	22,197	23,514	23,516	24,556

These patterns are depicted in Figure 2.
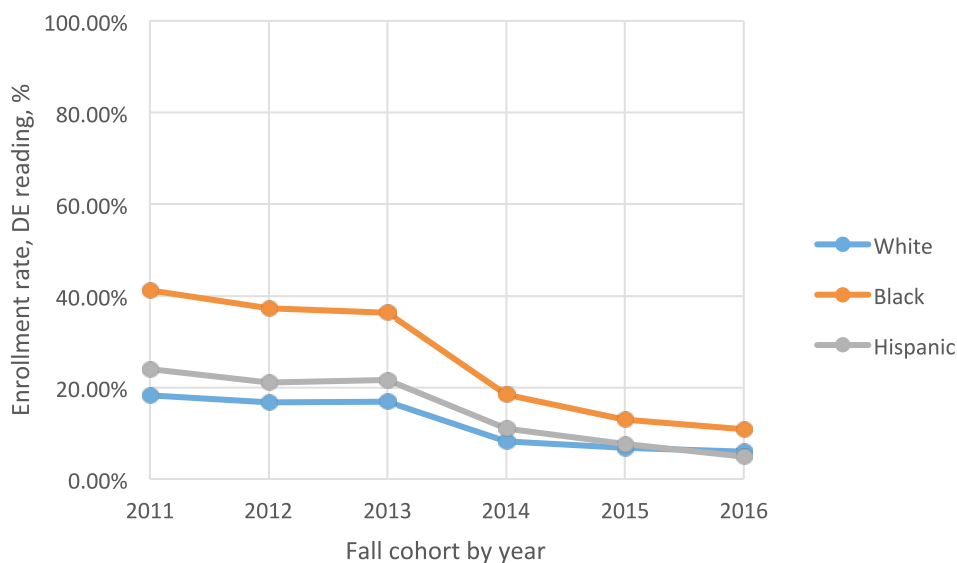
Figure 2. Developmental reading course enrollment rates, by race/ethnicity

As shown in Table 4, developmental writing enrollment rates fell for all students, and particularly for Black students. Again, while White students experienced a 2.45 percentage point decline in developmental writing enrollment rates between 2013 and 2014, Black students experienced an 11.53 percentage point decline. Like reading, developmental writing enrollment rates also continued to decline in the later years of the policy.

Table 4. Developmental writing course enrollment rates, by race/ethnicity

|	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
White Students						
Enrollment Rate	15.22%	11.69%	11.62%	9.17%	8.21%	7.72%
Students Enrolled	4,350	3,164	3,152	2,408	2,108	1,815
Number in Cohort	29,757	27,069	27,124	26,261	25,673	23,522
Black Students						
Enrollment Rate	40.15%	36.47%	34.11%	22.58%	17.54%	16.26%
Students Enrolled	6,497	4,898	5,051	3,176	2,349	2,114
Number in Cohort	16,180	13,432	14,809	14,065	13,391	12,998
Hispanic Students						
Enrollment Rate	20.91%	17.07%	17.00%	12.45%	10.37%	9.28%
Students Enrolled	4,650	3,470	3,773	2,928	2,439	2,279
Number in Cohort	22,241	20,333	22,197	23,514	23,516	24,556

These patterns are depicted in Figure 3.
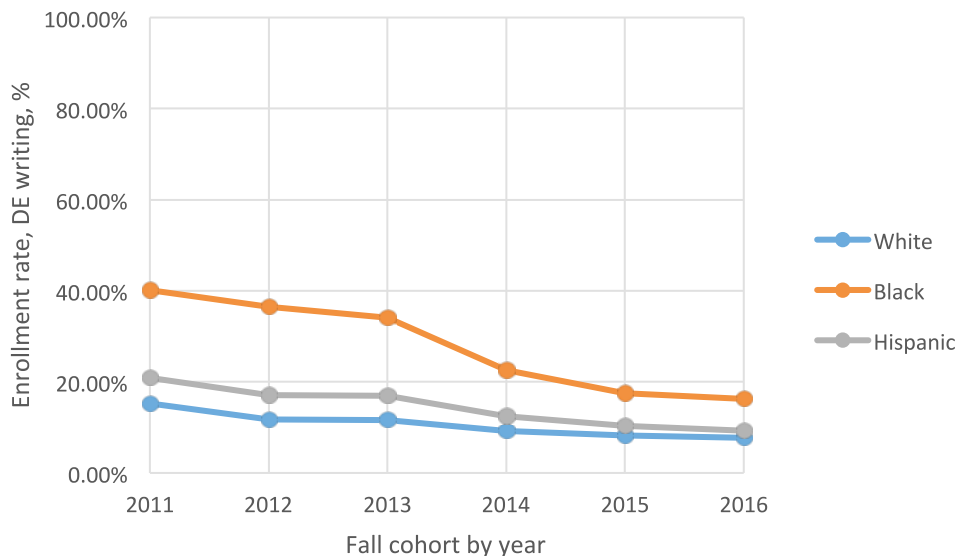
Figure 3. Developmental writing course enrollment rates, by race/ethnicity

As shown in Table 5, developmental math course enrollment rates declined sharply for all students, particularly for Black students who experienced a 22.63 percentage point decline from cohort 2013 to cohort 2014.

Table 5. Developmental math course enrollment rates, by race/ethnicity

	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
White Students						
Enrollment Rate	44.48%	45.00%	40.64%	25.58%	22.29%	19.94%
Students Enrolled	13,236	12,182	11,022	6,717	5,722	4,690
Number in Cohort	29,757	27,069	27,124	26,261	25,673	23,522
Black Students						
Enrollment Rate	60.97%	61.28%	55.70%	33.07%	26.88%	25.78%
Students Enrolled	9,865	8,231	8,248	4,651	3,600	3,351
Number in Cohort	16,180	13,432	14,809	14,065	13,391	12,998
Hispanic Students						
Enrollment Rate	43.77%	44.75%	41.16%	24.11%	22.87%	21.33%
Students Enrolled	9,734	9,099	9,136	5,670	5,379	5,238
Number in Cohort	22,241	20,333	22,197	23,514	23,516	24,556

These patterns are depicted in Figure 4.
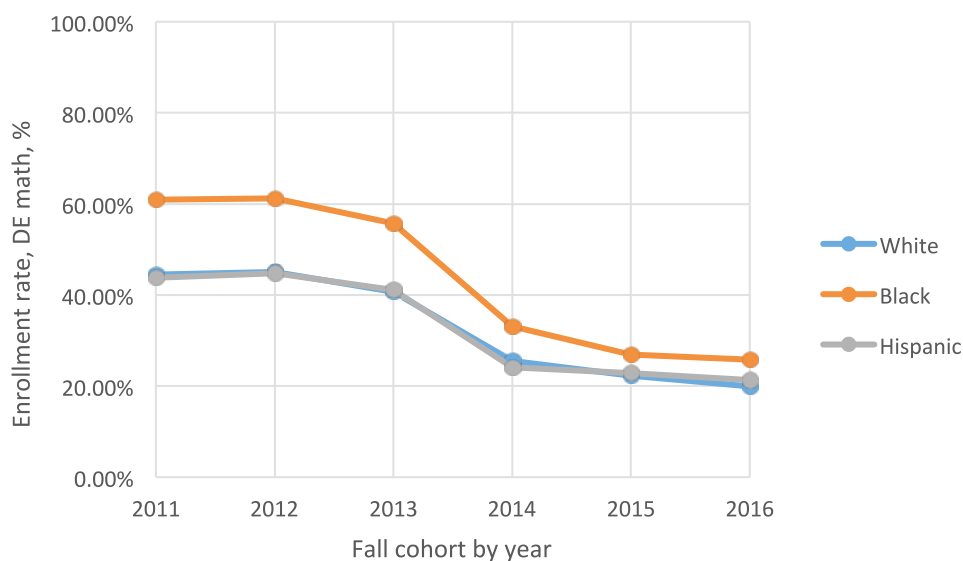
Figure 4. Developmental math course enrollment rates, by race/ethnicity

Regression-Adjusted Findings Related to Developmental Education Course Enrollment Rates

As shown in Table 6, changes in developmental course enrollment rates from the pre- to the post-reform period were statistically significant for all three subjects. Developmental math course enrollment rates experienced the largest magnitude of change, decreasing by over 16 percentage points.

Table 6. Predicted probabilities for developmental education enrollment rates before/after Florida's DE reform

	Pred. Prob. Pre-Reform	Pred. Prob. Post-Reform	Difference	
DE Reading	19.28%	9.12%	-10.16	***
DE Writing	15.97%	12.90%	-3.07	***
DE Math	42.57%	26.27%	-16.30	***

Note: Significance reported for differences pre/post: ***p<0.001, **p<0.01, *p<0.05

As shown in Table 7, enrollment rates in developmental education courses did not decline uniformly by race/ethnicity. All students experienced declines in enrollment in developmental education courses. However, Black students consistently had the largest declines across all three subjects, with changes in enrollment rates 13.98, 13.70, and 10.00 percentage points *lower* than White students in reading, writing, and math, respectively.

Table 7. Predicted probabilities and marginal effects for developmental education enrollment rates before/after Florida's DE reform, by race/ethnicity

	Developmental Reading			
	2011-2013	2014-2016	Diff.	
Predicted Probabilities				
Black	38.29%	14.05%	-24.24	***
Hispanic	22.11%	7.73%	-14.38	***
White	17.22%	6.96%	-10.26	***
Marginal Effects				
Black vs. White			-13.98	***
Hispanic vs. White			-4.12	***

	Developmental Writing			
	2011-2013	2014-2016	Diff.	
Predicted Probabilities				
Black	36.92%	18.71%	-18.21	***
Hispanic	18.20%	10.55%	-7.65	***
White	12.80%	8.29%	-4.51	***
Marginal Effects				
Black vs. White			-13.70	***
Hispanic vs. White			-3.14	***

	Developmental Math		
	2011-2013	2014-2016	Diff.
Predicted Probabilities			
Black	59.35%	28.58%	-30.77 ***
Hispanic	43.15%	22.65%	-20.50 ***
White	43.38%	22.61%	-20.77 ***
Marginal Effects			
Black vs. White			-10.00 ***
Hispanic vs. White			0.27

Note: Significance reported for differences pre/post: ***p<0.001, **p<0.01, *p<0.05

Findings Section 2: Developmental Course Passing Rates

Overall Pattern Related to Developmental Education Course Passing Rates

As shown in Table 8, developmental education course passing rates remained relatively stable throughout the 2011-2016 time period, without any noticeable change from 2013 to 2014. Developmental math passing rates fluctuated somewhat, but trended slightly upward over the six-year period, but, again, without a noticeable break from 2013 to 2014. This is particularly noteworthy given that the number students enrolling in developmental education courses decreased substantially in the post-policy period.

Table 8. Developmental education course passing rates, all students

	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
Developmental Reading						
Passing Rate	74.42%	76.23%	76.74%	76.78%	76.91%	78.30%
Students Passed	13,703	11,196	11,960	6,001	4,391	3,471
Students Enrolled	18,412	14,687	15,586	7,816	5,709	4,433
Developmental Writing						
Passing Rate	72.54%	74.11%	75.21%	75.39%	76.30%	77.75%
Students Passed	11,998	9,062	9,545	6,839	5,631	5,333
Students Enrolled	16,540	12,227	12,691	9,071	7,380	6,859
Developmental Math						
Passing Rate	58.93%	63.25%	60.46%	59.57%	64.08%	69.13%
Students Passed	11,998	9,062	9,545	6,839	5,631	5,333
Students Enrolled	16,540	12,227	12,691	9,071	7,380	6,859

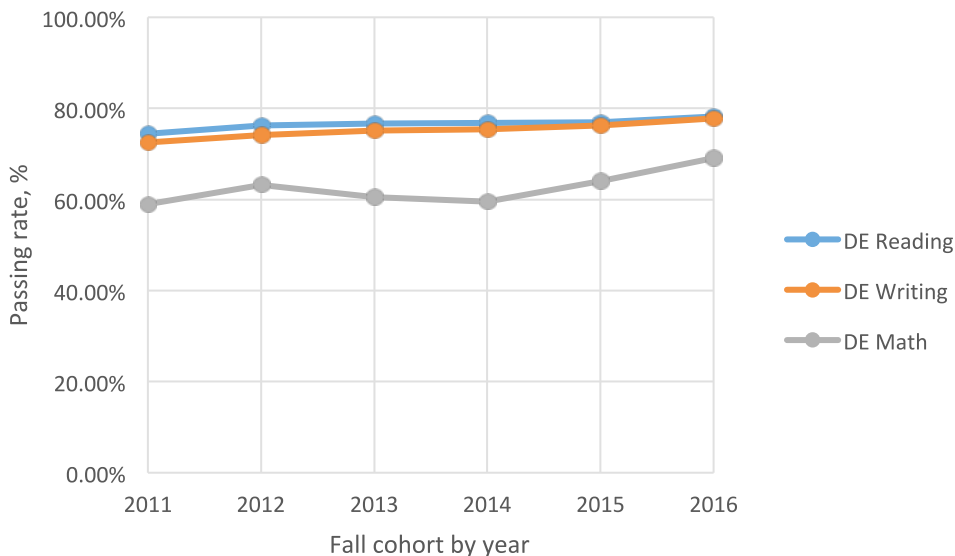Figure 5 depicts these patterns.

Figure 5. Developmental education course passing rates, all students

Patterns by Race/Ethnicity Related to Developmental Education Course Passing Rates

As shown in Table 9, developmental reading course passing rates have remained relatively constant for all students, except for slight variations by race/ethnicity in the 2015 and 2016 cohorts. While Black and Hispanic students experienced a slight upward tick in these years, rates for White students have remained relatively constant.

Table 9. Developmental reading course passing rates, by race/ethnicity

	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
White Students						
Passing Rate	75.69%	77.43%	77.53%	78.24%	79.60%	78.01%
Students Passed	4,131	3,520	3,537	1,683	1,405	1,089
Students Enrolled	5,458	4,546	4,562	2,151	1,765	1,396
Black Students						
Passing Rate	70.39%	72.45%	72.56%	73.44%	71.35%	73.33%
Students Passed	4,690	3,623	3,905	1,908	1,240	1,406
Students Enrolled	6,663	5,001	5,382	2,598	1,738	1,406
Hispanic Students						
Enrollment Rate	76.99%	78.62%	79.36%	77.71%	78.56%	83.00%
Students Passed	4,106	3,357	3,815	2,012	1,425	996
Students Enrolled	5,333	4,270	4,807	2,589	1,814	1,200

Figure 6 depicts these patterns.

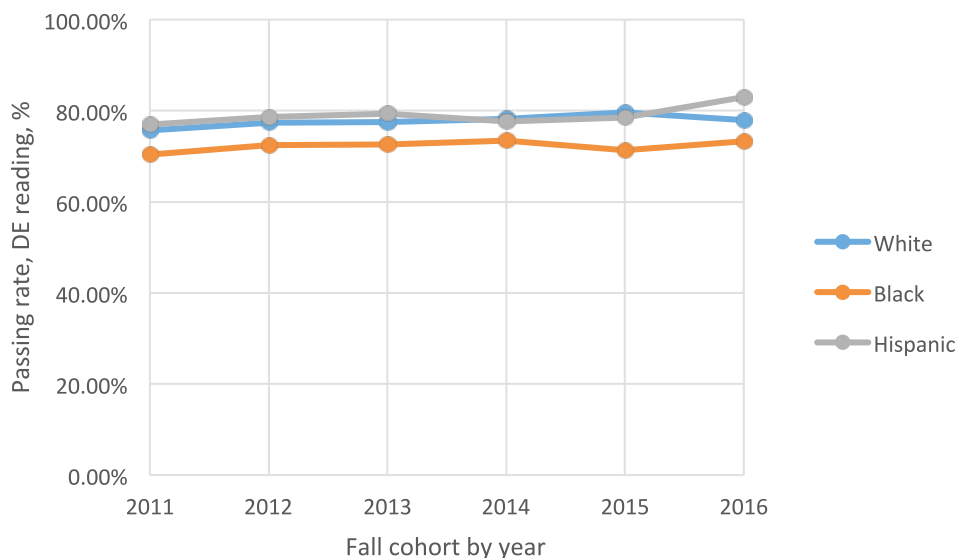Figure 6. Developmental reading course passing rates, by race/ethnicity

As shown in Table 10, developmental writing course passing rates remained relatively constant, with some variation in the later years of the post-policy period. While Black and Hispanic students had slight increases in developmental writing course passing rates, White students experienced a slight decline immediately following the reform.

Table 10. Developmental writing course passing rates, by race/ethnicity

	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
White Students						
Passing Rate	74.64%	73.77%	77.35%	74.75%	78.46%	77.25%
Students Passing	3,381	2,334	2,375	1,800	1,654	1,408
Students Enrolled	4,350	3,164	3,152	2,408	2,108	1,815
Black Students						
Passing Rate	68.35%	71.97%	72.10%	71.85%	70.50%	73.08%
Students Passing	4,441	3,525	3,642	2,282	1,656	1,545
Students Enrolled	6,497	4,898	5,051	3,176	2,349	2,114
Hispanic Students						
Passing Rate	75.78%	76.77%	78.16%	79.06%	78.72%	82.10%
Students Passing	3,524	2,664	2,949	2,315	1,920	1,871
Students Enrolled	4,650	3,470	3,773	2,928	2,439	2,279

Figure 7 depicts these patterns.

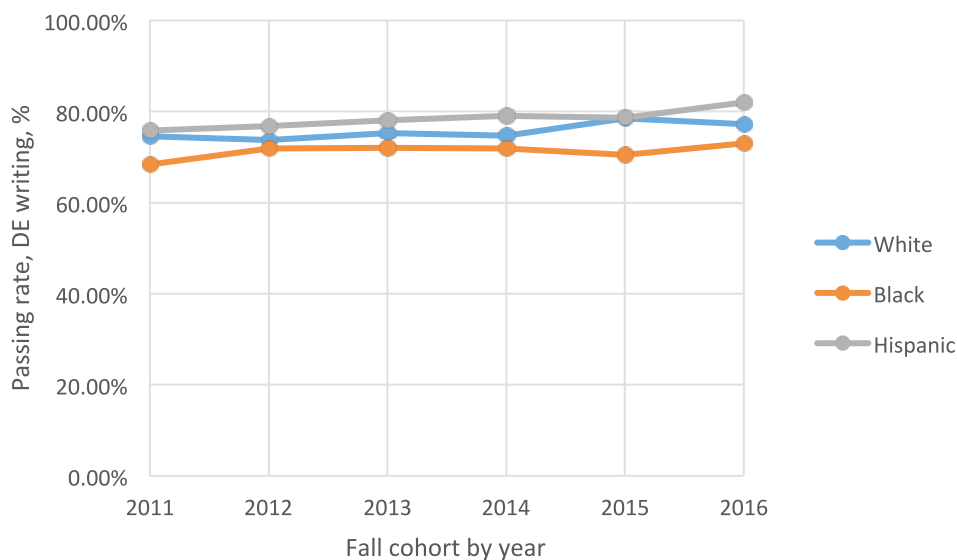Figure 7. Developmental writing course passing rates, by race/ethnicity

As shown in Table 11, developmental math passing rates fluctuated somewhat for all students; however, there is no clear trend pre-/post-policy. Rather, the passing rates waivered somewhat from year to year, with gains for Hispanic and Black students during the post-reform years, while passing rates for White students remained more constant.

Table 11. Developmental math course passing rates, by race/ethnicity

	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
White Students						
Passing Rate	64.53%	67.91%	63.84%	62.38%	65.41%	66.70%
Students Passing	8,541	8,273	7,036	4,190	3,743	3,128
Students Enrolled	13,236	12,182	11,022	6,717	5,722	4,690
Black Students						
Passing Rate	51.11%	55.93%	53.52%	53.26%	56.44%	61.77%
Students Passing	5,042	4,604	4,414	2,477	2,032	2,070
Students Enrolled	9,865	8,231	8,248	4,651	3,600	3,351
Hispanic Students						
Passing Rate	58.30%	63.18%	61.72%	60.69%	67.48%	76.27%
Students Passing	5,675	5,749	5,639	3,441	3,630	3,995
Students Enrolled	9,734	9,099	9,136	5,670	5,379	5,238

Figure 8 depicts these patterns.
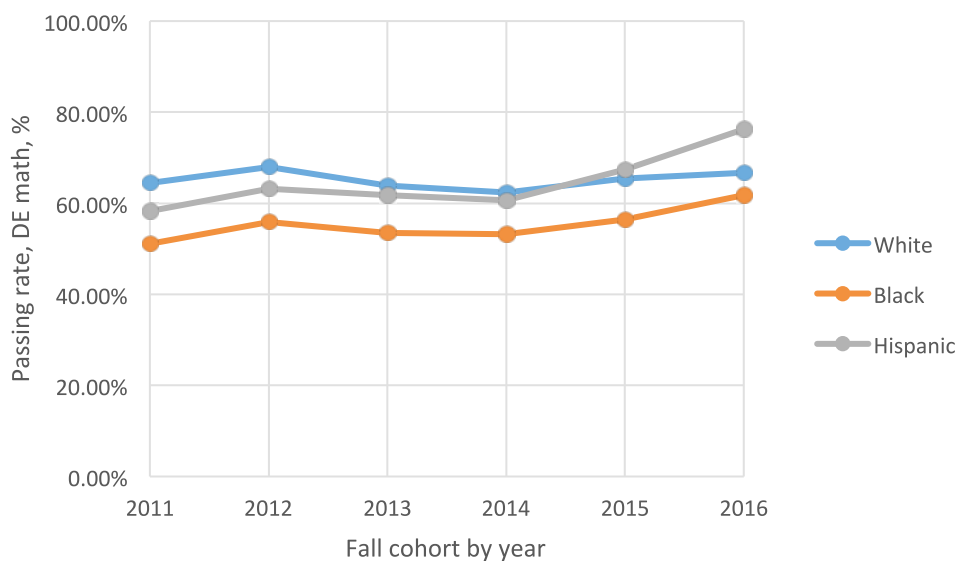
Figure 8. Developmental math course passing rates, by race/ethnicity

Regression-Adjusted Findings Related to Developmental Education Course Passing Rates

Table 12 provides regression-adjusted, empirical evidence to support the trends and patterns noticed in the descriptive data. The difference in pre- versus post- developmental education course passing rates is not statistically significant for reading and writing—these passing rates have essentially remained constant. In developmental math, however, passing rates declined slightly.

Table 12. Predicted probabilities for developmental education passing rates before/after Florida's DE reform, all students

	Pred. Prob. Pre-Reform	Pred. Prob. Post-Reform	Difference
DE Reading	76.37%	76.18%	-0.19
DE Writing	75.02%	74.80%	-0.22
DE Math	62.43%	61.27%	-1.16 *

Note: Significance reported for differences pre/post: ***p<0.001, **p<0.01, *p<0.05

Table 13 again confirms the trends identified in the descriptive data. None of the differences by race/ethnicity in developmental reading or writing are statistically significant. In developmental math, however, Hispanic and Black students' passing rates increased slightly following the developmental education reform; however, White students' passing rates declined slightly.

Table 13. Predicted probabilities and marginal effects for developmental education passing rates before/after Florida's DE reform, by race/ethnicity

	Developmental Reading		
	2011-2013	2014-2016	Diff.
Predicted Probabilities			
Black	71.76%	72.86%	1.10
Hispanic	78.36%	79.20%	0.84
White	76.88%	78.70%	1.82
Marginal Effects			
Black vs. White			-0.72
Hispanic vs. White			-0.98

	Developmental Writing		
	2011-2013	2014-2016	Diff.
Predicted Probabilities			
Black	70.65%	71.84%	1.19
Hispanic	76.90%	79.93%	3.03
White	74.65%	76.77%	2.12
Marginal Effects			
Black vs. White			-0.93
Hispanic vs. White			0.92

	Developmental Math		
	2011-2013	2014-2016	Diff.
Predicted Probabilities			
Black	53.39%	56.80%	3.41	***
Hispanic	61.08%	68.15%	7.07	***
White	65.53%	64.72%	-0.81	***
Marginal Effects			
Black vs. White			4.22	***
Hispanic vs. White			7.88	***

Note: Significance reported for differences pre/post: ***p<0.001, **p<0.01, *p<0.05

Findings Section 3: Introductory College-Level Course Enrollment Rates

Overall Pattern Related to Introductory College-Level Course Enrollment Rates

As shown in Table 14, introductory college-level course enrollment rates increased following the implementation of the developmental education reform. Immediately after implementation, introductory college-course enrollment rates increased by 6.49, 8.69, and 3.20 percentage points for English composition, intermediate algebra, and our pooled measure of gateway math courses, respectively. Further, this increase continued into the 2015 cohort before experiencing a slight plateau in the 2016 cohort.

Table 14. Introductory college-level course enrollment rates, all students

|	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
English Composition						
Enrollment Rate	56.14%	60.78%	63.64%	70.13%	73.04%	72.40%
Students Enrolled	40,718	39,411	43,552	47,910	49,105	48,772
Number in Cohort	72,527	64,838	68,440	68,315	67,232	67,364
Intermediate Algebra						
Enrollment Rate	26.50%	28.23%	33.19%	41.88%	45.28%	43.36%
Students Enrolled	19,219	18,306	22,712	28,613	30,446	29,208
Number in Cohort	72,527	64,838	68,440	68,315	67,232	67,364
Gateway Math Courses						
Enrollment Rate	21.75%	22.93%	24.84%	28.04%	33.48%	33.66%
Students Enrolled	15,772	14,866	17,000	19,153	22,508	22,672
Number in Cohort	72,527	64,838	68,440	68,315	67,232	67,364

Figure 9 depicts these patterns.
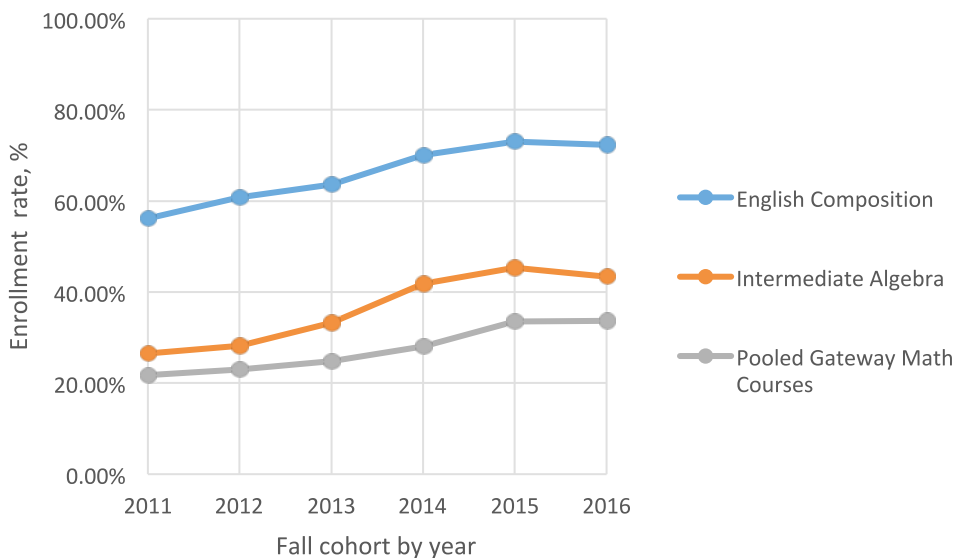
Figure 9. Introductory college-level course enrollment rates, all students

Patterns by Race/Ethnicity Related to Introductory College-Level Course Enrollment Rates

As shown in Table 15, English composition course enrollment rates increased for all students, with Hispanic and Black students experiencing the greatest gains. In fact, in the fall 2016 cohort, the English composition course enrollment rates for White, Black, and Hispanic students all fall within two percentage points of each other.

Table 15. English composition course enrollment rates, by race/ethnicity

|	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
White Students						
Enrollment Rate	63.07%	65.83%	67.58%	71.76%	72.98%	72.41%
Students Enrolled	18,768	17,820	18,330	18,845	18,736	17,033
Number in Cohort	29,757	27,069	27,124	26,261	25,673	23,522
Black Students						
Enrollment Rate	44.22%	49.14%	54.59%	66.41%	72.63%	71.07%
Students Enrolled	7,155	6,600	8,084	9,341	9,726	9,238
Number in Cohort	16,180	13,432	14,809	14,065	13,391	12,998
Hispanic Students						
Enrollment Rate	55.15%	61.56%	64.72%	70.73%	73.37%	72.96%
Students Enrolled	12,265	12,518	14,367	16,631	17,254	17,915
Number in Cohort	22,241	20,333	22,197	23,514	23,516	24,556

Figure 10 depicts these trends.
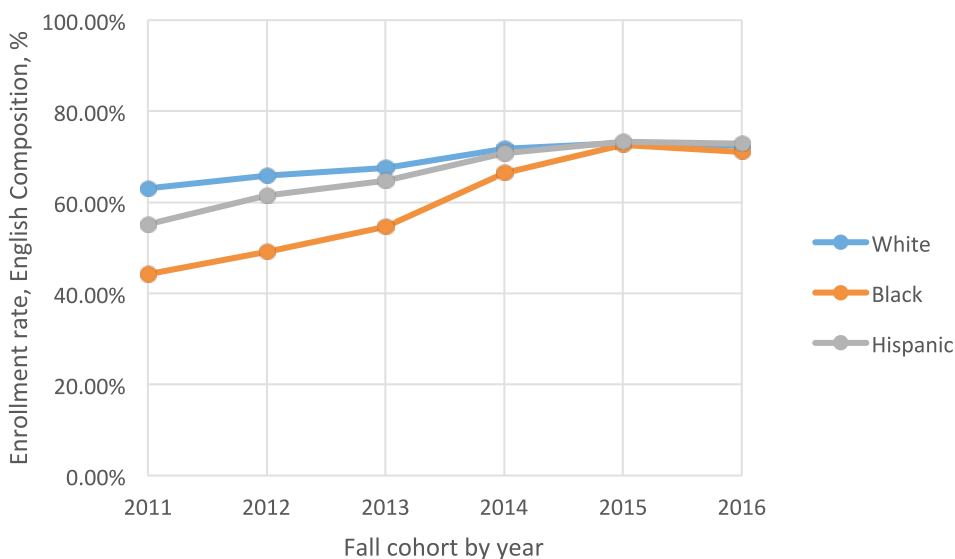
Figure 10. English composition course enrollment rates, by race/ethnicity

Enrollment rates for Intermediate Algebra increased following the implementation of the developmental education reform (Table 16). While all students experienced increased enrollment, Hispanic and Black student enrollment in Intermediate Algebra increased at far greater rates than White students. Put differently, greater shares of the Hispanic and Black student populations enrolled in intermediate algebra by the fall 2016 cohort, compared to the share of White students.

Table 16. Intermediate algebra course enrollment rates, by race/ethnicity

|	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
White Students						
Enrollment Rate	27.85%	28.19%	32.87%	39.04%	41.70%	40.43%
Students Enrolled	8,288	7,631	8,916	10,253	10,706	9,510
Number in Cohort	29,757	27,069	27,124	26,261	25,673	23,522
Black Students						
Enrollment Rate	21.40%	23.84%	29.46%	41.77%	47.89%	45.44%
Students Enrolled	3,462	3,202	4,363	5,875	6,413	5,906
Number in Cohort	16,180	13,432	14,809	14,065	13,391	12,998
Hispanic Students						
Enrollment Rate	28.26%	31.16%	36.30%	45.89%	48.24%	45.05%
Students Enrolled	6,285	6,336	8,057	10,790	11,343	11,063
Number in Cohort	22,241	20,333	22,197	23,514	23,516	24,556

Figure 11 depicts these trends.
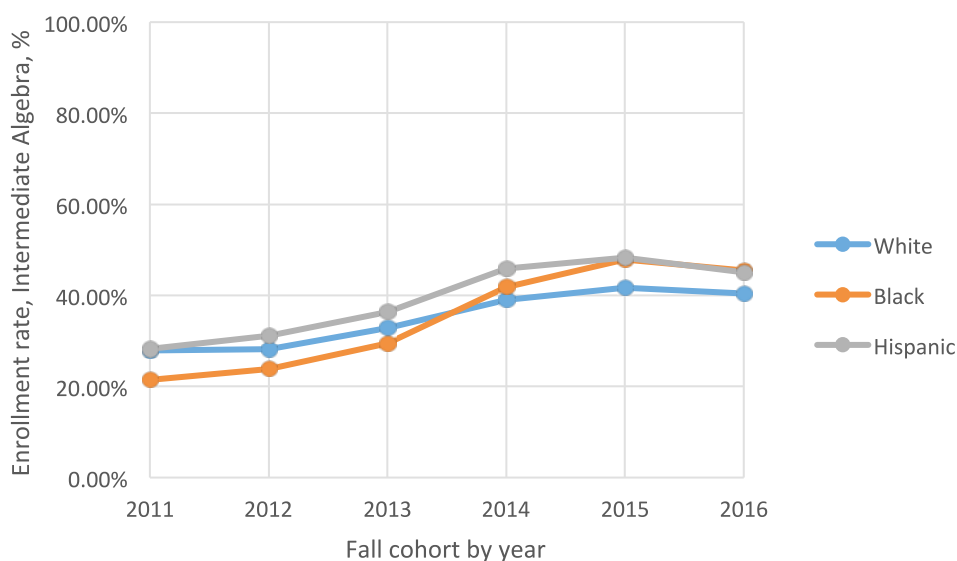
Figure 11. Intermediate algebra course enrollment rates, by race/ethnicity

As shown in Table 17, gateway math course enrollment rates increased for all students following the implementation of the reform. Further, all students experienced an additional increase in the second year of the reform and appear to be holding steady, with Hispanic students showing a slight additional increase into the 2016 cohort.

Table 17. Gateway math course enrollment rates, by race/ethnicity

	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
White Students						
Enrollment Rate	25.73%	26.05%	27.85%	30.63%	35.68%	35.10%
Students Enrolled	7,655	7,052	7,554	8,044	9,160	8,257
Number in Cohort	29,757	27,069	27,124	26,261	25,673	23,522
Black Students						
Enrollment Rate	11.88%	13.64%	15.36%	19.86%	25.92%	25.86%
Students Enrolled	1,922	1,832	2,274	2,793	3,471	3,361
Number in Cohort	16,180	13,432	14,809	14,065	13,391	12,998
Hispanic Students						
Enrollment Rate	22.00%	23.72%	26.08%	28.86%	34.41%	36.28%
Students Enrolled	4,893	4,823	5,788	6,786	8,093	8,910
Number in Cohort	22,241	20,333	22,197	23,514	23,516	24,556

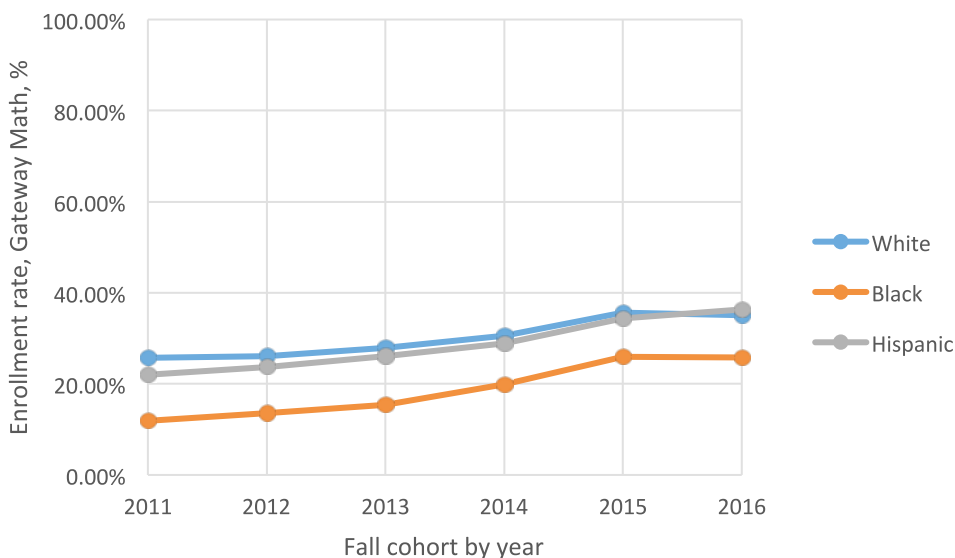Figure 12 depicts these trends.

Figure 12. Gateway math course enrollment rates, by race/ethnicity

Regression-Adjusted Findings Related to Introductory College-Level Course Enrollment Rates

All of the increases in the introductory college-level course enrollment rates following the implementation of the developmental education reform were statistically significant. English enrollment rates increased by 4.79 percentage points while intermediate algebra and gateway math courses increased by 8.19 and 4.89 percentage points, respectively (Table 18).

Table 18. Predicted probabilities of introductory college-level course enrollment rates before/after Florida's DE reform

	Pred. Prob. Pre-Reform	Pred. Prob. Post-Reform	Difference	
English				
ENC1101	65.44%	70.23%	4.79	***
Math				
MAT1033	31.02%	39.21%	8.19	***
Gateway Math	22.78%	27.67%	4.89	***

*Note: Significance reported for differences pre/post: ***p<0.001, **p<0.01, *p<0.05*

Further, all of the differential effects by race/ethnicity were also statistically significant and positive (Table 19). Not only did all students enroll in introductory college-level courses at higher rates following the implementation of the reform, but Hispanic and Black students increased their enrollment at faster rates than White students, narrowing the enrollment gap for Black and White students and effectively closing the enrollment gap for Hispanic and White students. In English composition, for instance, while White students experienced an increase of 7.47 percent points in their enrollment rate, Hispanic and Black students experienced 12.75 and 22.64 percentage point gains, respectively. A similar pattern also occurred in intermediate algebra and gateway math courses.

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Table 19. Predicted probabilities and marginal effects for introductory college-level course enrollment rates, by race/ethnicity

	English Composition			
	2011-2013	2014-2016	Diff.	
Predicted Probabilities				
Black	49.47%	72.11%	22.64	***
Hispanic	61.70%	74.45%	12.75	***
White	67.18%	74.65%	7.47	***
Marginal Effects				
Black vs. White			15.17	***
Hispanic vs. White			5.28	***

	Intermediate Algebra			
	2011-2013	2014-2016	Diff.	
Predicted Probabilities				
Black	24.09%	44.51%	20.42	***
Hispanic	31.04%	45.76%	14.72	***
White	28.66%	39.32%	10.66	***
Marginal Effects				
Black vs. White			9.76	***
Hispanic vs. White			4.06	***

	Gateway Math			
	2011-2013	2014-2016	Diff.	
Predicted Probabilities				
Black	11.86%	22.10%	10.24	***
Hispanic	21.92%	31.97%	10.05	***
White	24.60%	32.70%	8.10	***
Marginal Effects				
Black vs. White			2.14	***
Hispanic vs. White			1.95	***

*Note: Significance reported for differences pre/post: ***p<0.001, **p<0.01, *p<0.05*

Findings Section 4: Course-Based Introductory College-Level Course Passing Rates

Overall Pattern Related to Course-based Introductory College-Level Course Passing Rates

In this section, we present course-based passing rates for introductory college-level courses, which are computed by dividing the number of students passing the course by the number of students who enrolled in the course.

As shown in Table 20, the course-based passing rate for English Composition remained relatively constant over time, though the number of students entering the course increased dramatically following the implementation of SB1720. The course-based passing rate for Intermediate Algebra decreased by nearly five percentage points in 2014, but rebounded somewhat in the 2015 and 2016 cohorts. Just as with English, though, the number of students enrolling in Intermediate Algebra increased dramatically in the post-implementation cohorts. Course-based passing rates in gateway math courses declined slightly following the implementation of SB 1720.

Table 20. Course-based passing rates in introductory college-level courses, all students

	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
English Composition						
Success Rate	74.81%	75.26%	75.28%	74.51%	75.09%	74.41%
Number of Success	30,460	29,662	32,786	35,699	36,873	36,289
Number of Students	40,718	39,411	43,552	47,910	49,105	48,772
Intermediate Algebra						
Success Rate	65.28%	65.59%	62.65%	57.85%	60.29%	60.07%
Number of Success	12,547	12,006	14,229	16,554	18,357	17,545
Number of Students	19,219	18,306	22,712	28,613	30,446	29,208
Gateway Math Courses						
Success Rate	68.50%	68.80%	67.24%	65.93%	66.40%	66.96%
Number of Success	10,804	10,228	11,431	12,615	14,839	15,055
Number of Students	15,772	14,866	17,000	19,153	22,508	22,672

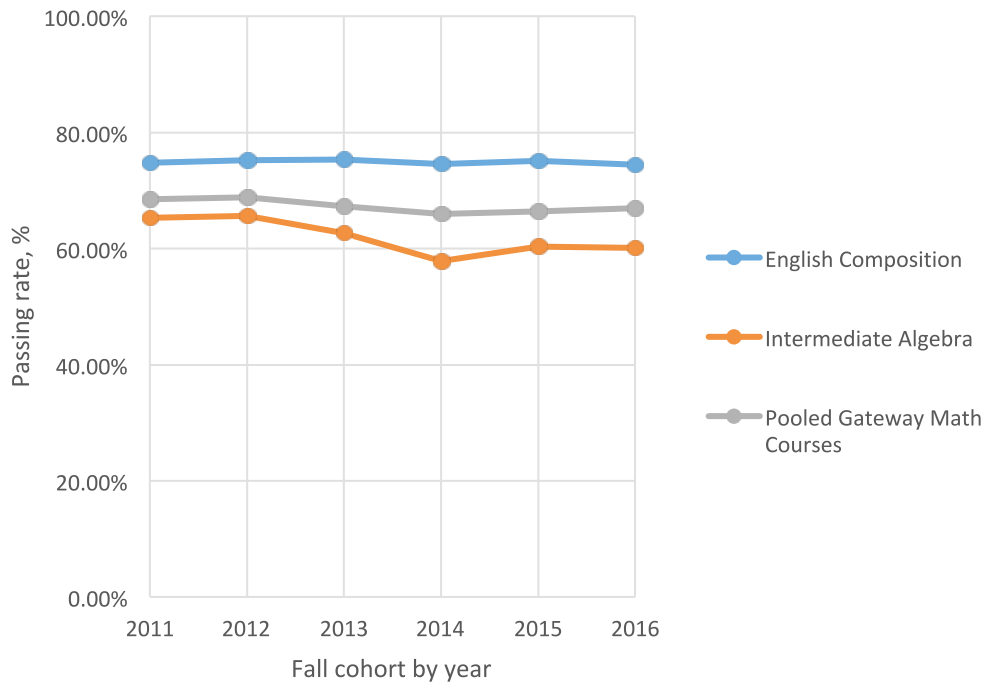These patterns are also illustrated in Figure 13.

Figure 13. Course-based passing rates in introductory college-level courses, all students

Patterns by Race/Ethnicity Related to Introductory College-Level Course Passing Rates

As shown in Table 21, the course-based passing rates remained relatively stable for White, Black, and Hispanic students, though the success rates for Black students remained lower than that of White and Hispanic students. Still, all three groups of students saw dramatic increases in the number of students enrolling in English Composition following the implementation of SB 1720.

Table 21. Course-based passing rates in English composition, by race/ethnicity

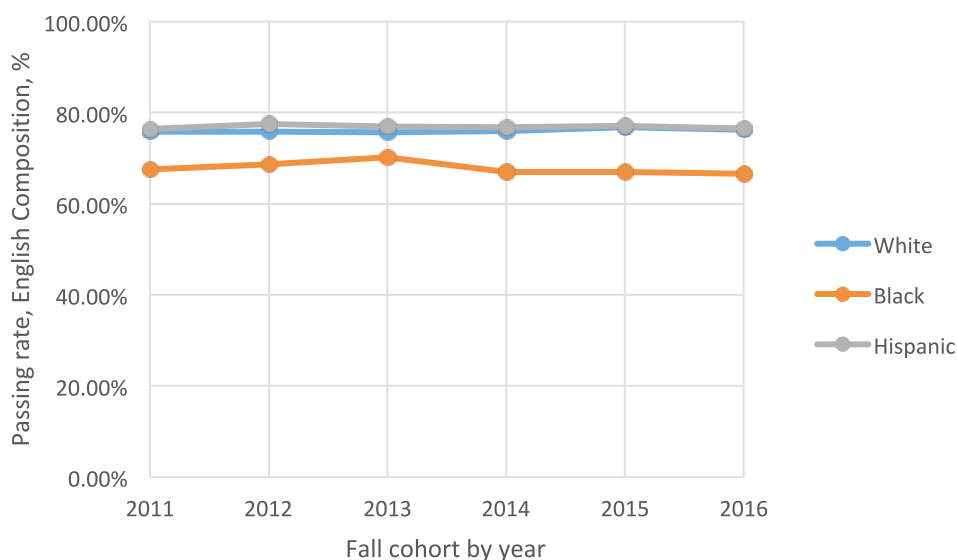|	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
English Composition						
White Students						
Success Rate	75.89%	75.79%	75.67%	75.95%	76.80%	76.32%
Number of Success	14,259	13,506	13,871	14,312	14,390	13,000
Number of Students	18,768	17,820	18,330	18,845	18,736	17,033
Black Students						
Success Rate	67.49%	68.64%	70.24%	67.02%	67.03%	66.61%
Number of Success	4,829	4,530	5,678	6,260	6,519	6,153
Number of Students	7,155	6,600	8,084	9,341	9.726	9,238
Hispanic Students						
Success Rate	76.46%	77.51%	77.00%	76.81%	77.11%	76.49%
Number of Success	9,378	9,703	11,062	12,775	13,305	13,704
Number of Students	12,265	12,518	14,367	16,631	17,254	17,915

This is also depicted in Figure 14.

Figure 14. Course-based passing rates in English composition, by race/ethnicity

As shown in Table 22, course-based passing rates in intermediate algebra dropped for White, Black, and Hispanic students in the post-policy period. Further, while White and Hispanic students experienced an increase in passing rates in 2015 and 2016, compared to 2014, passing rates remained relatively constant for Black students.

Table 22. Course-based passing rates in intermediate algebra, by race/ethnicity

|	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
Intermediate Algebra						
White Students						
Success Rate	66.84%	65.86%	64.12%	59.60%	63.02%	61.84%
Number of Success	5,540	5,026	5,717	6,111	6,747	5,881
Number of Students	8,288	7,631	8,916	10,253	10,706	9,510
Black Students						
Success Rate	57.45%	60.87%	54.76%	50.49%	50.97%	50.59%
Number of Success	1,989	1,949	2,389	2,966	3,269	2,988
Number of Students	3,462	3,202	4,363	5,875	6,413	5,906
Hispanic Students						
Success Rate	66.60%	67.30%	64.69%	59.36%	62.18%	63.14%
Number of Success	4,186	4,264	5,212	6,405	7,053	6,985
Number of Students	6,285	6,336	8,057	10,790	11,343	11,063

This is further depicted in Figure 15.
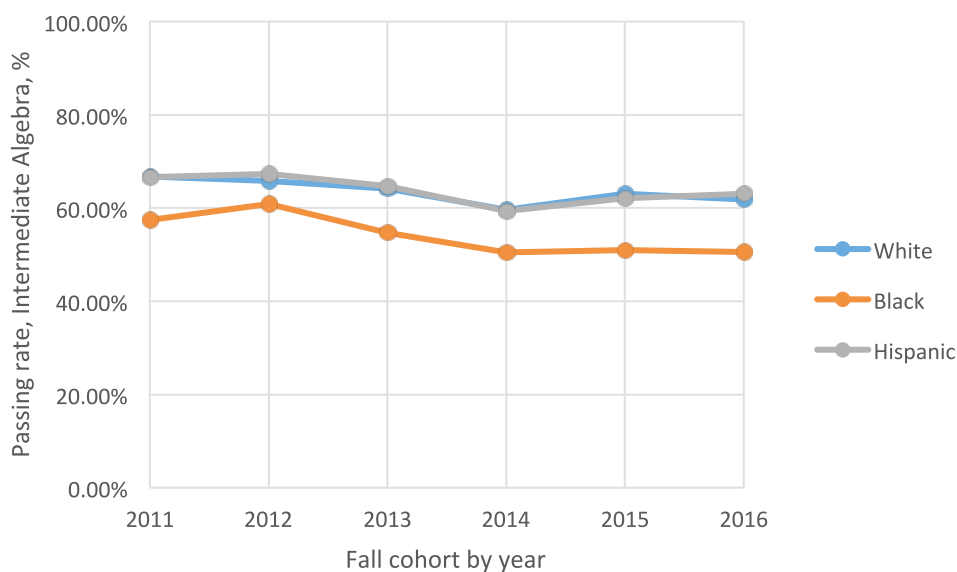
Figure 15. Course-based passing rates in intermediate Algebra, by race/ethnicity

As shown in Table 23, the course-based passing rates in gateway math for White and Hispanic students remained relatively constant over time; however, course-based passing rates dropped, and remained lower for Black students in the post-policy period. Still, across all student groups, the number of students entering gateway math courses increased following the implementation of SB 1720.

Table 23. Course-based passing rates in gateway math, by race/ethnicity

|	Pre-Policy			Post-Policy		
	2011	2012	2013	2014	2015	2016
Gateway Math Courses						
White Students						
Success Rate	69.44%	69.13%	68.18%	68.86%	67.67%	68.64%
Number of Success	5,316	4,875	5,150	5,378	6,199	5,668
Number of Students	7,655	7,052	7,554	8,044	9,160	8,257
Black Students						
Success Rate	58.90%	61.35%	62.27%	58.36%	53.96%	54.33%
Number of Success	1,132	1,124	1,416	1,630	1,873	1,826
Number of Students	1,922	1,832	2,274	2,793	3,471	3,361
Hispanic Students						
Success Rate	69.12%	69.79%	67.16%	66.80%	67.71%	68.32%
Number of Success	3,382	3,366	3,887	4,533	5,480	6,087
Number of Students	4,893	4,823	5,788	6,786	8,093	8,910

This is further depicted in Figure 16.
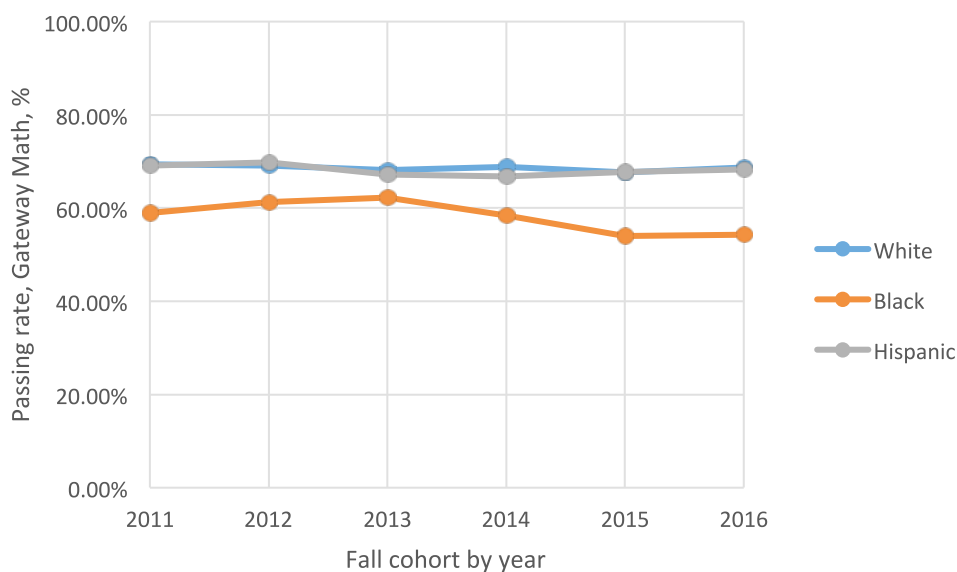
Figure 16. Course-based passing rates in gateway math, by race/ethnicity

Regression-Adjusted Findings Related to Introductory College-Level Course Passing Rates

Table 24 presents the results from our set of models predicting overall course-based passing rates in introductory college-level courses before and after the implementation of Florida's DE reform. Overall, course-based passing rates in English Composition (ENC1101) and gateway math course passing rates (MAC1105, MGF1106, MGF1107, and STA2023) remained the same, following the reform. In Intermediate Algebra, however, course-based passing rates declined by nearly five percentage points.

Table 24. Predicted probabilities for course-based passing rates for introductory college-level courses before/after Florida's DE reform

	Pred. Prob. Pre-Reform	Pred. Prob. Post-Reform	Difference	
English				
ENC1101	75.92%	76.09%	0.17	
Math				
MAT1033	64.17%	59.42%	-4.75	***
Gateway Math	67.87%	68.32%	0.45	

*Note: Significance reported for differences pre/post: ***p<0.001, **p<0.01, *p<0.05*

Table 25 presents the results from our set of models predicting differential course-based passing rates by race/ethnicity. In English Composition, White and Hispanic students experienced a

slight increase in course-based passing rates (1.25 and 0.54 percentage points, respectively), and Black students experienced a decline (0.67 percentage points). Further, in Intermediate Algebra, while all students experienced a decline, both Hispanic and White students had similar (non-statistically significant from each other) declines of around 4 percentage points, Black students had declines of 6.07 percentage points, roughly 2 percentage points more of a decline than White and Hispanic students. Finally, White and Hispanic students experienced no significant change in course-based gateway math courses, and Black students experienced 4.3 percentage point *decline* in course-based passing rates.

Table 25. Predicted probabilities and marginal effects for course-based passing rates for introductory college-level courses, by race/ethnicity

	English Composition			
	2011-2013	2014-2016	Diff.	
Predicted Probabilities				
Black	69.32%	68.57%	-0.67	***
Hispanic	77.50%	78.19%	0.54	***
White	76.31%	77.60%	1.25	***
Marginal Effects				
Black vs. White			-1.92	***
Hispanic vs. White			-0.71	

	Intermediate Algebra			
	2011-2013	2014-2016	Diff.	
Predicted Probabilities				
Black	56.08%	50.01%	-6.07	***
Hispanic	65.39%	60.91%	-4.48	***
White	64.13%	60.43%	-3.70	***
Marginal Effects				
Black vs. White			-2.37	*
Hispanic vs. White			-0.78	

	Gateway Math		
	2011-2013	2014-2016	Diff.
Predicted Probabilities			
Black	61.37%	57.07%	-4.30 **
Hispanic	69.09%	68.95%	-0.14
White	69.47%	68.97%	-0.53
Marginal Effects			
Black vs. White			-4.16 ***
Hispanic vs. White			0.39

Note: Significance reported for differences pre/post: ***p<0.001, **p<0.01, *p<0.05

Findings Section 5: Cohort-Based Introductory College-Level Course Passing Rates

Overall Pattern Related to Cohort-based Introductory College-Level Course Passing Rates

In this section, we present cohort-based passing rates for introductory college-level courses, which are computed by dividing the number of students passing the course by the total number of students in the cohort. This measure provides a glimpse at the overall impact of the policy and its goal of increasing the number of students who are able to take and pass college-level courses in their first year of study, given the feature of the Florida policy that allows exempt students to enroll in college-level courses directly.

As shown in Table 26, the number of students both taking and passing introductory college-level English and math courses increased following the reform. Cohort-based passing rates in both English Composition and Intermediate Algebra saw immediate high jumps in the first year post-reform, each increasing by 4.36 and 3.44 percentage points respectively. College-level math courses had a moderate passing rate increase of 1.77 percentage points in the first year post reform, but it experienced a higher increase in the second year post reform with a jump by 5.37 percentage points from 2013. All courses reached a plateau in the third year post reform.

Table 26. Cohort-based passing rates in introductory college-level courses, all students

	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
English Composition						
Success Rate	42.00%	45.75%	47.90%	52.26%	54.84%	53.87%
Number of Success	30,460	29,662	32,786	35,699	36,873	36,289
Number of Students	72,527	64,838	68,440	68,315	67,232	67,364
Intermediate Algebra						
Success Rate	17.30%	18.52%	20.79%	24.23%	27.30%	26.05%
Number of Success	12,547	12,006	14,229	16,554	18,357	17,545
Number of Students	72,527	64,838	68,440	68,315	67,232	67,364
Gateway Math Courses						
Success Rate	14.90%	15.77%	16.70%	18.47%	22.07%	22.35%
Number of Success	10,804	10,228	11,431	12,615	14,839	15,055
Number of Students	72,527	64,838	68,440	68,315	67,232	67,364

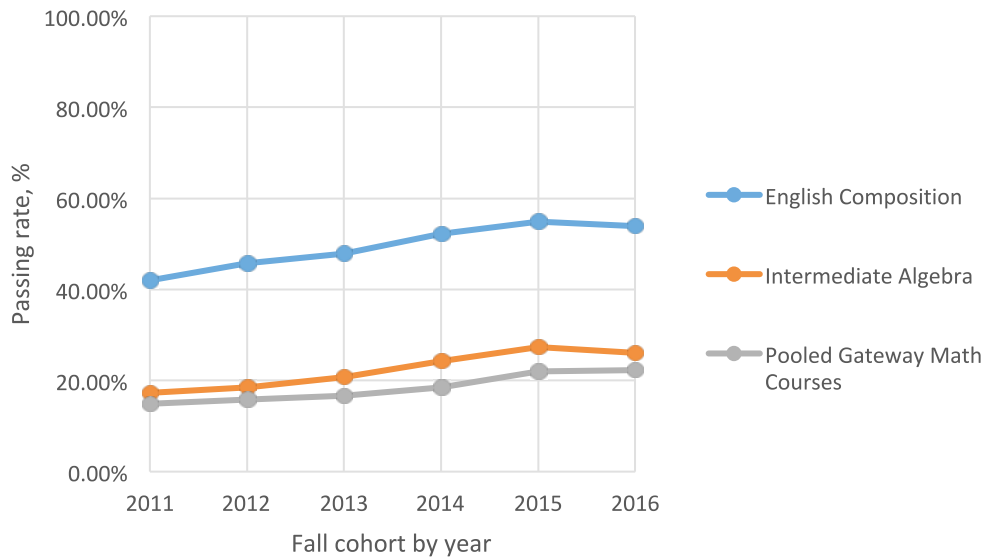The pattern is also illustrated in Figure 17.

Figure 17. Cohort-based passing rates in introductory college-level courses, all students

Table 27 shows the cohort-based passing rates of English Composition by race/ethnicity in both the pre- and post-policy periods. Cohort-based passing rates for Black and Hispanic students increased at greater rates than White students, narrowing the race/ethnicity performance gap. In English Composition, Black students' passing rate increased by 6.17 percentage points from 2013 (pre-policy) to 2014 (post-policy), Hispanic students, while closely trailing behind White students in the pre-reform period, met or surpassed White students in the post-policy period.

Table 27. Cohort-based passing rates in English composition, by race/ethnicity

	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
English Composition						
White						
Success Rate	47.92%	49.89%	51.14%	54.50%	56.05%	55.27%
Number of Success	14,259	13,506	13,871	14,312	14,390	13,000
Number of Students	29,757	27,069	27,124	26,261	25,673	23,522
Black						
Success Rate	29.85%	33.73%	38.34%	44.51%	48.68%	47.34%
Number of Success	4,829	4,530	5,678	6,260	6,519	6,153
Number of Students	16,180	13,432	14,809	14,065	13,391	12,998
Hispanic						
Success Rate	42.17%	47.72%	49.84%	54.33%	56.58%	55.81%
Number of Success	9,378	9,703	11,063	12,775	13,305	13,704
Number of Students	22,241	20,333	22,197	23,514	23,516	24,556

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Figure 18 illustrates the pattern by race/ethnicity.
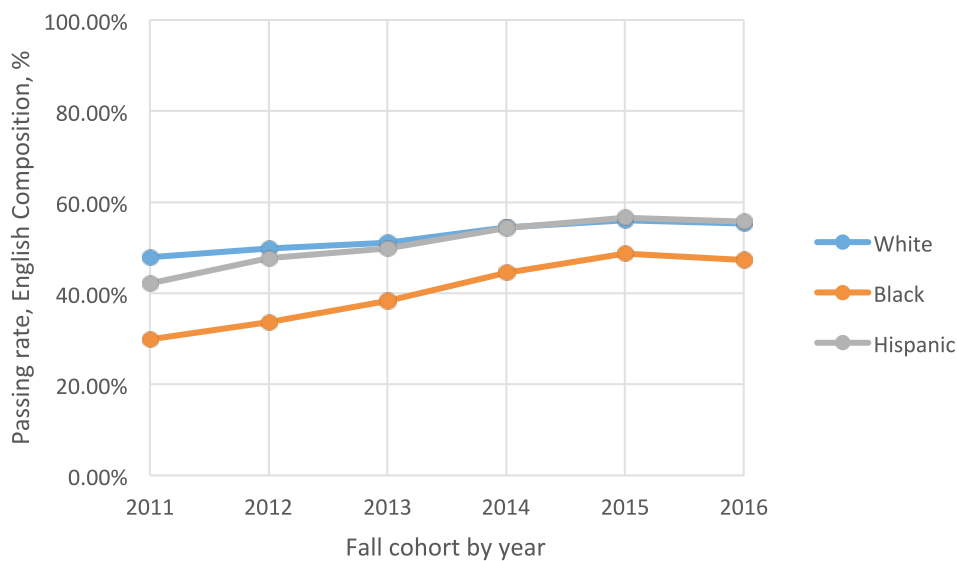
Figure 18. Cohort-based passing rates in English composition, by race/ethnicity

In terms of cohort-based passing rates in Intermediate Algebra, Hispanic students surpassed White students by 3.45 percentage points in 2016 (Table 28). Passing rates for Black students increased the sharpest between 2013 and 2014, by 4.96 percentage points. The gap between Black student performance and White student performance reduced slightly during the post-policy period with a difference of 2.01 percentage points in 2016.

Table 28. Cohort-based passing rates in intermediate algebra, by race/ethnicity

	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
Intermediate Algebra						
White						
Success Rate	18.62%	18.57%	21.08%	23.27%	26.28%	25.00%
Number of Success	5,540	5,026	5,717	6,111	6,747	5,881
Number of Students	29,757	27,069	27,124	26,261	25,673	23,522
Black						
Success Rate	12.29%	14.51%	16.13%	21.09%	24.41%	22.99%
Number of Success	1,989	1,949	2,389	2,966	3,269	2,988
Number of Students	16,180	13,432	14,809	14,065	13,391	12,998
Hispanic						
Success Rate	18.82%	20.97%	23.48%	27.24%	29.99%	28.45%
Number of Success	4,186	4,264	5,212	6,405	7,053	6,985
Number of Students	22,241	20,333	22,197	23,514	23,516	24,556

Figure 19 illustrates the pattern by race/ethnicity.

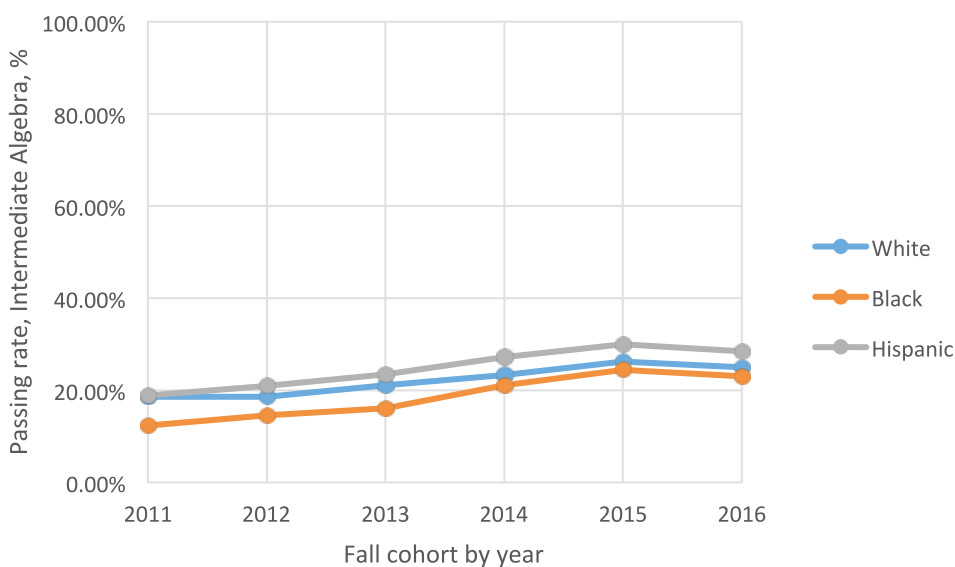Figure 19. Cohort-based passing rates in intermediate algebra, by race/ethnicity

In term of cohort-based passing rates in gateway math, Hispanic students caught up with White students three years into the policy implementation (Table 29). The gap between Black student performance and White student performance reduced slightly during the post-policy period. Between 2015 and 2016, Black students' passing rates remained unchanged.

Table 29. Cohort-based passing rates in gateway math, by race/ethnicity

	Pre-Policy			Post-Policy		
	2011	2012	2013	2014	2015	2016
Gateway Math Courses						
White						
Success Rate	17.86%	18.01%	18.99%	20.48%	24.15%	24.10%
Number of Success	5,316	4,875	5,150	5,378	6,199	5,668
Number of Students	29,757	27,069	27,124	26,261	25,673	23,522
Black						
Success Rate	7.00%	8.37%	9.56%	11.59%	13.99%	14.05%
Number of Success	1,132	1,124	1,416	1,630	1,873	1,826
Number of Students	16,180	13,432	14,809	14,065	13,391	12,998
Hispanic						
Success Rate	15.21%	16.55%	17.51%	19.28%	23.30%	24.79%
Number of Success	3,382	3,366	3,887	4,533	5,480	6,087
Number of Students	22,241	20,333	22,197	23,514	23,516	24,556

Figure 20 indicates these patterns by race/ethnicity.
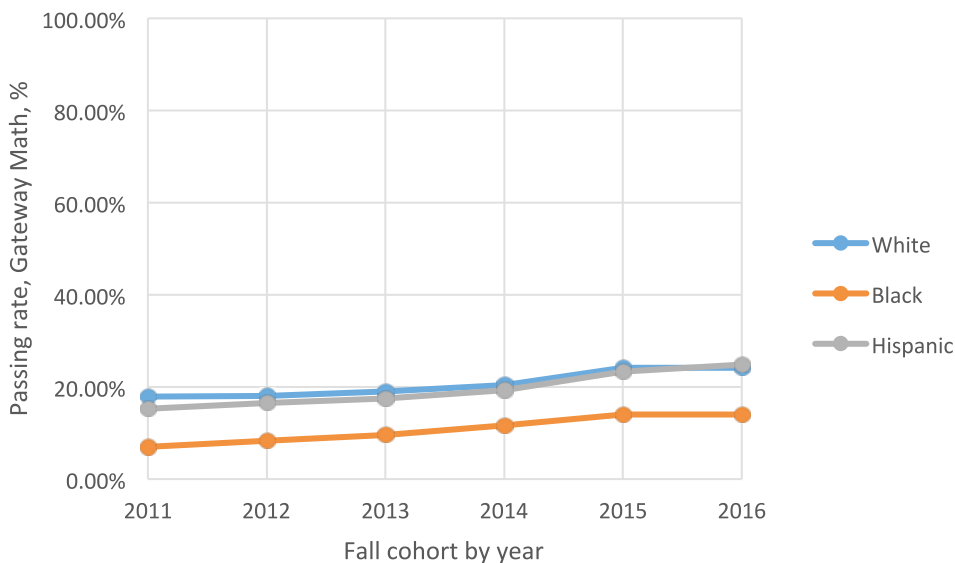
Figure 20. Cohort-based passing rates in gateway math, by race/ethnicity

Regression-Adjusted Findings Related to Introductory College-Level Cohort Passing Rates

Table 30 presents regression-adjusted cohort-based passing rates before and after the implementation of Florida's DE reform. Overall, we find that all three indicators for cohort-based passing rates increased significantly following the reform. Specifically, cohort based-basing rates increased by 3.38, 3.48, and 2.94 percentage points in English Composition, Intermediate Algebra, and combined gateway math courses, respectively. Of note is that following the reform, over half of the incoming cohorts were successfully taking and passing

gateway English courses within the first year, with nearly one in five students taking and passing gateway math courses.

Table 30. Predicted probabilities for cohort-based passing rates for introductory college-level courses before/after Florida's DE reform

	Pred. Prob. Pre-Reform	Pred. Prob. Post-Reform	Difference	
English				
ENC1101	47.85%	51.23%	3.38	***
Math				
MAT1033	19.71%	23.19%	3.48	***
Gateway Math	14.53%	17.47%	2.94	***

*Note: Significance reported for differences pre/post: ***p<0.001, **p<0.01, *p<0.05*

Table 31 presents the results from our set of models predicting differential cohort-based passing rates by race/ethnicity. Across the three panels, students of all racial/ethnic backgrounds experienced increased cohort-based passing rates in their English and math courses, with Black and Hispanic students seeing even greater increases than White students. For instance, Black students' passing rates in English Composition increased by 14.18 percentage points, which is 7.89 percentage points higher than the increase for White students. Further, Black students experienced gains that were 3.27 percentage points higher than White students in Intermediate Algebra.

Table 31. Predicted probabilities and marginal effects for cohort-based passing rates for introductory college-level courses, by race/ethnicity

	English Composition			
	2011-2013	2014-2016	Diff.	
Predicted Probabilities				
Black	33.36%	47.54%	14.18	***
Hispanic	46.44%	56.56%	10.12	***
White	49.76%	56.05%	6.29	***
Marginal Effects				
Black vs. White			7.89	***
Hispanic vs. White			3.83	***

	Intermediate Algebra			
	2011-2013	2014-2016	Diff.	
Predicted Probabilities				
Black	13.78%	22.52%	8.74	***
Hispanic	20.44%	28.05%	7.61	***
White	18.73%	24.20%	5.47	***
Marginal Effects				
Black vs. White			3.27	***
Hispanic vs. White			2.14	***

	Gateway Math			
	2011-2013	2014-2016	Diff.	
Predicted Probabilities				
Black	6.97%	11.76%	4.79	***
Hispanic	14.45%	20.76%	6.31	***
White	16.20%	21.17%	4.97	***
Marginal Effects				
Black vs. White			-0.18	
Hispanic vs. White			1.34	***

Note: Significance reported for differences pre/post: ***p<0.001, **p<0.01, *p<0.05

Findings Section 6: College-Level Credit Accumulation

Overall Findings Related to College-Level Credit Hour Accumulation in the First Year of Enrollment

We report the total number of college-level credit hours attempted and earned in the first (fall-spring) academic year for all students in each cohort (Table 32).

Table 32. College-level credit hours attempted and earned in the first year, all students

	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
Year One Attempted Credits	13.82	14.16	14.51	15.72	16.63	16.67
Year One Earned Credits	9.86	9.98	10.14	10.73	11.55	11.58
Number of Students	72,527	64,838	68,440	68,315	67,232	67,364

As shown in Table 32, total attempted and earned credit hours in the first year of enrollment for all students continued to increase in the post-policy period from 2014 to 2016. Figure 21 also indicates the increasing trend of college-level credit hours attempted and earned in the first year of enrollment.
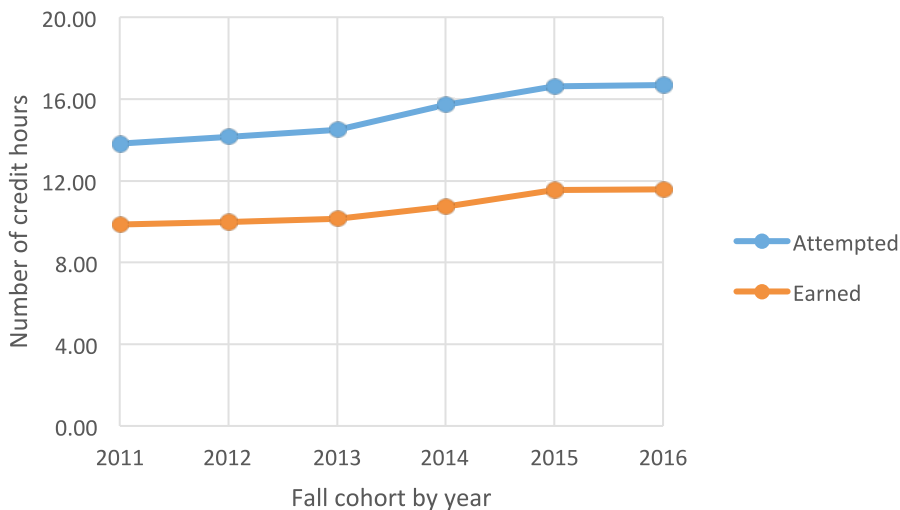

Figure 21. College-level credit hours attempted and earned in the first year, all students

Patterns by Race/Ethnicity Related to College-level Credit Hour Accumulation in the First Year of Enrollment

Table 33 reports total credit hours attempted and earned in the first year of enrollment by race/ethnicity. We focus the discussion of our results on the total number of credits earned. There was a small gap in credits earned between White and Hispanic students prior to the reform, but

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both groups perform similarly by 2016. There was a larger gap in credits earned between White and Black students prior to the reform, but this gap narrows after the reform. Figure indicates the increasing trend of college-level credit hours earned in the first year of enrollment by race/ethnicity.

Table 33. College-level credit hours attempted and earned in the first year, by race/ethnicity, all students

	Pre-policy			Post-policy		
	2011	2012	2013	2014	2015	2016
White						
Year One Attempted Credits	14.95	15.20	15.45	16.24	17.05	17.00
Year One Earned Credits	10.58	10.83	10.98	11.35	12.20	12.15
Number of Students	29,759	27,069	27,125	26,261	25,673	23,522
Black						
Year One Attempted Credits	11.37	11.56	12.07	14.17	15.23	15.18
Year One Earned Credits	6.86	7.31	7.57	8.48	9.16	9.10
Number of Students	16,181	13,432	14,809	14,065	13,391	12,998
Hispanic						
Year One Attempted Credits	13.79	14.25	14.67	15.92	16.75	17.05
Year One Earned Credits	9.90	10.36	10.52	11.17	11.94	12.23
Number of Students	22,242	20,333	22,198	23,514	23,516	24,556

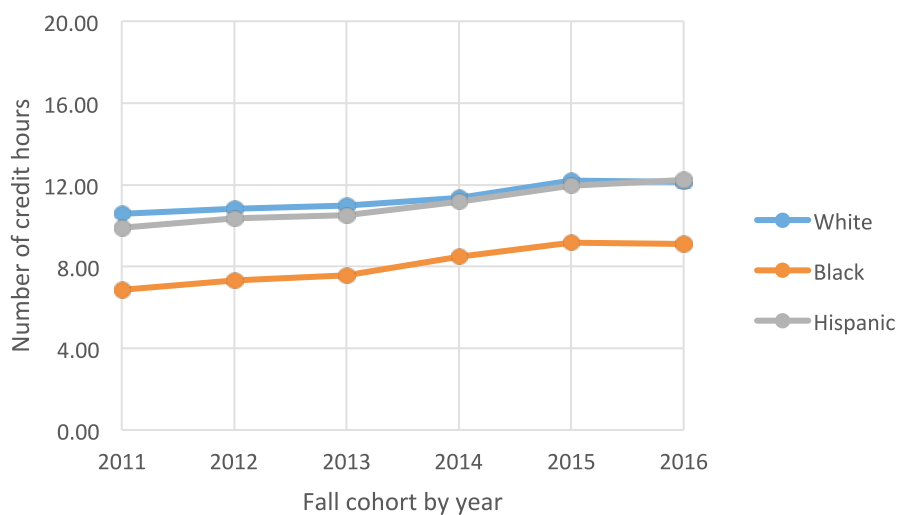Figure 22 illustrates the patterns by race/ethnicity.

Figure 22. College-level credit hours earned in the first year, by race/ethnicity, all students

Regression-Adjusted Findings Related to College-level Credit Hour Accumulation in the First Year of Enrollment

Table 34 presents our regression adjusted results for all students. Overall, we observe a base increase of 0.422 credits attempted and 0.397 credits earned for all students, regardless of race/ethnicity. Further, while credit accumulation is, on average, lower for Black and Hispanic students, compared to White students, we observe greater rates of change for Black and Hispanic students in the post-policy period (0.525 and 0.348 credits earned for Black and Hispanic students, respectively). Put differently, all students show increases in the number of credits accumulated over the first year in the post-policy period, with Black and Hispanic students having greater increases than White students.

Table 34. Regression-adjusted first-year college-level credits attempted and earned, by race/ethnicity

	Credits Attempted		Credits Completed	
Post	0.422	***	0.397	***
	(0.062)		(0.017)	
Black	-3.065	***	-2.819	***
	(0.048)		(0.049)	
Hispanic	-0.870	***	-0.300	***
	(0.042)		(0.044)	
Post*Black	1.595	***	0.525	***
	(0.068)		(0.070)	
Post*Hispanic	0.706	***	0.348	***
	(0.060)		(0.061)	
R2	0.173		0.133	

*p<0.05, **p<0.01, ***p<0.001*

Summary

Since the implementation of SB 1720 in fall 2014, developmental education course enrollment rates dropped and have continued to drop each year ever since, while developmental education course passing rates have remained relatively stable. At the same, introductory college-level course enrollment rates increased substantially following the implementation of SB 1720.

Overall outcome comparisons on introductory college-level course passing rates and first year credit hour accumulation before and after the 2014 developmental reform show impressive improvement of student progress. The reform seems to have helped mitigate the performance gap between White and minority students, contributing to equalizing postsecondary educational outcomes. To name a few, Hispanic students caught up and slightly outperformed White students in introductory college-level course passing rates and have almost gained equal footing with White students on first year credit accumulation. Black students also have experienced greatly reduced performance gaps on both outcomes post reform, compared to White students. Our findings from the regression analyses with an interrupted time series design provide further evidence that the changes we witnessed post-reform are not occurring due to random chance. Rather, the policy change does seem to be making consistent, substantive and positive impacts on overall student success and equity in student outcomes in the Florida College System.

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