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CENTRAL TEXAS  
**Student Futures**  
PROJECT

**The Influence of Activities and  
Coursework on Postsecondary  
Enrollment and One-Year Persistence  
for the Class of 2010**

# **The Influence of Activities and Coursework on Postsecondary Enrollment and One-Year Persistence for the Class of 2010**

**A Research Report of the Central Texas Student Futures  
Project**

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## LIST OF ACRONYMS

ACT	formerly, American College Testing Program
AP	Advanced Placement
BPGPA	GPA at end of 10th Grade between 70-80%
CTE/CATE	Career and Technology Education
ERC	Education Research Center
FAFSA	Free Application for Federal Student Aid
G/T	Gifted and Talented Program
GACC	Austin Chamber of Commerce
HS	High School
HLF	Hispanic, Low Income or First Generation
ISD	Independent School District
NSC	National Student Clearinghouse
PEIMS	Public Education Information Management System
PSAT	Preliminary Scholastic Aptitude Test
RMC	Ray Marshall Center for the Study of Human Resources
SAT	Scholastic Aptitude Test/Scholastic Assessment Test
SSN	Social Security Number
TAKS	Texas Assessment of Knowledge and Skills
TEA	Texas Education Agency
TG	formerly, Texas Guaranteed Student Loan Corporation
THECB	Texas Higher Education Coordinating Board
TWC	Texas Workforce Commission
UI	Unemployment Insurance

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## EXECUTIVE SUMMARY

### Background

The Central Texas Student Futures Project is a research partnership of the Ray Marshall Center and eleven Central Texas independent school districts (ISDs). This multi-year project follows the progress of Central Texas high school graduates as they make the critical transition from high school to postsecondary education and the labor market. This effort grew out of concerns among key education, business, workforce development and community stakeholders that the region's economy and its residents would not prosper in the near- and longer-term unless more of its graduates obtained higher levels of enrollment in postsecondary education and better labor market outcomes.

The Student Futures Project is but one part of a wider community effort to better understand and improve postsecondary outcomes for high school graduates. Regional efforts to improve postsecondary enrollment rates, while initially fruitful in the early years of the project which started in 2006, have stalled in recent years with approximately 60-62% of each graduating class enrolling in a college or university. This apparent lack of improvement from year to year stems in part from the large increase in the share of high school graduates from backgrounds that traditionally are less likely to enroll in college. Regionally, 31% of high school graduates qualify for free or reduced lunch, up from 26% of the graduating population of 2009 and 23% of the graduating population of 2008 (Cumpton et al., 2012). These increasing shares are concurrent with rapid regional growth in the number of high school graduates; more than 1,500 additional high school students have graduated from the region from 2008 to 2010. This large, steady regional increase in the share of low income students and the size of the graduating class provides some evidence of the incredible barriers the region faces when attempting to increase its direct to college enrollment rate.

Even with the regional increases, the vast majority of seniors (over 90%) surveyed in the spring of their final semester of school indicate a desire to go to college. However, only about 60% of high school graduates enroll in college the following fall. Recent work on understanding this aspiration gap has led in the last year to two regional projects: the Summer Melt project and this report. The Summer Melt project is an intervention designed to reduce barriers to college enrollment by providing supports to high school students in the summer after their graduation. While the Summer Melt project looks at the period just after

high school graduation, this report goes further back to examine and explores the relationship between 11th and 12th grade activities and coursework on postsecondary enrollment and one year persistence.

### **Findings for 2010 High School Graduates**

Using multinomial logistic regression and adjusted marginal predicted effects utilizing linked data from the Student Futures Project and the National Student Clearinghouse, this report finds that the 11th and 12th grade activities and courses examined in this report are closely linked to postsecondary enrollment and persistence. Nearly all of these factors are associated with postsecondary enrollment, even when accounting for academic performance in the first two years of high school. These courses and activities do not work in isolation, as the effects of several of these courses and activities are mediated when including them all in the model. Findings within this report include the following:

- ❖ Students who are Hispanic and/or low income and/or would be the first generation to go to college from 2008 through 2011 all enrolled in college at lower rates than their counterparts.
- ❖ Students with a GPA between 70-80% at the end of the 10th grade enroll in college at lower rates than students with a GPA about 80%.
- ❖ Since Algebra 2 was required for the recommended plan in Texas, over 90% of the class of 2010 took this course.
- ❖ In the region, 81% of students who received dual credit also took an Advanced Placement course.
- ❖ Only 51% of students who took a CATE course completed the FAFSA, compared with 59% of students who took Algebra 2 and 67% of students who took an Advanced Placement course.
- ❖ Hispanic, low income or first generation students are more likely to get help on more than one college related topic from their counselor than their counterparts.
- ❖ Hispanic, low income or first generation students and students with a GPA between 70-80% at the end of their 10th grade not only participate less frequently in key courses and activities known to be related to enrolling in college, those who do participate in these courses and activities are less likely to engage in multiples of them.
- ❖ When accounting for other 11th and 12th grade courses and activities, Algebra 2 is not positively associated with college enrollment for Hispanic, low income or first generation students.
- ❖ The following factors are associated with enrolling within a year from high school graduation for all populations examined:

- Taking an advanced math course,
  - taking an Advanced Placement course,
  - improving overall GPA,
  - completing the FAFSA,
  - taking an SAT/ACT preparation course and
  - Visiting a college while in high school.
- ❖ The model predicts that increasing participation in these activities increases the share of students enrolling in college after high school graduation.
  - ❖ The marginal effect of taking either an advanced math class or an Advanced Placement class is the same.
  - ❖ The influence of taking advanced math and/or Advanced Placement on predicted 4-year enrollment rises as 10th grade GPA increases, but reaches their peak effect with a GPA of roughly 85%.
  - ❖ The marginal effect on 4-year enrollment of taking an advanced math course, an Advanced Placement course, completing the FAFSA and improving overall GPA in the last two years of high school is equivalent to taking any of these three options in combination with each other.
  - ❖ Students with a 10th grade GPA just under 70% to just under 80% who take an Advanced Placement or advanced math course have a significantly higher predicted effect on 4-year enrollment than students who do not take an Advanced Placement course.

## Recommendations

These findings lead to several recommendations related to when college preparation services should begin to target students, and what types of students should be targeted. Additionally, course and activity recommendations that demonstrated consistency across models and across types of students are also included. Finally, process recommendations are also discussed.

- ❖ **Engage students at the beginning of their 11th grade year.**

One of the key questions for regional stakeholders is when to target students for services related to postsecondary enrollment. Findings in this report suggest that engaging the student at the beginning of their 11th grade year could produce significant impact on regional college enrollment rates.

- ❖ **Supports and services should target Hispanic, low income or first generation, and students whose GPA at the end of the 10th grade was between 70-80%.**

Another key question for regional stakeholders is how to identify students that might need academic or college process supports. This report finds demonstrates that these two populations of students are readily identifiable at the end of the 10th grade and likely to receive significant benefit from academic and college preparation supports.

❖ **Require students to take Algebra 2 as their default graduation program.**

In the policy environment of 2010, all students were required to take Algebra 2. This report finds that taking Algebra 2 is positively associated with postsecondary enrollment for most students, and is not negatively associated with college enrollment for any population of students. Additionally, many of the advanced courses demonstrated in this report require knowledge obtained in taking an Algebra 2 class.

❖ **Integrate financial aid concepts into CATE course curriculums.**

Only 51% of students who took a CATE course completed a FAFSA, the lowest rate of any course studied. These students are relatively easy to target within these classrooms and providing college financial aid and enrollment information would be beneficial.

❖ **Encourage all students to engage in the following courses and activities:**

- An advanced math course,
- An Advanced Placement course,
- Improve overall GPA after 10th grade,
- Complete the FAFSA,
- Take an SAT/ACT preparation course and,
- Visiting a college while in high school.

Time and again, participation in these activities is found to be related to postsecondary enrollment, across all populations examined and accounting for factors such as parental background, student characteristics, high school of graduation, academic background prior to the 9th grade, even including academic performance in the first two years of high school and any and all other 11th and 12th grade courses and activities.

❖ **Encourage participation in these courses and activities, but be mindful of student preferences and flexible in pursuing student participation in multiples of these activities.**

Students from backgrounds that have traditionally been less likely to enroll in college tend not only to participate in these activities at lower shares than their peers, but also in engaging in multiples of these activities. However, participating in each of these activities does not necessarily imply greater and greater returns for each additional course or activity. For example, the marginal effect of taking only an Advanced Placement course is equivalent to that of taking only an advanced math course.

❖ **Survey students about their college intentions as early as possible and continue to ask these questions over time.**

While this report provides recommendations regarding targeting students after their 10th grade year, one key factor not known about many students in the region at that time is their intention or interest in going to college or their plans for after high school if they do not intend to go to college. Surveying these students earlier might enable better targeting efforts which could improve regional enrollment rates.

## **Plans for the Future**

This analysis provides evidence of the importance of 11th and 12th grade courses and activities on postsecondary enrollment and one year persistence. Much of the critical data related to college enrollment activities, such as applications and completing the FAFSA were collected using survey data. Currently, the region has some access to additional data for analysis including administrative data such as FAFSA completion. Future analyses will likely include these new data. Additionally, future analytical reports will likely include additional cohorts of high school graduates.



## CHAPTER I. INTRODUCTION

### Project Overview

The Central Texas Student Futures Project is a research partnership of the Ray Marshall Center and eleven Central Texas independent school districts (ISDs). This multi-year project follows the progress of Central Texas high school graduates as they make the critical transition from high school to postsecondary education and the labor market. This effort grew out of concerns among key education, business, workforce development and community stakeholders that the region's economy and its residents would not prosper in the near- and longer-term unless more of its graduates obtained higher levels of enrollment in postsecondary education and better labor market outcomes.<sup>1</sup> The purpose of the Student Futures Project is two-fold:

- To provide Central Texas school districts, postsecondary education institutions and employers with comprehensive, longitudinal research on what local high school students do after high school, and how a variety of educational, personal and financial factors relate to their success in higher education and the workforce; and
- To foster best practices through workshops, seminars and applied research, assisting the region's ISDs and postsecondary institutions to increase the number of Central Texas youth who obtain 2-year and 4-year postsecondary education and workforce credentials (e.g., occupational certificates).

To determine what students plan to do after high school and the key influences on those outcomes, the Student Futures Project surveys seniors in the spring prior to graduation. Graduates' actual postsecondary education and work outcomes are computed annually (for at least four years) using postsecondary enrollment and employment records. To date, the Ray Marshall Center has published three reports that used multivariate statistical techniques to identify the factors most strongly associated with successful initial enrollment in both 4-year and 2-year postsecondary education for surveyed Central Texas high school graduates.

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<sup>1</sup> These concerns are outlined in the 2006 *Beyond the Numbers* report by King, Schexnayder, and Gourgey.



Those reports analyzed results for surveyed 2006, 2007, 2008 and 2009 graduates from Central Texas ISDs.

The Student Futures Project at the Ray Marshall Center is but one part of a wider community effort to better understand and improve postsecondary outcomes for high school graduates. Regional efforts to improve postsecondary enrollment rates, while initially fruitful in the early years of the project, have stalled in recent years with approximately 60-62% of each graduating class enrolling in a college or university. This apparent lack of improvement from year to year stems in part from the large increase in the share of high school graduates from backgrounds that traditionally are less likely to enroll in college. Meanwhile, the number and types of efforts to increase this direct to college transition rate have increased over the years. Financial Aid Saturdays, funded by the Greater Austin Chamber of Commerce (GACC) and conducted at high schools on several Saturdays in January through March, provide trained help for families in filling out and completing the Free Application for Federal Student Aid (FAFSA). GACC also hosts a monthly or semi-monthly meeting of the College Readiness and Enrollment Strike Team (CREST). This team of school district counselors and staff, local researchers and college leaders from across the region meet to discuss the barriers encountered by students as they transition to college with the aim of reducing those barriers or constructing supports to enable them to cross over those hurdles. In an effort to make it easier for school counselors to access pertinent college enrollment and preparation information, local school districts and the GACC are working with a private company, OneLogos, to implement usage of the Counselor Portal, which allows counselors the ability to readily see what help their students need in the college and financial aid application process. Previous work from the SFP demonstrated that students less likely to enroll in college, were less likely to ask their parents about applying to college and used counselor and other services at higher rates than their counterparts. All of these efforts are particularly important in the context of the regional growth of high school graduates from backgrounds that are less likely to enroll in college.

Even with the aforementioned regional growth, the vast majority of seniors (over 90%) surveyed in the spring of their final semester of school indicate a desire to go to college; however, only about 60% of high school graduates enroll in college the following fall. Recent work on understanding this aspiration gap has led in the last year to two regional projects: the Summer Melt project and this report. The Summer Melt program is an

intervention designed to reduce barriers to college enrollment by providing supports to high school students in the summer after their graduation. By providing these additional supports, regional stakeholders hope to see increases in the direct to college enrollment rate. While the Summer Melt project looks at the period just after high school graduation, this report goes further back to examine and explore the relationship between 11th and 12th grade activities and coursework on postsecondary enrollment and one year persistence. A short literature review follows this section which provides context for the 11th and 12th grade coursework and activities examined in this report. These aims stem in part from the extensive local work that has gone into removing college enrollment barriers for students within their senior year that have produced results (a larger share of students from backgrounds less likely to go to college are now enrolling in college) but not improved overall regional enrollment rates. Should efforts to provide supports go back a little further in time, to the 11th grade and/or should they continue after high school graduation? The hope is that by engaging in both of these strategies, the region will see improved direct to college and one year persistence rates.

### **Summary of Relevant Literature**

Earning a postsecondary credential has become increasingly important. According to the 2010 U.S. Census, 36.3% of persons 25-64 had an Associate's degree or higher. More than 60% of the United States did not have a postsecondary credential. It is forecasted that by the year 2018, 63% of the projected 46.8 million jobs created by the economy will require some postsecondary education credential. It is also projected that "the postsecondary system will have produced 3 million fewer college graduates than demanded by the labor force." (Carnevale, Smith, Strohl, 2010). Increasing postsecondary credential attainment is important to meet the supply of jobs, the demand for a qualified labor force and to help ensure economic stability.

College completion rates are not keeping pace with college enrollment rates. According to the National Information Center on Higher Education Policymaking and Analysis, approximately 55% of students who start a four-year bachelor's degree program complete in six years and about 30% of students who start at community college graduate with an Associate's degree in three years. Students are enrolling in college but many are not persisting and completing. With no postsecondary credential, those individuals will not have

the prerequisite to apply for, or to be eligible for, the majority of jobs that will require a postsecondary education.

Inadequate academic preparation, the design and implementation of remediation, the lack of or perceived lack of access to financial aid, convoluted college credit transfer policies, incentives on enrollment and not completion, are but a few of the argued reasons that point to the persistent gap between college enrollment and completion.

It is for this reason, among others, that efforts have been made to ensure students are graduating high school college-ready and are enrolling in, persisting through and completing some form of postsecondary education. Research has played a significant role in efforts to understand how policies, programs and initiatives influence college readiness and postsecondary enrollment. Researchers have conducted experiments, gathered data and evaluated efforts, from the K-12 perspective and the higher education perspective, for many purposes and among them has been to identify what factors influence and impact a student's college readiness and postsecondary and workforce outcomes.

Many factors have been identified that influence and impact postsecondary enrollment and success. In the original literature review for the Student Futures Project, King et al. (2006) and Schexnayder et al. (2006) identified five categories of background variables that influenced enrollment in postsecondary education: family background, student characteristics, pre-high school experiences, individual high school experiences and community and neighborhood effects. In the multivariate analysis of the Class of 2007 that consisted of eight Central Texas school districts, Schexnayder et al. (2009) identified personal, academic and social background factors associated with successful postsecondary transitions for all surveyed Central Texas graduates, regardless of the school district in which a high school was located. It also confirmed the importance of some variables on postsecondary enrollment from prior research (e.g., taking rigorous curricula, parents' education level, knowledge of the financial aid process) but found that some variables statistically linked to postsecondary enrollment in previous research (e.g., parental involvement, participation in some extracurricular activities) were no longer significant when using a more comprehensive set of student-level variables.

This literature review will focus on high school academic factors, particularly Advanced Placement, dual credit, and advanced mathematics courses and their relationship to postsecondary enrollment, persistence and completion. Adelman (1999, 2006) conducted

a study that assessed the relationship between high school characteristics and postsecondary outcomes. Using transcript data for a nationally representative cohort of students, Adelman found that a student's "academic resource," which consisted of class rank/GPA, achievement test scores and the intensity of their coursework was a significant predictor of college enrollment and completion. Of the three components, the intensity and quality of one's secondary curriculum was the strongest influence.

Advanced Placement, dual credit and advanced high school curriculum are all strategies being used to prepare students academically for success in college. Overall, these strategies have all been shown to be positively and significantly associated with college enrollment and completion.

### ***Dual Credit***

Dual credit is a type of dual enrollment program that allows high school students to take college courses and earn, upon passing, both high school and college credit. In its inception, like AP courses, dual credit was limited to advanced students but is increasingly serving more of the average-achieving student population (Karp et al., 2007). Studies on dual credit and its impact on postsecondary outcomes for students show positive and significant relationships with postsecondary outcomes. Although, according to Karp et al. (2007), most studies suffer from a lack of comprehensive data and use of non-rigorous methodologies that do not control for preexisting student characteristics and achievements.

The major findings of many dual enrollment studies have shown a positive relationship to enrollment in college, an increased likelihood of initially enrolling in a four-year college, a continuation to a second semester, an increased likelihood to earn more college credits than non-participating peers and an increased likelihood of degree attainment.

Karp et al. (2007) examined the impact of dual enrollment participation for CTE students in New York and for both CTE and non CTE students in Florida. They analyzed two existing large-scale administrative datasets, controlled for preexisting student characteristics and used non-experimental methods. They found positive relationships for college enrollment and persistence for all students who participated in dual credit courses including CTE dual enrollees. Other studies with the same or less rigor found similar relationships to college enrollment (Branco, Prescott, & Taylor, 2007; Speroni, 2011[1].)

More rigorous studies, which used regression discontinuity and propensity score matching, confirmed the findings of previous studies and added evidence that dual

enrollment also increased the likelihood of degree attainment (Speroni, 2011[1]; Speroni, 2011[2]; An, 2012; Giani, Alexander and Reyes, 2012; Struhl and Vargus, 2012).

Speroni (2011[2]) employed the quasi-experimental method of regression discontinuity to gauge the causal effects on students' likelihood of high school graduation, college enrollment and college completion in Florida. She found no evidence that simply taking a general dual enrollment course, a non-math or non-English course, improved marginal students' rates of high school graduation, college enrollment, or college degree attainment. However, "for students on the margin of participation in algebra, taking a challenging DE course—college algebra—had a large and significant effect on college enrollment and graduation rates."

Brian P. An (2012) assessed the influence of dual enrollment on college degree attainment by conducting a propensity score matching model to examine the impact of dual enrollment on college degree attainment, investigating if the impact varies by socio-economic status (SES) and assessing the effect dual enrollment had on reducing SES gaps in college degree attainment. He found that dual enrollment does increase the likelihood of degree attainment, even after accounting for covariates and that dual enrollment significantly benefits low income students in boosting rates of college degree attainment.

Struhl and Vargus (2012) used quasi-experimental methods, analyzing longitudinal data that followed Texas students for six years after high school graduation to examine both college enrollment and completion. They found that students who completed college courses through dual enrollment were significantly more likely to attend college, persist in college and complete an Associate's degree or higher within six years.

Giani, Alexander and Reyes (2012) estimated the impact of dual-credit courses on postsecondary access, first-to-second year persistence and college attainment. They also investigated how the estimated impact varied by the subject of the course, the number of courses completed and the type of student completing the course. They found that taking dual credit was positive and significant across all post-secondary outcomes of interest, but was more influential for college enrollment than completion. They also found that dual credit math was positively related to all post-secondary outcomes. Additionally, earning multiple dual credits increased the likelihood of college enrollment and completion beyond that of taking a single dual-credit course.

While these findings are beneficial and encouraging, there are still areas of clarification and research that need to be explored. Dual enrollment implementation varies. Some dual enrollment courses can be taught by a high school teacher or a college professor. They can be taught at a college campus or a high school campus. They can be for dual credit or no credit. Additionally, questions of the quality of dual enrollment courses should be captured and measured to get a better understanding of the impact dual enrollment has on postsecondary enrollment, persistence and completion.

### ***Advanced Placement Coursework***

Advanced Placement (AP) is a program run by the College Board that provides college-level courses to high school students. Unlike dual enrollment, AP courses are only offered on high school campuses and are taught by high school teachers. Upon finishing an AP course, a student can elect to take an AP exam for college credit. A score of three or higher earns the student college credit, depending on the credit policy of the postsecondary institution. Similar to dual credit, AP is also used as a strategy to increase college readiness, enrollment and success among high school students.

Many of the studies that investigate or explore the relationships between AP and postsecondary enrollment, persistence and completion show a positive relationship. In a comparison of the roles of AP and dual enrollment, Speroni (2011[1]) found that both AP and dual enrollment were strongly associated with an increased likelihood of enrolling in college after high school, enrollment in a four-year college and attainment of a bachelor's degree.

The College Board (2007) conducted a study that examined the performance and amount of coursework taken in subject areas that were close to those in which students took their AP exams, their graduation rates and their eventual college major. They found that those with an AP score of three or higher had higher grade point averages in intermediate courses than did the non-AP students who took introductory courses. They also found that AP students to a large extent graduate earlier than non-AP students. These findings were based on controlling for SAT scores, an attempt to control for academic achievement. A distinction between this study and others is that these findings are based on those students who passed an AP exam and not just those who participated in an AP course. In other words, AP students in this study refer to those who took and passed an AP exam.

Not all studies found such positive relationships. Klopenstein and Thomas (2006) investigated the validity of AP experience as a predictor of early college success, defined as second year retention and college success. Using Texas Schools Microdata, they found that for the average student, regardless of race and income, AP experience did not increase the likelihood of early college success beyond that predicted by non-AP curriculum. They did state, however, that on average, students who take an AP course do perform better in their first year of college than non-AP students.

Klopenstein and Thomas (2006) go on to point out that the latter finding, along with the findings of other studies that do not control for preexisting factors, including non-AP experiences are not reliable due to potential selection bias. Additionally, the College Board (2007) also points out that “No research, without a controlled experimental design, can definitively determine causal effects of advanced coursework in high school on the futures of secondary school students.”

Dougherty, Mellor and Jian (2006) explored the relationship between college graduation rates and a student’s participation and success in AP courses and exams, controlling for student demographics and achievements. They found that those who participate in AP and for those who participate in and pass an AP exam, are more likely to graduate from college than those who did not take an AP course.

While there are limitations to the studies on the impact of AP coursework, there is evidence that supports a positive relationship between AP coursework and postsecondary outcomes.

### ***Advanced Math Coursework***

Along with dual credit and AP coursework, taking advanced mathematics coursework, defined as any course above Algebra 2 (ACT, 2005; Choy et al., 2006; Adelman, 2006), is also a strategy used to help students graduate high school college-ready. Adelman stated that not only does the academic intensity of a student’s high school curriculum count for more than anything else in precollegiate history but also that “the highest level of mathematics reached in high school continues to be a key marker in precollegiate momentum, with a tipping point of momentum toward a bachelor’s degree now firmly above Algebra 2.” Additional studies have provided evidence supporting the importance of taking advanced mathematics coursework. Taking advanced mathematics coursework has been positively associated with the likelihood of one graduating from high

school (Schneider, Swanson and Crumb, 1998), enrolling in college (Schneider, Swanson and Crumb, 1998; Adelman 2006), and the likelihood of completing college (Adelman, 2006).

Schneider, Swanson and Crumb (1998), using national data, examined the educational outcomes of course sequences in high school and “explored the curricular dislocations within the context of school choice.” Of relevance to this literature review, they found that students with more of an advanced course sequence in the 12<sup>th</sup> grade are significantly more likely to attain some amount of postsecondary education. They also found that this effect is greater for students attending a four year college than a less than four year institution. Additionally, the greatest predictor of 12<sup>th</sup> grade coursework in mathematics is the student’s 10<sup>th</sup> grade mathematics course.

Culpepper et al. (2010) examined the relationship between high school mathematics and science courses and the performance in college mathematics and science courses. Performance in college mathematics and science is important to highlight because a large portion of student failure and academic probation is due to failure in college mathematics and science (Culpepper et al., 2010). Additionally, remediation courses in college increase time to degree and may have negative effects on college persistence and completion. This study found that students who completed trigonometry and lab-based chemistry tended to earn higher grades in college algebra and general chemistry respectively. Additionally, those who took calculus in high school also tended to earn high grades in college biology.

While taking advanced math coursework is beneficial, there is evidence that not all students benefit equally. Long, Iatarola and Conger (2009) wrote an article that examined the contribution of the highest math course taken in high school in Florida by race, socioeconomic status and gender to explain gaps in readiness for college level math, controlling for various characteristics and achievements prior to entering high school. They found that between 25-38 percent of black-white, Hispanic-white and poverty gaps in college readiness in math was explained by differences in math courses taken in high school. Additionally, they found that low-income, Black and Asian students saw a lower return to math courses, pointing to the possibility of a differentiation of educational quality for these students. The majority of research on advanced math courses has shown evidence of positive relations to postsecondary outcomes, regardless of demography.



As with any empirical research efforts, there are always limitations that prevent proving 100% causality. The research on dual enrollment, Advanced Placement and advanced math classes are not exempt. Yet, we can draw from the evidence and support to continue research efforts to enhance our understanding of the relationship between college readiness strategies and their impact on postsecondary outcomes. The Student Futures Project adds to the relevant research on postsecondary enrollment indicators by 1) considering these relationships at a regional, rather than state-wide level,<sup>2</sup> 2) utilizing survey data that may not have been available to this earlier research to account for factors such as parent educational background, and 3) considering coursework and activities outside of their isolation, for example many students who take dual credit courses in the region also take Advanced Placement courses. This work also adds to the relevant research on success indicators by examining not only direct to college enrollment, but, where relevant, enrollment in college within a year from graduating high school and one-year persistence in college.

### **Purpose and Organization of This Report**

School administrators, community leaders and researchers who advocate for improved programs and services related to college access and persistence often struggle with when such interventions should begin. Naturally, efforts to improve academic achievement should begin as early as possible. Additionally, initiatives designed to carry students over the informational and procedural hurdles of applying for and enrolling in college often focus on the senior year. Unfortunately, neither of these intervention time frames is perfect. Long-term efforts may prove costly for a community to sustain because they occur over many years, and results from such efforts take a long time to demonstrate success. Senior year efforts reach students with an established academic history, leaving capable but underperforming students with limited opportunities to improve themselves prior to being reviewed by admissions officers.

Many of the critical college-going decisions students make during high school occur after their first two years (their 9th and 10th grades). Students interested in taking advanced

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<sup>2</sup> Previous SFP work on the classes of 2008 and 2009 has shown that some factors associated with postsecondary enrollment at the state level differ from those in Central Texas (Cumpton et al., 2012).

coursework (including dual credit courses and Advanced Placement (AP) courses) often lack the opportunity to do so before the 11th grade as courses in the previous two years are intended to lay the foundation for further studies. Also, students who underperformed during their first two years of school may see the 11th and 12th grades as an opportunity to improve their grade point average (GPA). Students engaging in either or both of these strategies (taking advanced coursework and improving their GPA) likely do so, at least in part, in an effort to improve their chances of enrolling in their college of choice (college access) and increase their chances of remaining in college once enrolled (college persistence).

Additionally, nearly all the college application preparation and procedures occur during the last two years of high school including taking the PSAT, the SAT and/or ACT, completing financial aid paperwork and applying to colleges. Thus, this work supports previous literature that interventions designed to improve student college access and persistence focusing on coursework and application activities in the 11th and 12th grades might prove particularly helpful in improving aggregate postsecondary enrollment.

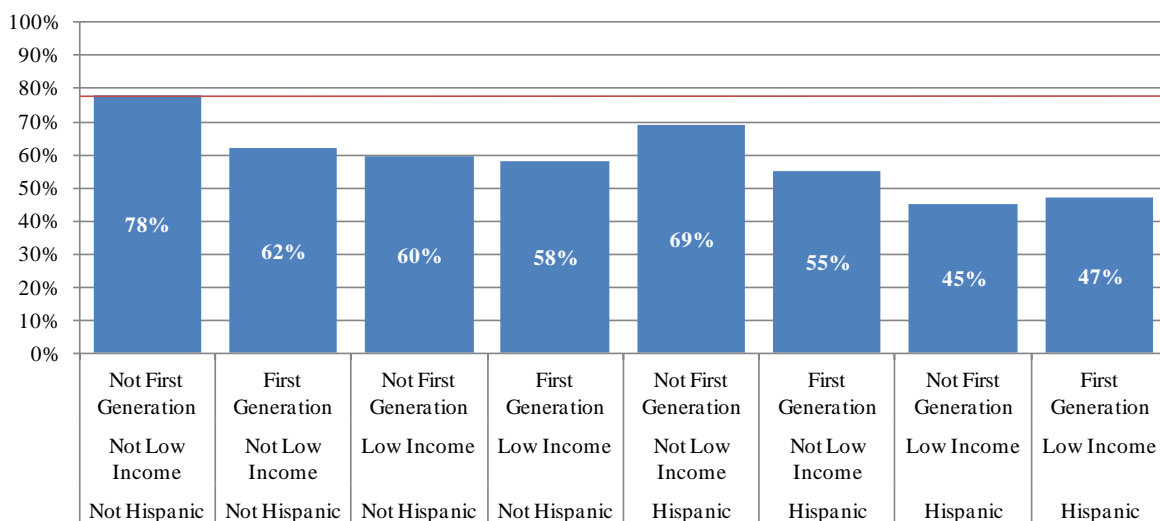
While the collective importance of the last two years of high school is apparent, much of the literature related to such coursework and activities examine them individually, in an effort to gauge their unique importance in relation to college access and persistence. The analysis contained within this report closely examines the 11th and 12th grade years of the Class of 2010 for school districts participating in the Central Texas Student Futures Project. In particular, this report:

- examines patterns of 11th and 12th grade coursework and activities;
- estimates the association of specific coursework and activities on postsecondary enrollment including direct to college enrollment, enrollment within a year from graduating high school and one year persistence; and
- estimates the cumulative association and the marginal effect of select 11th and 12th grade coursework and activities on postsecondary enrollment and one year persistence.

Thus, this report includes both a descriptive analysis (to examine and establish patterns of 11th and 12th grade coursework) and an enhanced multivariate analysis of 11th and 12th grade factors associated with successful transitions to college and one year college persistence.

In addition to examining when and how to target services to students, this report also explores to which students services should be targeted. Previous SFP work focused on several populations of interest, including Hispanic students, students qualified for free or reduced lunch (low income) and students who would be the first generation to go to college. Findings in these reports differentiated results related to these ostensibly different populations of students. These analyses implied differential approaches for improving student postsecondary enrollment. However, students are human beings who cannot always be readily categorized into specific groups; Hispanic students can also be low income students, low income students might also be first generation students. Placing each of these students into these categories and then differentiating services for them creates an unnecessary burden on school counselors and other staff. Figure 1 shows Central Texas high school outcomes for graduating cohorts from 2008 through 2011 broken down into Hispanic, low income and first generation status.

**Figure 1. Direct to College Enrollment Outcomes for the Classes of 2008 through 2011, by Hispanic, Low Income and First Generation Status**



Source: Student Futures Project data.

While students who are both low income and Hispanic have significantly lower initial postsecondary enrollment rates (45% or 47% depending on first generation status) than other groups, high school graduates with any combination of these three classifications enrolled in college at lower rates than students without any of these classifications. Throughout this report, students classified as Hispanic, low income or first generation (HLF) received

additional analyses. This is intended to provide insight into how best to provide services to this particular population of students in the region while removing as many barriers as possible for identification of these students at their respective campuses.

Another group identified for special analysis included in this report are students whose GPA at the end of their 10th grade year was between 70-80%. Interest in this group of students began as the analysis of this report progressed. Since many of the coursework and college preparation activities are mediated by student academic performance in the first two years of high school, it made logical sense to examine students along this spectrum. Based on their GPA, students are classified into four groups: those with a failing average GPA (below 60%), those with a barely failing GPA (between 60-70%), those with a barely passing GPA (between 70-80%), and those with a passing GPA (above 80%). A noticeable drop in the share of postsecondary enrollment occurs for students from the class of 2010 with a barely passing GPA [BPGPA] compared to those students with a passing GPA (Table 4). Since these students are readily identifiable by counselors and other campus staff, and because they would likely benefit from academic and other supports during their last two years of high school, researchers felt that performing additional analysis on these students would provide information that might help improve college access rates in the region.

The report is organized into six chapters and an appendix. Chapter II describes specific research questions, methods and data used in this analysis. The third chapter examines patterns of 11th and 12th grade coursework and activities and summarizes descriptive outcomes. Chapter IV examines the association of individual 11th and 12th grade coursework and activities on postsecondary enrollment, paying particular attention to whether and how 9th and 10th grade academic performance mediates these associations. Chapter V investigates the marginal effects and the cumulative association of 11th and 12th grade coursework and activities on postsecondary enrollment. Findings specifically related to populations of interest are included in each of these chapters. The final chapter summarizes findings from this report and identifies policy and practice implications. The technical appendix completes the report, providing details related to the methods and data used.

## CHAPTER II. RESEARCH QUESTIONS, METHODS AND DATA

This report is part of a series examining postsecondary transitions for Central Texas high school graduates. Previous reports described outcomes and factors associated with these outcomes for the classes of 2006, 2007, 2008 and 2009.<sup>3</sup> The primary research focus of the Student Futures Project is determining which factors from a collection of categories including family background and influences, student characteristics, pre-high school and individual high school experiences are statistically associated with graduates' postsecondary enrollment and persistence.

### Research Questions

This report addresses the following research questions for 2010 graduates:

1. What 11th and 12th grade coursework and activities both individually and cumulatively are statistically associated with graduates' postsecondary education outcomes?
2. How do these factors differ for specific populations of interest in the Central Texas region, including students who are either Hispanic, low income or first generation high school graduates and students whose GPA at the end of the 10th grade was between 70-80%?
3. How are these 11th and 12th grade activities on college access and persistence mediated by academic performance during the 9th and 10th grade years?

### Research Methods

To answer these questions and provide adequate context for their analysis, researchers use descriptive statistics, multinomial logistic regression and adjusted marginal predicted effects. The methods used to analyze these outcomes are briefly described below.

***Descriptive Statistics:*** Patterns of coursework and activities engaged in during the 11th and 12th grades for the region and all populations of interests are described to provide context for analyses that follow. Postsecondary outcomes, including direct to college enrollment, enrollment within a year of graduating high school and one year persistence are

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<sup>3</sup> Previous reports are available on the project website: <http://www.centexstudentfutures.org>.

described in the context of the relative importance of 11th and 12th grade coursework on these outcomes. Chapter III summarizes this information for respective research samples in this report.

***Multinomial Logistic Regression:*** Researchers employ multinomial logistic regression to determine the individual factors associated with postsecondary enrollment. Multinomial logistic regression accounts for the natural categorical nature of postsecondary enrollment outcomes, since students make choices about applying to and enrolling in either a 2-year or a 4-year school compared to not enrolling in any college. Previous SFP work indicated that factors associated with these two choices differ and that utilizing a binary outcome variable (enrolled in college or did not enroll in college) masks the importance of specific factors for each of these enrollment choices.<sup>4</sup>

The dependent variables consider student enrollment and one year persistence in the context of the type of initial college (2-year or 4-year) enrolled in. Models describing direct to college enrollment (in the fall following high school graduation) include three categories: enrolled in a 2-year college, enrolled in a 4-year college or university, or not enrolled. Models describing college enrollment within a year of graduating high school (in the fall or spring following high school graduation) include the same three categories. Models describing one year persistence (enrolled within a year, either the fall or the spring, from high school graduation and then enrolled in the following fall) include three categories: persisted in college having started in a 2-year college, persisted in college having started in a 4-year college or university, or did not persist in college having started in any type of college.

Explanatory variables in the regression models include coursework and activities from the 11th and 12th grades. Control variables include background characteristics, student characteristics and pre-high school experiences. Mediating variables include categorical variables describing academic performance in the 9th and 10th grades. The dataset construction section includes more detailed information on these. Results from the multinomial logistic regressions are presented in Chapter IV. The technical appendix presents a list of variables used in the model and their means.

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<sup>4</sup> Previous reports are available on the project website: <http://www.centexstudentfutures.org>.

After developing the multinomial logistic regression models mentioned above, researchers utilized an estimation technique called adjusted marginal predicted effects (AMPE). This method allows researchers to use the full model (with all control variables) and make adjustments to variables of interest without making changes to other variables. Say researchers wanted to estimate the effect of forcing all students to take an AP course on postsecondary enrollment. AMPE changes the value of that variable ("forcing" everyone to take an AP course) without changing the value of other variables in the model. Comparing this new predicted aggregate enrollment rate to the actual enrollment rate offers some indication of the likely effect of making all students take an AP course.<sup>5</sup> AMPE is particularly helpful in estimating the marginal and the cumulative effect of changing one or a group of variables under many circumstances on an outcome, since the value of variables can be changed together in an effort to gauge their mutual effect. Chapter V uses AMPE to examine the marginal and cumulative effect of relevant 11th and 12th grade coursework and activities on postsecondary enrollment and one year persistence.

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<sup>5</sup> This change only predicts student aggregate outcomes in relation to the model and so the predicted effect always includes relevant caveats. As described above, the estimated effect of forcing all students to take an AP course does not account for the availability of instructors to teach these courses or the capacity of school districts to hire them. Furthermore, ensuring 100% participation with any initiative is unlikely. Thus, the estimated effect of forcing all students to take an AP course is likely higher than the actual effect of such a policy.

## Construction and Description of the Research Datasets

The Class of 2010 contains over 13,072 students, and the research sample includes students who completed the senior exit survey (N=6,436).<sup>6</sup> Two smaller research samples are constructed from the first including students who are either Hispanic, low income or first generation [HLF] (N=2,959), and students whose 9th and 10th grade GPA was barely passing [BPGPA] (N=1,117). Analysis on one year persistence includes only students from each group who enrolled in college within a year from graduating high school, as shown in Table 1.

**Table 1. Multinomial Logistic Regression Model  
Analysis Samples for the Class of 2010**

<i>Survey Samples</i>	College Enrollment†	One Year Persistence
All Surveyed Students	6,436	5,016
Hispanic, Low Income or First Generation Students	2,959	2,062
Students with a GPA After 10th Grade between 70-80%	1,117	647

†Includes the following samples: direct to college enrollment and enrollment in college within a year from graduating high school.

Source: Student Futures Project data.

**Research Datasets:** The Ray Marshall Center collects Student Futures Project (SFP) data from a variety of sources and compiles it for reporting and research. The six research datasets contain surveyed seniors from the class of 2010. These datasets contain information collected by the school districts during students' senior year; this includes data reported to the state using the Public Education Information Management System (PEIMS), as well as transcript information collected and maintained by the school districts and a high school exit survey for a large sample of graduates. The Ray Marshall Center also links to employment

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<sup>6</sup> Analysis includes weights to adjust for student survey non-response, improving the predictive power of the senior exit survey sample. A description of the method used to account for survey non-response is included in the technical appendix.



information [using Texas Unemployment Insurance (UI) wage data] and obtains college enrollment information [using National Student Clearinghouse (NSC) data].

**Regression Models:** The research samples are utilized in a series of multinomial logistic regression models which vary depending on the chapter. A brief description of the explanatory variables of each model follows:

**Chapter IV Models** begin by examining the variable of interest (an 11th and 12th grade course or activity) without any control or mediating variables [Model 1]. Control variables are placed within the model to examine the extent to which the estimated effect of the variable of interest is attenuated by factors such as family background and student characteristics [Model 2]. A categorical variable describing 9th and 10th grade academic performance investigates the extent to which grades in the first two years of high school mediate the effect of the 11th and 12th grade course or activity on postsecondary enrollment [Model 3]. The final model in this progression includes all variables in the model, including other 11th and 12th grade courses and activities [Model 4].

**Chapter V Model** uses the final model presented in Chapter IV with the addition of several interaction terms to facilitate understanding of the interplay of engaging in one or more courses or activities.

### **Characteristics of 2010 Central Texas High School Graduates**

The demographic characteristics of the research samples are presented in Table 2. Regionally, 31% of high school graduates qualify for free or reduced lunch, up from 26% of the graduating population of 2009 and 23% of the graduating population of 2008 (Cumpton et al., 2012). These increasing shares are concurrent with rapid regional growth in the number of high school graduates; more than 1,500 additional high school students have graduated from the region from 2008 to 2010. This large, steady regional increase in the share of low income students and the size of the graduating class provides some evidence of the incredible barriers the region faces when attempting to increase its direct to college enrollment rate.

Not all high school graduates take the voluntary senior survey in their final semester of college; higher shares of white students take the survey compared to their representation in

the region, while lower shares of students qualifying for free lunch take the survey. These differences indicate the importance of weighting the survey for student non-response to account for the demographic differences between these groups within each high school. The sample of Hispanic, low income or first generation students who took the survey represent a population with a much larger share qualifying for free or reduced lunch (50%). The sample of students who were barely passing in the 10th grade are much more likely to be male (60%) rather than female (40%).

**Table 2. Demographic Characteristics of the Class of 2010 and Select Research Samples**

	Overall N	Survey Sample	HLF	BPGPA
<i>Ethnicity</i>				
Asian	5%	6%	4%	3%
African American	10%	8%	9%	15%
Hispanic	39%	31%	67%	46%
White	44%	53%	18%	35%
<i>Gender</i>				
Male	51%	50%	48%	60%
Female	49%	50%	52%	40%
<i>Income Status</i>				
Free Lunch	24%	17%	37%	29%
Reduced Lunch	7%	6%	13%	7%
Not Low Income	69%	77%	50%	64%

Source: Student Futures Project data.

### Data Limitations and Interpretations

There are always some limitations related to measuring student outcomes, including the absence of some postsecondary institutions from the National Student Clearinghouse (NSC) database and an inability to measure out-of-state employment and employment not covered by Texas UI wage records.<sup>7</sup> In-state employment (used to account for employment while in high school) is likely under-reported as some students (~ 10% for Central Texas) did

<sup>7</sup> In Texas, more than 95% of wage and salary employment is covered by UI. Gaps in coverage exist for those who are self-employed, including independent contractors, as well as employees of religious organizations, railroads, small farms and the military (Stevens, 2007).

not provide their SSNs to their high school; therefore, student records could not be linked with the UI wage records for this population of students.

### **CHAPTER III. OUTCOMES AND PATTERNS OF 11TH AND 12TH GRADE COURSEWORK AND ACTIVITIES FOR THE CLASS OF 2010**

This chapter examines postsecondary enrollment outcomes and the patterns of 11th and 12th grade coursework and activities for the class of 2010. This descriptive analysis includes students in each of the analysis samples. Outcomes are examined for direct to college enrollment, enrollment within a year from graduating high school and, for students who do enroll in college, whether they persisted in college and enrolled the following fall. The extent to which the research samples engaged in the coursework and activities examined in this study and the patterns of participating across multiples of these activities are also explored.

#### **Enrollment and Persistence Outcomes**

Initial enrollment outcomes are reported for 2010 graduates from Austin, Bastrop, Del Valle, Eanes, Hays, Hutto, Leander, Manor, Pflugerville, Round Rock and San Marcos ISDs (Table 3). Outcomes shown indicate that students who complete the senior survey are more likely to enroll in college than the population as a whole. The sample of Hispanic, low income or first generation [HLF] students that took the survey are less likely to enroll in college either directly or within a year from graduating high school compared to the survey sample as a whole. Students with poor but not, on average, failing academic performance in their first two years of high school are much less likely to enroll in college compared to the survey sample or to the region as a whole. Regionally, an additional 7% of high school graduates are found enrolled within a year from graduating high school compared to those who enrolled directly from high school. This trend is particularly noticeable for surveyed HLF and barely passing students whose within a year college enrollment are 8% and 9% points higher, respectively, than the share enrolled in the fall following high school graduation. These populations of students are marginally more likely to delay entry into college until the spring. While a majority of surveyed students who enrolled in college did so at a 4-year college within a year from graduating high school, equal shares of surveyed HLF students who enrolled in college did so at both 2- and 4-year colleges, and a larger share

of surveyed barely passing students who enrolled chose to do so at a 2-year college rather than a 4-year college or university.

If a high school graduate enrolls in college within a year from graduating high school (either in the fall or spring) and is subsequently enrolled the next fall (one year following high school graduation) that student is considered in this report to have persisted for one year. Persistence rates reflect the same dynamic as the other outcomes, with survey taking students who enrolled in college within a year from graduating high school being more likely to persist in college to the following fall compared to the population as a whole, to the sample of Hispanic, low income or first generation students who took the survey or to students who took the survey and had a GPA at the end of 10th grade between 70-80%.

**Table 3. College Enrollment and Persistence Outcomes for the Class of 2010 and Select Research Samples**

	Overall	Survey Sample	HLF	BPGPA
	13,072	6,436	2,959	1,117
<i>Direct to College</i>				
2-Year	23%	24%	27%	36%
4-Year	37%	48%	35%	13%
<b>Overall</b>	<b>60%</b>	<b>72%</b>	<b>62%</b>	<b>49%</b>
<i>Within a Year</i>				
2-Year	30%	30%	35%	44%
4-Year	37%	48%	35%	14%
<b>Overall</b>	<b>67%</b>	<b>78%</b>	<b>70%</b>	<b>58%</b>
<i>One-Year Persistence †</i>				
2-Year	26%	24%	30%	42%
4-Year	51%	58%	46%	21%
<b>Overall</b>	<b>77%</b>	<b>82%</b>	<b>76%</b>	<b>62%</b>

Sources: National Student Clearinghouse and Student Futures Project Data.

†Includes only students who enrolled within a year from high school graduation with sizes 8776, 5016, 2062 and 647 respectively. College types listed are the first type of institution student enrolled in.

The patterns indicated for the surveyed populations of HLF and barely passing students in Table 3 are also true for the entire population of HLF and barely passing students as shown in Table 4. The overall enrollment rates of HLF students (50% for direct to college

enrollment seen in Table 4) are lower than those for surveyed HLF students (62% for direct to college enrollment seen in Table 3). This pattern is also true for students who barely passed their 9th and 10th grade coursework. Non-HLF students are much more likely to enroll in a 4-year college (50%) compared to HLF students (25%), which accounts for most of the differences between their direct to college enrollment rates. Barely passing students are more likely to enroll in a 2-year college than passing students (29% vs. 22%) and are much less likely to enroll in a 4-year college compared to passing students (8% vs. 49%). A larger share of HLF students choose to enroll in the spring following high school graduation compared to non-HLF students (8% vs. 5%). This pattern also hold true for barely passing students who choose to enroll in the spring at a higher rate than students who's GPA in the 10th grade was above 80% (10% vs. 7%).

**Table 4. Initial Enrollment Outcomes for Populations of Interest (N=13,072)**

<i>Grade Categories</i>	<i>Direct to College</i>		<i>Enrolled Within a Year</i>	
	2-Year	4-Year	2-Year	4-Year
Barely Failing	20%	6%	29%	6%
Barely Passing	29%	8%	38%	9%
Passing	22%	49%	28%	50%
Hispanic, Low Income or First Generation	25%	25%	33%	25%
Neither Hispanic, Low Income nor First Generation	22%	50%	26%	51%

Sources. National Student Clearinghouse and Student Futures Project Data.

Initial enrollment outcomes by demographic characteristics are presented in Table 5. White and Asian students are more likely to enroll in college following high school graduation than Hispanic and African American students. All ethnicities except Hispanic students enroll in 4-year institutions at higher rates than 2-year colleges. Female students are more likely to enroll in college than male students (65% vs. 56% directly enrolled in college). While a larger share of male students enroll for the first time in the spring compared to female students (8% vs. 6%), this does not close the college enrollment gap between then genders. Students qualifying for free lunch are much less likely to directly

enroll in college than students who are not low income (42% vs. 67%) and are more likely to enroll in a 2-year college than a 4-year college.

**Table 5. College Enrollment Outcomes for the Class of 2010, by Demographic Characteristics (N=13,072)**

	<i>Direct to College</i>		<i>Enrolled Within a Year</i>	
	2-Year	4-Year	2-Year	4-Year
<i>Ethnicity</i>				
Asian	19%	57%	24%	58%
African American	25%	35%	32%	36%
Hispanic	25%	23%	33%	23%
White	22%	48%	27%	48%
<i>Gender</i>				
Male	23%	33%	30%	34%
Female	24%	41%	30%	41%
<i>Income Status</i>				
Free Lunch	23%	19%	32%	19%
Reduced Lunch	25%	29%	32%	30%
Not Low Income	23%	44%	29%	45%

Sources: National Student Clearinghouse and Student Futures Project data.

These demographic patterns in regards to college enrollment for the class of 2010 are consistent with those seen in all previous cohorts of high school graduates examined as part of the Student Futures Project. These patterns are also consistent for one year persistence rates (not shown) and for each of the research samples (also, not shown).

### **Activities Uptake and Outcomes**

This report examines various 11th and 12th grade courses, counselor interactions, college preparation activities and improvement in GPA from the end of 10th grade. These categories were chosen in conjunction, not only because of their importance in the literature, but also as an instructive way to divide the work of improving postsecondary enrollment rates among interested parties. High school teachers could receive training and work to identify students who may be capable of success at higher level courses, and then teach these

courses with the appropriate academic rigor. Counselors could use the results of this analysis to focus their college discussions with students. School district and community leaders could work together to improve access to appropriate college preparation activities that occur outside of the classroom and/or school setting. And finally, students could push themselves a little harder to take more difficult or specific coursework and do their best to perform better academically in the 11th and 12th grades compared to their first two years of high school.

The share of students from the region and for each of the samples who participated in these courses or activities is presented in Table 6. Algebra 2, being a required course for almost all of the students in this study, was widely taken, with over 90% of students attempting this class. Surveyed students are more likely to take an advanced math course and take an Advanced Placement course compared to all 2010 graduates (58% vs. 47% and 63% vs. 52%, respectively). Outside of these course-taking patterns, surveyed students are roughly just as likely to engage in specific counselor interactions and college preparation activities as the population as a whole. Hispanic, low income or first generation students [HLF] are less likely than the surveyed population as a whole to take an advanced math course or take an Advanced Placement course. Students who left 10th grade with a barely passing GPA [BPGPA], were much less likely than the surveyed population as a whole to take an advanced math course or an Advanced Placement course. As a group, these students were also less likely to engage in any college preparation activities than either the surveyed population or the overall population, but BPGPA students were more likely to improve their overall and math GPA than other examined groups.



**Table 6. Share of Students Participating in Select 11th and 12th Grade Courses and Activities, for Select Research Samples**

	N	Overall	Survey Sample	HLF	BPGPA
		13,072	6,436	2,959	1,117
<i>Coursework</i>					
Algebra 2		91%	97%	96%	91%
Any Advanced Math		47%	58%	45%	18%
Dual Credit		9%	9%	8%	3%
Advanced Placement		52%	63%	52%	30%
Career and Technology Course		17%	12%	15%	17%
<i>Counselor Interactions</i>					
College Applications		25%	23%	25%	22%
Scholarships		42%	42%	46%	33%
College Information		54%	56%	56%	51%
<i>College Preparation Activities</i>					
Completed FAFSA		57%	60%	63%	44%
Attended College Fair		50%	52%	48%	37%
Took SAT/ACT Prep Course		31%	32%	25%	24%
Visited a College		59%	63%	53%	41%
<i>Improvement in 11th and 12th Grade GPA</i>					
Overall GPA Improved		47%	47%	48%	68%
Math GPA Improved		39%	37%	39%	55%

Source: Student Futures Project Data.

### **Interplay of Activities**

Students rarely engage in any of these courses or activities in isolation; for example, some students take an advanced math course and they also complete the FAFSA. Table 7 demonstrates the relationships and challenges some commonly held assumptions about the share of students participating in multiples of these activities. For example, researchers often think of taking a dual credit course as one strategy of obtaining college credit prior to leaving high school and taking an Advanced Placement course as a separate strategy of obtaining college credit. In Central Texas, 81% of students who took a dual credit course also took an Advanced Placement course, perhaps demonstrating that students are hedging their bets for college credit by using two different methods to obtain it. Traditionally, CATE courses are geared for out of high school employment, but in Central Texas 55% of students who took a

CATE course also took an Advanced Placement course. However, 51% of CATE students completed a FAFSA, the lowest share for any of the other factors investigated; perhaps integrating or reaching out to CATE students in their classroom might help them improve their financial aid prospects.

Additionally, Table 7 provides some insight into avenues of clustered activities and coursework. Of students who took a dual credit course 73% also completed the FAFSA, perhaps indicating that time spent going through the community college application process demonstrated the importance of filing for financial aid. There is obvious synergy in some of these 11th and 12th grade activities. Of students who attended a college fair, visited a college, or took an advanced math class, 69% also completed the FAFSA. There is also evidence of the hard work of high school counselors: of students who indicated they sought help with scholarships from their counselor, 72% indicated they completed a FAFSA. In fact, just over half of students who completed a FAFSA (53%) indicated they spoke with their counselor about college scholarships. But there may be room for counselors to provide additional help: of those who met with their counselor about college information, 60% indicated they also spoke to their counselor about scholarships and only 39% indicated they spoke about college applications. While these are survey responses, it may make sense to cluster some of these related activities into one meeting.

**Table 7. Relationships of Select Activities and Coursework in the 11th and 12th Grades for the Class of 2010**

	<u>Coursework</u>					<u>Counselor Interactions</u>			<u>College Preparation Activities</u>				<u>Improvement in 11th and 12th</u>	
	Algebra 2	Advanced Math	Dual Credit	AP Course	Career and Tech Course	College Applications	Scholarships	College Information	Completed FAFSA	Attended College Fair	SAT/ACT Prep Course	Visited a College	Overall GPA Improved	Math GPA Improved
<i>Coursework</i>														
Algebra 2	100%	51%	9%	57%	18%	26%	43%	55%	59%	51%	32%	61%	46%	37%
Advanced Math	100%	100%	14%	83%	17%	28%	48%	58%	69%	61%	39%	75%	42%	32%
Dual Credit	99%	74%	100%	81%	23%	37%	54%	60%	73%	66%	36%	76%	39%	31%
AP Course	99%	74%	13%	100%	18%	28%	47%	58%	67%	61%	38%	72%	42%	33%
CATE Course	95%	45%	11%	55%	100%	46%	51%	56%	51%	53%	40%	55%	50%	42%
<i>Counselor Interactions</i>														
College Apps.	97%	56%	13%	64%	31%	100%	78%	83%	66%	63%	44%	69%	49%	37%
Scholarships	97%	59%	11%	65%	21%	47%	100%	78%	72%	62%	36%	69%	47%	37%
College Info.	96%	55%	10%	61%	18%	39%	60%	100%	63%	58%	36%	66%	48%	38%
<i>College Preparation Activities</i>														
Completed FAFSA	97%	62%	11%	68%	15%	29%	53%	61%	100%	60%	35%	72%	46%	36%
College Fair	98%	63%	12%	70%	18%	32%	52%	63%	69%	100%	40%	79%	46%	35%
SAT/ACT Course	98%	66%	10%	71%	22%	36%	49%	64%	64%	65%	100%	76%	46%	37%
Visited a College	97%	65%	11%	70%	16%	29%	49%	60%	69%	66%	39%	100%	46%	36%
<i>Improvement in 11th and 12th Grade GPA</i>														
Overall GPA Up	90%	41%	7%	47%	19%	26%	41%	55%	55%	49%	30%	57%	100%	60%
Math GPA Up	89%	39%	7%	45%	19%	24%	40%	54%	53%	46%	29%	56%	72%	100%

Source: Student Futures Project Data.

Note: This table is meant to be read horizontally. Percents represent the share of students who engaged in coursework or activities in a column (Advanced Math) as the numerator and who also engaged in coursework or activities in a row (Dual Credit) as the denominator; thus, 74% of students who took a dual credit course also took an advanced math course.

Tables 8 and 9 investigate how these shares of engaging in mutual activities differ for specific populations. Table 8 explores the differences for Hispanic, low income or first generation students to all other students. For example, not only are surveyed HLF students less likely to take an Advanced Placement course (see Table 6), if they do take one, they are less likely than non-HLF students to also take an advanced math course or visit a college. Regardless of the factor examined, HFL students are more likely than their counterparts to both engage in that activity or course and also obtain information from their counselor about scholarships. HLF students are more likely to get help on more than one topic from their counselor than non-HFL students.

Table 9 explores the differences in engaging in multiple activities for barely passing students compared to passing students. Not only are these students much less likely to complete a FAFSA or take an advanced math or Advanced Placement course (see Table 6), even students who do take an Advanced Placement course (and so may be better prepared for college level work) are much less likely to also complete a FAFSA compared to students with a 10th grade GPA above 80%. Not only do these students not take as many advanced courses, they do so in much more isolation than their peers, being more likely to take an advanced math course or an Advanced Placement course, but not both. However, because of their low 10th grade GPA, many of these students likely see improvements in the overall and math GPA compared to their counterparts, even when they do take more advanced coursework.

## **Summary**

A majority (60%) of students from the class of 2010 enrolled in college in the fall following graduation; a further 7% of the class of 2010 joined them in college the following spring. These enrollment rates noticeably varied depending on whether the student was Hispanic, low income or first generation, or if their GPA at the end of the 10th grade was between 70-80%. These enrollment rate differences are reflected in participation rates in relevant 11th and 12th grade activities, with a smaller share of each of these populations engaging in rigorous coursework, interactions with their counselor about college, college preparation activities. Additionally, HLF and BPGPA students who did engage in these

types of courses and activities were less likely to engage in multiples of these activities, for example taking an Advanced Placement course and visiting a college, than their counterparts. Because of their lower initial and mutual participation rates in these courses and activities these populations have higher burdens than their respective peers to overcome if their college enrollment rates are to improve.

**Table 8. Differences in Relationships of Select Activities and Coursework in the 11th and 12th Grades for the Class of 2010 between Hispanic, Low Income or First Generation Students Compared to All Others**

	<u>Coursework</u>				<u>Counselor Interactions</u>			<u>College Preparation Activities</u>				<u>Improvement in 11th and 12th</u>		
	Algebra 2	Advan- ced Math	Dual Credit	AP Course	Career and Tech Course	College Applica- tions	Scholar- ships	College Infor- mation	Completed FAFSA	Attended College Fair	SAT/ACT Prep Course	Visited a College	Overall GPA Improved	Math GPA Improved
<i>Coursework</i>														
Algebra 2	0%	-24%	-2%	-21%	9%	6%	8%	2%	4%	-7%	-12%	-17%	3%	6%
Advanced Math	0%	0%	0%	-10%	10%	7%	12%	4%	13%	-4%	-9%	-13%	1%	0%
Dual Credit	-1%	-15%	0%	-10%	20%	18%	16%	9%	13%	2%	-1%	-9%	6%	2%
AP Course	0%	-16%	0%	0%	12%	8%	12%	5%	10%	-2%	-9%	-12%	1%	0%
CATE Course	-3%	-22%	1%	-15%	0%	8%	9%	9%	-1%	-4%	-14%	-14%	5%	9%
<i>Counselor Interactions</i>														
College Apps.	-2%	-23%	0%	-20%	15%	0%	12%	6%	5%	-6%	-11%	-16%	1%	5%
Scholarships	-2%	-23%	-2%	-20%	10%	9%	0%	6%	3%	-5%	-8%	-14%	4%	5%
College Info.	-3%	-24%	-1%	-20%	11%	9%	13%	0%	7%	-6%	-13%	-16%	2%	4%
<i>College Preparation Activities</i>														
Completed FAFSA	-3%	-22%	-1%	-20%	7%	6%	8%	5%	0%	-6%	-8%	-16%	2%	4%
College Fair	-3%	-23%	-1%	-18%	11%	8%	12%	5%	8%	0%	-12%	-13%	1%	2%
SAT/ACT Course	-2%	-19%	1%	-15%	13%	13%	17%	5%	15%	-3%	0%	-15%	-1%	3%
Visited a College	-3%	-22%	-1%	-17%	9%	8%	13%	5%	10%	-1%	-11%	0%	1%	2%
<i>Improvement in 11th and 12th Grade GPA</i>														
Overall GPA Up	-6%	-24%	-2%	-22%	9%	5%	8%	2%	4%	-9%	-14%	-18%	0%	6%
Math GPA Up	-6%	-28%	-3%	-26%	9%	5%	6%	0%	2%	-10%	-13%	-21%	0%	0%

Source: Student Futures Project data.

Note: These differences represent the difference in the share of activities engaged in between these two groups. Thus, the share of HLF students who took an advanced math course who also took an AP course was ten percent less than the share of non-HLF students who took an advanced math course and also took an AP course.

**Table 9. Differences in Relationships of Select Activities and Coursework in the 11th and 12th Grades for the Class of 2010 between Barely Passing Students Compared to Passing Students.**

	<u>Coursework</u>				<u>Counselor Interactions</u>				<u>College Preparation Activities</u>				<u>Improvement in 11th and 12th</u>	
	Algebra 2	Advan- ced Math	Dual Credit	AP Course	Career and Tech Course	College Applica- tions	Scholar- ships	College Infor- mation	Completed FAFSA	Attended College Fair	SAT/ACT Prep Course	Visited a College	Overall GPA Improved	Math GPA Improved
<i>Coursework</i>														
Algebra 2	0%	-49%	-7%	-43%	3%	-2%	-9%	-6%	-20%	-20%	-12%	-27%	24%	21%
Advanced Math	0%	0%	-6%	-25%	2%	3%	-8%	2%	-15%	-9%	-1%	-21%	38%	26%
Dual Credit	-3%	-48%	0%	-45%	9%	-5%	-15%	-11%	-28%	-10%	-11%	-25%	29%	25%
AP Course	-2%	-46%	-8%	0%	6%	2%	-8%	1%	-16%	-11%	-6%	-21%	31%	20%
Career Tech Course	-9%	-49%	-10%	-41%	0%	-5%	-7%	-1%	-23%	-23%	-18%	-24%	23%	22%
<i>Counselor Interactions</i>														
College Apps.	-8%	-48%	-10%	-41%	9%	0%	2%	1%	-17%	-14%	-8%	-21%	21%	21%
Scholarships	-7%	-52%	-8%	-44%	9%	10%	0%	3%	-18%	-18%	-8%	-23%	20%	21%
College Info.	-9%	-48%	-8%	-41%	8%	2%	-6%	0%	-18%	-18%	-10%	-25%	23%	21%
<i>College Preparation Activities</i>														
Completed FAFSA	-9%	-52%	-8%	-44%	3%	1%	-7%	-2%	0%	-18%	-6%	-22%	25%	22%
College Fair	-8%	-49%	-7%	-40%	5%	4%	-6%	0%	-17%	0%	-9%	-16%	27%	23%
SAT/ACT Course	-7%	-48%	-7%	-39%	5%	6%	-2%	2%	-9%	-14%	0%	-24%	24%	19%
Visited a College	-9%	-53%	-7%	-43%	5%	2%	-6%	-2%	-15%	-11%	-11%	0%	24%	22%
<i>Improvement in 11th and 12th Grade GPA</i>														
Overall GPA Up	-14%	-46%	-7%	-40%	2%	-4%	-14%	-9%	-21%	-20%	-13%	-27%	0%	16%
Math GPA Up	-16%	-46%	-7%	-43%	2%	-3%	-12%	-9%	-21%	-20%	-14%	-28%	14%	0%

Source: Student Futures Project data.

Note: These differences represent the difference in the share of activities engaged in between these two groups. Thus, the share of barely passing students who took an advanced math course who also took an AP course was six percent less than the share of passing students who took an advanced math course and also took an AP course.

## **CHAPTER IV. THE ASSOCIATION OF 11TH AND 12TH GRADE COURSEWORK AND ACTIVITIES ON POSTSECONDARY ENROLLMENT AND PERSISTENCE**

This chapter utilizes multiple models to tease out the effect of individual 11th and 12th grade courses and activities identified in previous literature to be related to postsecondary enrollment. Two sections examine 4-year and 2-year outcomes, respectively. Within each of these sections, the relationship of these variables is examined for direct to college enrollment, enrollment in college within a year from graduating high school, and for students who did enroll in college whether they persisted to the following fall (one year persistence). Results for Hispanic, low income or first generation students [HLF] and students whose GPA at the end of 10th grade was between 70-80% [BPGPA] are integrated into these sections.

Each of the four models discussed in each table fulfills a specific function. The first model examines whether the 11th and 12th grade course or activity is significantly related to a particular outcome (say direct to college enrollment). The second model includes information on family background, student characteristics, pre-high school academic characteristics, a campus-level dummy variable and other non-academic activities engaged in during high school.<sup>8</sup> The second model controls for these factors to account for selection bias; for example, students whose parents graduated from college may be more likely to enroll in an advanced math course than students whose parents do not have that background because, long before high school, the college-educated parents indicated the need for taking advanced coursework. Accounting for selection bias is particularly important, since these factors cannot be changed by efforts during the high school years. The third model examines which 11th and 12th grade factors are mediated by 9th and 10th grade course performance. It seems likely that taking advanced coursework improves college-related knowledge and skills, which thus might provide additional opportunities for college acceptance and persistence compared to not taking advanced coursework. However, students without a strong academic foundation might see much less benefit from taking such courses than students with a better academic background. Thus the strength of the academic background mediates the effect of taking advanced courses. It is important to examine this mediation,

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<sup>8</sup> A list of relevant variables included in these models and their means is in Appendix A.



since school districts may set policies related to a specific set of courses and, where 9th and 10th grade academic performance mediates the effect of a course or activity, district policies should reflect this. The fourth model includes all the variables identified above and also includes all the 11th and 12th grade coursework and activities variables. This final model reflects the complexity of examining the effect of 11th and 12th grade activities on postsecondary enrollment and persistence, since students may choose several types of courses examined and engage in multiple activities related to enrolling and persisting in college.

### **Enrollment in 4-Year Colleges or Universities**

Table 10 describes the 11th and 12th grade factors related to direct to college enrollment. This table, and those that follow in this chapter, include many separate analyses and place them into the same context. Variables listed under Model 1,2 and 3 each represent a separate multinomial logistic regression so results in each column represent 14 individual regressions, for a total of 42 regressions across all three models. Model 1 results show the estimate of the variable when no other independent variables are included. Model 2 results show the estimate of the variable if both the variable and the control variables are included. Model 3 results show the estimate of the variable if controls and the mediating variables are included. Model 4 results are for a single regression that includes all variables in all of three of the previous models.

**Table 10. Factors Associated with Direct to College Enrollment in 4 Year Colleges†  
(N=6,436)<sup>9</sup>**

	Model 1	Model 2	Model 3	Model 4
<i>Coursework</i>				
Algebra 2	60.35 ***	18.38 ***	12.57 ***	10.52 ***
Any Advanced Math	7.84 ***	3.57 ***	2.81 ***	1.79 ***
Dual Credit	2.70 ***	2.05 ***	1.85 ***	1.27
Advanced Placement	7.73 ***	3.51 ***	3.05 ***	2.24 ***
Career and Technology Course	0.58 ***	1.13	1.17	1.18
<i>Counselor Interactions</i>				
College Applications	1.65 ***	1.84 ***	1.78 ***	1.15
Scholarships	2.23 ***	2.20 ***	2.11 ***	1.40 ***
College Information	1.75 ***	1.53 ***	1.53 ***	1.09
<i>College Preparation Activities</i>				
Completed FAFSA	4.09 ***	4.20 ***	4.05 ***	2.89 ***
Attended College Fair	3.12 ***	2.20 ***	2.12 ***	1.19 *
Took SAT/ACT Prep Course	2.64 ***	1.76 ***	1.74 ***	1.36 ***
Visited a College	7.15 ***	3.98 ***	3.79 ***	2.68 ***
<i>Improvement in 11th and 12th Grade GPA</i>				
Overall GPA Improved	0.85 **	1.15	1.46 ***	1.39 ***
Math GPA Improved	0.74 ***	0.96	1.28 **	1.16
Controls		X	X	X
Grade Performance in 9th and 10th Grade (Mediating Variables)			X	X
All 11th and 12th Grade Variables				X

†Compared to not being enrolled.

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

Students who graduated in 2010 were required to take and pass an Algebra 2 class in order to graduate on the recommended (college preparatory) plan. In order to graduate on the minimum plan (and hence, remove the Algebra 2 course requirement) students needed to have their parents accept this change from the default recommended plan. Thus, students who did not take Algebra 2 were very unlikely to either plan to go to college or to eventually enroll in college. Thus the large estimated Direct effect of Algebra 2 on direct to college enrollment stems from the fact that students who did not take Algebra 2 were much less likely to enroll in any college. However, these results are presented to remind the reader of the complexity

<sup>9</sup> The numbers in these models represent relative risk ratios from multinomial logistic regressions. For convenience to the reader, only the direction of these associations and their statistical significance are discussed in this section.

of this type of analysis along with the fact that Algebra 2 is a pre-requisite for taking any advanced math course and for some Advanced Placement courses; without taking this course, other college preparatory courses may not be available.

The effects of coursework, including Algebra 2, advanced math, dual credit and Advanced Placement on 4-year direct to college enrollment, are reduced with the addition of the mediating variables, meaning that academic performance prior to the 10th grade mediates the effect of these courses. The effect of counselor interactions and college preparation activities are only slightly reduced by including academic performance to the 10th grade. Once this early high school academic performance is included, improvement in grade performance in the last two years of high school shows a positive relationship to enrolling in college. Even accounting for all controls and mediating variables in Model 3, each of the 11th and 12th grade courses and activities, saving taking a CATE course, is positively associated with 4-year direct to college enrollment.

However, 11th and 12th grade courses and activities do not usually occur in complete isolation as discussed in the previous chapter; Model 4 demonstrates that accounting for engaging in any of these activities (rather than any single one of these activities) eliminates many positive associations with directly enrolling in a 4-year college or university. This difference likely stems from students' engagement in more than one of these courses and activities. Thus, taking Algebra 2, an advanced math course and/or an Advanced Placement course, improving overall GPA, discussing college scholarships with your counselor, completing the FAFSA, attending a college fair, taking an SAT/ACT preparation course and visiting a college while in high school are all positively associated with directly enrolling in a 4-year college or university.

**Table 11. Factors Associated with Direct to College Enrollment in 4 Year Colleges†, for Hispanic, Low Income or First Generation Students (N=2,959)**

	Model 1	Model 2	Model 3	Model 4
<i>Coursework</i>				
Algebra 2	101.87 ***	28.16 **	13.85 *	15.95
Any Advanced Math	7.90 ***	4.13 ***	3.18 ***	1.97 ***
Dual Credit	3.84 ***	2.38 ***	2.10 **	1.17
Advanced Placement	7.88 ***	4.04 ***	3.34 ***	2.34 ***
Career and Technology Course	0.57 ***	0.98	1.03	0.99
<i>Counselor Interactions</i>				
College Applications	2.01 ***	2.32 ***	2.23 ***	1.44 *
Scholarships	2.90 ***	2.48 ***	2.28 ***	1.16
College Information	2.14 ***	1.89 ***	1.88 ***	1.29
<i>College Preparation Activities</i>				
Completed FAFSA	9.04 ***	7.49 ***	7.06 ***	4.55 ***
Attended College Fair	3.58 ***	2.66 ***	2.46 ***	1.32 *
Took SAT/ACT Prep Course	2.41 ***	1.99 ***	1.94 ***	1.26
Visited a College	5.99 ***	4.03 ***	3.84 ***	2.47 ***
<i>Improvement in 11th and 12th Grade GPA</i>				
Overall GPA Improved	0.80 *	1.19	1.64 ***	1.53 **
Math GPA Improved	0.61 ***	0.89	1.19	1.07
Controls		X	X	X
Grade Performance in 9th and 10th Grade (Mediating Variables)			X	X
All 11th and 12th Grade Variables				X

†Compared to not being enrolled.

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

For HLF students, we see similar effects and patterns across all courses and activities through Model 3 (Table 11). The effects of Algebra 2 are significantly attenuated by the addition of mediating variables, meaning that academic performance prior to the 10th grade mediates the effect of Algebra 2 for HLF students. Model 4 demonstrates that accounting for engaging in any of these activities eliminates many positive associations with directly enrolling in a 4-year college or university. In particular, HLF students see no effect on direct to college enrollment for taking Algebra 2 or for taking an ACT/SAT preparation course, a notable difference compared to the surveyed population as a whole. HLF students see an effect on direct to college enrollment from visiting with a counselor about college applications, though no other counselor interactions are statistically related to direct to

college enrollment. Thus, taking an advanced math course and/or an Advanced Placement course, improving overall GPA, discussing college applications with a counselor, completing the FAFSA, attending a college fair and visiting a college while in high school are all positively associated with directly enrolling in a 4-year college or university for Hispanic, low income or first generation students.

**Table 12. Factors Associated with Direct to College Enrollment in 4 Year Colleges†, for Students with a GPA between 70-80% at the End of the 10th Grade (N=1,117)**

	Model 1	Model 2	Model 3	Model 4
<i>Coursework</i>				
Algebra 2	25.19 **	11.66 *	9.98 *	7.35
Any Advanced Math	9.06 ***	5.57 ***	5.63 ***	3.18 ***
Dual Credit	2.63	3.55	3.84	3.00
Advanced Placement	5.63 ***	4.08 ***	4.15 ***	2.54 **
Career and Technology Course	0.45 *	0.42	0.38 *	0.35
<i>Counselor Interactions</i>				
College Applications	1.90 **	1.50	1.44	0.56
Scholarships	1.83 **	2.30 **	2.35 **	1.85
College Information	1.97 ***	1.57	1.52	0.83
<i>College Preparation Activities</i>				
Completed FAFSA	5.32 ***	7.36 ***	7.49 ***	6.24 ***
Attended College Fair	4.55 ***	3.85 ***	3.87 ***	1.65
Took SAT/ACT Prep Course	4.80 ***	2.48 ***	2.34 **	1.89 *
Visited a College	6.01 ***	4.10 ***	4.19 ***	2.67 ***
<i>Improvement in 11th and 12th Grade GPA</i>				
Overall GPA Improved	2.83 ***	2.92 ***	2.98 ***	2.61 **
Math GPA Improved	0.84	1.08	1.18	0.85
Controls		X	X	X
Grade Performance in 9th and 10th Grade (Mediating Variables)			X	X
All 11th and 12th Grade Variables				X

†Compared to not being enrolled.

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

For BPGPA students analyzed in Table 12, fewer coursework and activities are initially shown to be statistically significant; there is no evidence that taking a dual credit course improves the odds of enrolling directly in college. The addition of mediating variables in Model 3 amplifies the effect of taking advanced coursework (advanced math or

Advanced Placement) on direct to college enrollment. Model 4 demonstrates that accounting for engaging in all 11th and 12th grade activities eliminates the effect of many seemingly positive associations for BPGPA students with directly enrolling in a 4-year college or university, including taking Algebra 2, a CATE course, visiting with your counselor about scholarships and attending a college fair. BPGPA students see a particularly large effect for completing the FAFSA, which this population completes at comparatively low rates (see Table 6).

**Table 13. Factors Associated with College Enrollment in 4 Year Colleges Within a Year from Graduating High School† (N=6,436)**

	Model 1	Model 2	Model 3	Model 4
<i>Coursework</i>				
Algebra 2	57.72 ***	16.58 ***	10.76 ***	8.46 ***
Any Advanced Math	8.59 ***	3.90 ***	3.02 ***	1.91 ***
Dual Credit	2.75 ***	2.02 ***	1.82 ***	1.19
Advanced Placement	7.97 ***	3.49 ***	3.01 ***	2.13 ***
Career and Technology Course	0.57 ***	1.09	1.13	1.12
<i>Counselor Interactions</i>				
College Applications	1.83 ***	2.08 ***	2.01 ***	1.24
Scholarships	2.37 ***	2.33 ***	2.22 ***	1.38 **
College Information	1.88 ***	1.63 ***	1.62 ***	1.12
<i>College Preparation Activities</i>				
Completed FAFSA	4.50 ***	4.62 ***	4.44 ***	3.08 ***
Attended College Fair	3.49 ***	2.44 ***	2.35 ***	1.28 **
Took SAT/ACT Prep Course	3.05 ***	2.01 ***	1.99 ***	1.52 ***
Visited a College	7.77 ***	4.24 ***	4.03 ***	2.71 ***
<i>Improvement in 11th and 12th Grade GPA</i>				
Overall GPA Improved	0.88 *	1.17	1.52 ***	1.44 ***
Math GPA Improved	0.72 ***	0.93	1.25 *	1.13
Controls		X	X	X
Grade Performance in 9th and 10th Grade (Mediating Variables)			X	X
All 11th and 12th Grade Variables				X

†Compared to not being enrolled.

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

Factors associated with enrolling in a college within a year from graduating from high school for survey takers show similar associations to factors associated with direct to college

enrollment (Table 13). Model 4 affirms the results found in Table 10; taking Algebra 2, an advanced math course and/or an Advanced Placement course, improving overall GPA, discussing college scholarships with your counselor, completing the FAFSA, attending a college fair, taking an SAT/ACT preparation course and visiting a college while in high school are all positively associated with directly enrolling in a 4-year college or university for the class of 2010.

**Table 14. Factors Associated with College Enrollment in 4 Year Colleges† Within a Year of Graduating from High School, for Hispanic, Low Income or First Generation Students (N=2,959)**

	Model 1	Model 2	Model 3	Model 4
<i>Coursework</i>				
Algebra 2	121.96 ***	32.13 **	15.40 *	17.76
Any Advanced Math	9.08 ***	5.06 ***	3.87 ***	2.42 ***
Dual Credit	4.25 ***	2.54 ***	2.24 **	1.16
Advanced Placement	8.05 ***	4.03 ***	3.29 ***	2.14 ***
Career and Technology Course	0.55 ***	0.91	0.97	0.88
<i>Counselor Interactions</i>				
College Applications	2.29 ***	2.78 ***	2.67 ***	1.66 **
Scholarships	3.09 ***	2.63 ***	2.41 ***	1.10
College Information	2.32 ***	2.05 ***	2.04 ***	1.33
<i>College Preparation Activities</i>				
Completed FAFSA	9.88 ***	8.04 ***	7.55 ***	4.64 ***
Attended College Fair	4.03 ***	2.98 ***	2.76 ***	1.45 **
Took SAT/ACT Prep Course	2.77 ***	2.32 ***	2.26 ***	1.41 *
Visited a College	6.39 ***	4.29 ***	4.10 ***	2.48 ***
<i>Improvement in 11th and 12th Grade GPA</i>				
Overall GPA Improved	0.87	1.28 *	1.81 ***	1.67 ***
Math GPA Improved	0.60 ***	0.87	1.21	1.06
Controls		X	X	X
Grade Performance in 9th and 10th Grade (Mediating Variables)			X	X
All 11th and 12th Grade Variables				X

†Compared to not being enrolled.

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

Factors associated with enrollment in college within a year from graduating high school for HLF students also closely parallels those associated with direct to college

enrollment (Table 14). However, HLF students who take an SAT/ACT preparation course are more likely to enroll in college within a year; this activity was not associated with direct to college enrollment. Otherwise, taking an advanced math course and/or an Advanced Placement course, improving overall GPA, discussing college applications with your counselor, completing the FAFSA, attending a college fair and visiting a college while in high school are all positively associated with enrolling in a 4-year college or university within a year from graduating high school for Hispanic, low income or first generation students.

**Table 15. Factors Associated with College Enrollment in 4 Year Colleges† Within a Year from Graduating High School, for Students with a GPA between 70-80% at the End of the 10th Grade (N=1,117)**

	Model 1	Model 2	Model 3	Model 4
<i>Coursework</i>				
Algebra 2	29.92 ***	13.68 *	11.75 *	8.23
Any Advanced Math	9.09 ***	5.43 ***	5.38 ***	2.91 **
Dual Credit	3.45 *	6.24 *	6.73 **	5.00 *
Advanced Placement	5.70 ***	3.99 ***	4.05 ***	2.35 **
Career and Technology Course	0.44 **	0.50	0.46	0.41
<i>Counselor Interactions</i>				
College Applications	2.08 ***	1.68	1.60	0.62
Scholarships	1.96 ***	2.44 ***	2.51 ***	1.95
College Information	1.94 ***	1.44	1.40	0.70
<i>College Preparation Activities</i>				
Completed FAFSA	5.74 ***	7.92 ***	8.11 ***	6.47 ***
Attended College Fair	4.84 ***	3.93 ***	3.95 ***	1.69
Took SAT/ACT Prep Course	5.36 ***	2.78 ***	2.66 ***	2.13 *
Visited a College	6.27 ***	4.26 ***	4.30 ***	2.65 ***
<i>Improvement in 11th and 12th Grade GPA</i>				
Overall GPA Improved	2.56 ***	2.61 ***	2.64 ***	2.26 *
Math GPA Improved	0.76	0.97	1.07	0.82
Controls		X	X	X
Grade Performance in 9th and 10th Grade (Mediating Variables)			X	X
All 11th and 12th Grade Variables				X

†Compared to not being enrolled.

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



Factors associated with enrollment in college within a year from graduating high school for BPGPA students also closely parallels those associated with direct to college enrollment (Table 15). However, BPGA students who take a dual credit course are more likely to enroll in college within a year; this activity was not associated with direct to college enrollment, though this may be due to the relatively small size of this group. Otherwise, taking an advanced math course and/or an Advanced Placement course, improving overall GPA, completing the FAFSA, taking an SAT/ACT preparation course and visiting a college while in high school are all positively associated with enrolling in a 4-year college or university within a year from graduating high school for students with a GPA between 70-80% at the end of the 10th grade.

### **One Year Persistence in 4-Year Colleges or Universities**

Students who enroll in a college or university within a year from graduating high school and then enroll in college the following fall are considered to have persisted in college for one year. The association of 11th and 12th grade activities on one year persistence provides an indication that these activities continue to fulfill a purpose for students even after they have enrolled in college. If student academic performance in the 9th and 10th grades mediate 11th and 12th grade activities' influence on one year persistence, this provides some evidence of either the need to reach out to students even earlier (prior to the 11th grade) or to provide additional educational supports to students after their 10th grade. Table 16 demonstrates just that; the influence of courses on one year persistence for students who enroll in a 4-year college or university is attenuated by academic performance in the first two years of college.

Algebra 2, which appeared to play a significant role in postsecondary enrollment, does not influence one year persistence when considering all courses and activities engaged in during the 11th and 12th grades. Dual credit, which was only associated with enrolling in college within a year from high school graduation, appears to play a role in one year persistence for all enrolled students. Additionally, meeting with a counselor about scholarships, already found to be associated with direct to college and enrollment in college within a year from graduating high school for the surveyed population, continues to influence student relationship with college, being positively associated with one year persistence. Taking any advanced mathematics course, Advanced Placement course, taking an SAT/ACT

prep course, visiting a college while in high school and improving overall GPA are all positively associated with one year persistence.

**Table 16. Factors Associated with One Year Persistence in 4 Year Colleges† (N=5,016)**

	Model 1	Model 2	Model 3	Model 4
<i>Coursework</i>				
Algebra 2	17.05 ***	5.70 ***	4.46 **	2.87
Any Advanced Math	7.04 ***	3.66 ***	2.86 ***	1.93 ***
Dual Credit	2.17 ***	2.08 ***	1.95 ***	1.48 *
Advanced Placement	7.23 ***	3.79 ***	3.33 ***	2.65 ***
Career and Technology Course	0.61 ***	0.66	0.69	0.69
<i>Counselor Interactions</i>				
College Applications	1.20 *	1.26 *	1.23	0.89
Scholarships	1.62 ***	1.71 ***	1.65 ***	1.37 **
College Information	1.24 **	1.23 *	1.21 *	0.99
<i>College Preparation Activities</i>				
Completed FAFSA	2.18 ***	2.59 ***	2.54 ***	1.91 ***
Attended College Fair	2.18 ***	1.81 ***	1.77 ***	1.14
Took SAT/ACT Prep Course	2.18 ***	1.51 ***	1.54 ***	1.29 *
Visited a College	5.20 ***	3.40 ***	3.20 ***	2.48 ***
<i>Improvement in 11th and 12th Grade GPA</i>				
Overall GPA Improved	0.88	1.12	1.45 ***	1.46 ***
Math GPA Improved	0.82 *	0.97	1.27 *	1.16
Controls		X	X	X
Grade Performance in 9th and 10th Grade (Mediating Variables)			X	X
All 11th and 12th Grade Variables				X

†Compared to not being enrolled.

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

Hispanic, low income or first generation students who take an advanced math course, Advanced Placement course, complete the FAFSA, improve overall GPA or visit a college while in high school are more likely to persist to their sophomore year (Table 17). Notably, once other 11th and 12th grade courses and activities are taken into account, meeting with a counselor about scholarships is not associated with one year persistence for HLF students, though completing a FAFSA retains its statistically significant association.

**Table 17. Factors Associated with One Year Persistence in 4 Year Colleges†, for Hispanic, Low Income or First Generation Students (N=2,062)**

	Model 1	Model 2	Model 3	Model 4
<i>Coursework</i>				
Algebra 2	32.48 ***	7.83	4.55	3.46
Any Advanced Math	5.94 ***	3.58 ***	2.86 ***	1.75 **
Dual Credit	2.24 ***	1.78 *	1.70 *	1.10
Advanced Placement	7.29 ***	4.98 ***	4.35 ***	3.54 ***
Career and Technology Course	0.56 ***	0.66	0.73	0.72
<i>Counselor Interactions</i>				
College Applications	1.24	1.31	1.26	0.95
Scholarships	1.96 ***	1.87 ***	1.74 ***	1.26
College Information	1.47 ***	1.46 **	1.41 *	1.19
<i>College Preparation Activities</i>				
Completed FAFSA	3.79 ***	3.64 ***	3.56 ***	2.55 ***
Attended College Fair	2.01 ***	1.61 ***	1.52 **	0.94
Took SAT/ACT Prep Course	1.77 ***	1.54 **	1.57 **	1.18
Visited a College	4.32 ***	3.29 ***	3.21 ***	2.59 ***
<i>Improvement in 11th and 12th Grade GPA</i>				
Overall GPA Improved	0.77 *	1.09	1.45 *	1.47 *
Math GPA Improved	0.68 **	0.98	1.26	1.20
Controls		X	X	X
Grade Performance in 9th and 10th Grade (Mediating Variables)			X	X
All 11th and 12th Grade Variables				X

†Compared to not being enrolled.

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

While the share of barely passing students taking Advanced Placement courses during their 11th and 12th grades is lower than that of the region and to the share of HLF (Table 6), those that have taken an AP do see a significant benefit, as this is the only type of course associated with one year persistence for these students (Table 18). Completing the FAFSA, visiting a college or improving overall GPA are all positively associated with one year persistence.

**Table 18. Factors Associated with One Year Persistence in 4 Year Colleges†, for Students with a GPA between 70-80% at the End of the 10th Grade (N=647)**

	Model 1	Model 2	Model 3	Model 4
<i>Coursework</i>				
Algebra 2	7.74 *	3.65	3.02	2.52
Any Advanced Math	5.52 ***	3.77 ***	3.79 ***	1.82
Dual Credit	1.31	0.91	1.05	0.82
Advanced Placement	7.55 ***	8.27 ***	8.88 ***	7.10 ***
Career and Technology Course	0.52	0.53	0.51	0.41
<i>Counselor Interactions</i>				
College Applications	1.39	1.41	1.33	0.81
Scholarships	1.00	1.44	1.48	1.46
College Information	1.19	1.07	1.06	0.57
<i>College Preparation Activities</i>				
Completed FAFSA	2.33 ***	3.69 ***	3.81 ***	3.17 **
Attended College Fair	3.13 ***	2.91 ***	2.82 ***	1.54
Took SAT/ACT Prep Course	3.80 ***	2.15 *	2.07 *	1.40
Visited a College	5.40 ***	4.36 ***	4.13 ***	2.97 **
<i>Improvement in 11th and 12th Grade GPA</i>				
Overall GPA Improved	3.19 ***	3.26 ***	3.36 ***	4.20 ***
Math GPA Improved	0.99	1.18	1.16	0.69
Controls		X	X	X
Grade Performance in 9th and 10th Grade (Mediating Variables)			X	X
All 11th and 12th Grade Variables				X

†Compared to not being enrolled.

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

## Enrollment in 2-Year Colleges

Many of the courses and activities investigated in the literature and examined in this report are known to be related to enrolling and persisting in 4-year colleges. Table 18 demonstrates that some of these courses and activities are also associated with enrolling in a 2-year college within a year from graduating high school.<sup>10</sup> Note that comparing Model 2 to Model 3 shows that academic performance in the first two years of high school only slightly

<sup>10</sup> Multivariate results examining directly enrolling in a 2-year college very closely parallel those examining enrolling in a 2-year college within a year from graduating high school. For the convenience of the reader, only the later are included in this report.

mediates the effect of courses and other 11th and 12th grade activities. Taking Algebra 2, obtaining college information from a counselor, completing the FAFSA or improving overall GPA are also positively associated with directly enrolling in a 2-year college.

**Table 19. Factors Associated with College Enrollment in 2 Year Colleges† Within a Year of Graduating from High School (N=6,436)**

	Model 1	Model 2	Model 3	Model 4
<i>Coursework</i>				
Algebra 2	3.28 ***	2.74 ***	2.53 ***	2.35 ***
Any Advanced Math	1.38 ***	1.32 **	1.32 **	1.18
Dual Credit	1.34	1.30	1.31	1.10
Advanced Placement	1.27 **	1.18	1.17	1.04
Career and Technology Course	0.80 *	1.22	1.23	1.20
<i>Counselor Interactions</i>				
College Applications	1.37 ***	1.61 ***	1.60 ***	1.21
Scholarships	1.44 ***	1.48 ***	1.47 ***	1.08
College Information	1.66 ***	1.55 ***	1.55 ***	1.31 **
<i>College Preparation Activities</i>				
Completed FAFSA	1.80 ***	1.85 ***	1.83 ***	1.64 ***
Attended College Fair	1.44 ***	1.39 ***	1.37 ***	1.19
Took SAT/ACT Prep Course	1.41 ***	1.31 **	1.29 **	1.14
Visited a College	1.29 ***	1.09	1.10	0.90
<i>Improvement in 11th and 12th Grade GPA</i>				
Overall GPA Improved	1.25 **	1.28 **	1.36 ***	1.35 ***
Math GPA Improved	0.94	0.99	1.03	0.95
Controls		X	X	X
Grade Performance in 9th and 10th Grade (Mediating Variables)			X	X
All 11th and 12th Grade Variables				X

†Compared to not being enrolled.

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

Examining factors associated with 4-year college enrollment within a year of graduating high school for Hispanic, low income or first generation students reveal that additional factors may be associated with 2-year enrollment for these students (Table 20). Taking an advanced math course, receiving college information from a counselor and attending a college fair are all positively associated with 2-year enrollment for these students. Factors identified in Table 19 also apply to HLF students; taking Algebra 2, obtaining

college information from a counselor, completing the FAFSA or improving overall GPA are all positively associated with directly enrolling in a 2-year college.

**Table 20. Factors Associated with College Enrollment in 2 Year Colleges† Within a Year of Graduating from High School, for Hispanic, Low Income or First Generation Students (N=2,959)**

	Model 1	Model 2	Model 3	Model 4
<i>Coursework</i>				
Algebra 2	4.11 ***	3.35 ***	3.08 ***	2.80 ***
Any Advanced Math	1.64 ***	1.66 ***	1.61 ***	1.38 *
Dual Credit	2.00 **	1.91 *	1.91 *	1.43
Advanced Placement	1.43 ***	1.27 *	1.22	1.01
Career and Technology Course	0.78 *	1.14	1.15	1.05
<i>Counselor Interactions</i>				
College Applications	1.55 ***	1.88 ***	1.86 ***	1.34
Scholarships	1.62 ***	1.60 ***	1.57 ***	1.00
College Information	1.75 ***	1.68 ***	1.67 ***	1.33 *
<i>College Preparation Activities</i>				
Completed FAFSA	2.34 ***	2.34 ***	2.29 ***	1.91 ***
Attended College Fair	1.74 ***	1.65 ***	1.61 ***	1.31 *
Took SAT/ACT Prep Course	1.51 ***	1.49 **	1.45 **	1.15
Visited a College	1.37 **	1.25 *	1.24 *	0.93
<i>Improvement in 11th and 12th Grade GPA</i>				
Overall GPA Improved	1.35 **	1.39 **	1.53 ***	1.47 **
Math GPA Improved	0.89	0.91	0.98	0.87
Controls		X	X	X
Grade Performance in 9th and 10th Grade (Mediating Variables)			X	X
All 11th and 12th Grade Variables				X

†Compared to not being enrolled.

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

Students with a GPA between 70-80% at the end of 10th grade are more likely to enroll in a 2-year college rather than a 4-year college or university (Table 3). For these students, taking Algebra 2 or a dual credit course are strongly and positively associated with enrolling in a 2-year college within a year from high school graduation. Additionally, completing a FAFSA or improving overall GPA are also positively associated with 2-year

enrollment when accounting for all controls, mediating variables and other 11th and 12th grade courses and activities.

**Table 21. Factors Associated with College Enrollment in 2 Year Colleges† Within a Year from Graduating High School, for Students with a GPA between 70-80% at the End of the 10th Grade (N=1,117)**

	Model 1	Model 2	Model 3	Model 4
<i>Coursework</i>				
Algebra 2	3.49 ***	3.37 ***	3.26 ***	3.23 ***
Any Advanced Math	1.76 **	1.81 *	1.83 *	1.33
Dual Credit	2.92 *	6.27 **	6.21 **	4.82 **
Advanced Placement	1.41 *	1.39	1.38	1.08
Career and Technology Course	0.99	1.24	1.23	1.19
<i>Counselor Interactions</i>				
College Applications	1.61 **	1.58 *	1.57 *	1.15
Scholarships	1.54 **	1.45 *	1.44 *	1.08
College Information	1.55 ***	1.29	1.29	1.00
<i>College Preparation Activities</i>				
Completed FAFSA	2.57 ***	2.68 ***	2.65 ***	2.45 ***
Attended College Fair	1.64 ***	1.42 *	1.42 *	1.09
Took SAT/ACT Prep Course	1.83 ***	1.44	1.40	1.20
Visited a College	1.34 *	1.22	1.23	1.04
<i>Improvement in 11th and 12th Grade GPA</i>				
Overall GPA Improved	1.46 **	1.54 **	1.57 **	1.54 *
Math GPA Improved	0.84	0.95	1.01	0.93
Controls		X	X	X
Grade Performance in 9th and 10th Grade (Mediating Variables)			X	X
All 11th and 12th Grade Variables				X

†Compared to not being enrolled.

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

### One Year Persistence in 2-Year Colleges

Several factors are associated with one year persistence in 2-year colleges (Table 22). Taking an Advanced Placement course and improving overall GPA are both positively associated with 2-year persistence. Students who indicated they visited a college while in high school appear less likely to persist in a 2-year college.

**Table 22. Factors Associated with One Year Persistence in 2 Year Colleges† (N=5,016)**

	Model 1	Model 2	Model 3	Model 4
<i>Coursework</i>				
Algebra 2	1.29	1.24	1.27	1.21
Any Advanced Math	1.20 *	1.27 *	1.26 *	1.22
Dual Credit	1.06	1.23	1.25	1.20
Advanced Placement	1.25 *	1.36 **	1.35 **	1.34 **
Career and Technology Course	0.90	0.87	0.89	0.90
<i>Counselor Interactions</i>				
College Applications	0.86	0.91	0.90	0.84
Scholarships	0.98	1.07	1.07	1.10
College Information	1.17	1.17	1.16	1.18
<i>College Preparation Activities</i>				
Completed FAFSA	0.89	0.98	0.98	0.97
Attended College Fair	0.84	0.92	0.92	0.97
Took SAT/ACT Prep Course	1.00	0.89	0.89	0.91
Visited a College	0.76 **	0.72 ***	0.72 ***	0.70 ***
<i>Improvement in 11th and 12th Grade GPA</i>				
Overall GPA Improved	1.26 **	1.18	1.22 *	1.29 *
Math GPA Improved	0.99	0.93	0.94	0.87
Controls		X	X	X
Grade Performance in 9th and 10th Grade (Mediating Variables)			X	X
All 11th and 12th Grade Variables				X

†Compared to not being enrolled.

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

Several factors are associated with one year persistence in 2-year colleges for Hispanic, low income or first generation students (Table 23). Taking an Advanced Placement course is positively associated with 2-year persistence. Students who indicated they visited a college while in high school appear less likely to persist in a 2-year college.



**Table 23. Factors Associated with One Year Persistence in 2 Year Colleges†, for Hispanic, Low Income or First Generation Students (N=2,062)**

	Model 1	Model 2	Model 3	Model 4
<i>Coursework</i>				
Algebra 2	1.72	1.86	1.94	1.85
Any Advanced Math	1.12	1.13	1.11	1.00
Dual Credit	1.05	1.21	1.21	1.16
Advanced Placement	1.39 **	1.53 **	1.52 **	1.56 **
Career and Technology Course	0.89	0.97	1.00	0.99
<i>Counselor Interactions</i>				
College Applications	0.81	0.88	0.86	0.76
Scholarships	1.06	1.16	1.14	1.18
College Information	1.16	1.19	1.17	1.19
<i>College Preparation Activities</i>				
Completed FAFSA	0.92	1.03	1.03	1.00
Attended College Fair	0.84	0.89	0.88	0.89
Took SAT/ACT Prep Course	1.06	1.02	1.03	1.01
Visited a College	0.80	0.76 *	0.76 *	0.74 *
<i>Improvement in 11th and 12th Grade GPA</i>				
Overall GPA Improved	1.27	1.16	1.23	1.34
Math GPA Improved	0.95	0.88	0.89	0.81
Controls		X	X	X
Grade Performance in 9th and 10th Grade (Mediating Variables)			X	X
All 11th and 12th Grade Variables				X

†Compared to not being enrolled.

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

Several factors are associated with one year persistence in 2-year colleges for students with a GPA between 70-80% after their 10th grade year (Table 24). For these students, taking an Advanced Placement course is the only factor statistically associated with 2-year persistence.

**Table 24. Factors Associated with One Year Persistence in 4 Year Colleges†, for Students with a GPA between 70-80% at the End of the 10th Grade (N=647)**

	Model 1	Model 2	Model 3	Model 4
<i>Coursework</i>				
Algebra 2	1.15	0.96	0.95	1.05
Any Advanced Math	0.93	0.93	0.91	0.64
Dual Credit	1.30	1.12	1.11	1.04
Advanced Placement	2.20 ***	2.80 ***	2.77 ***	3.00 ***
Career and Technology Course	1.19	1.82	1.83	2.00
<i>Counselor Interactions</i>				
College Applications	0.92	0.84	0.83	0.97
Scholarships	0.76	0.71	0.71	0.73
College Information	0.91	0.78	0.78	0.79
<i>College Preparation Activities</i>				
Completed FAFSA	1.15	1.33	1.34	1.40
Attended College Fair	1.02	0.99	0.99	0.94
Took SAT/ACT Prep Course	1.43	1.10	1.11	1.06
Visited a College	1.13	1.11	1.11	1.08
<i>Improvement in 11th and 12th Grade GPA</i>				
Overall GPA Improved	1.48 *	1.33	1.32	1.53
Math GPA Improved	0.86	0.79	0.75	0.66
Controls		X	X	X
Grade Performance in 9th and 10th Grade (Mediating Variables)			X	X
All 11th and 12th Grade Variables				X

†Compared to not being enrolled.

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

## Summary

Most 11th and 12th grade courses and activities examined have some statistically significant association with 2- or 4-year enrollment or persistence. Academic performance in the first two years of college mediates to some degree how much 11th and 12th grade courses and activities influence postsecondary enrollment and persistence. However, including all 11th and 12th grade courses and activities in each model often fully attenuates the association of courses and activities on enrollment and persistence.

Taking Advanced Placement courses is positively associated with both 2- and 4-year enrollment for all class of 2010 graduates as well as for Hispanic, low income or first

generation students and students who left 10th grade with a GPA between 70-80%. These courses provide college-level knowledge about subject material, which could improve the academic foundation of a student enrolling in college. Additionally, Advanced Placement courses provide context about college academic expectations, including the amount of work required to understand concepts, the span of time allowed to learn new ideas and a sense of the academic difficulty of college-level work. While taking dual credit courses may offer similar advantages, the results here do not show a consistent association with college enrollment and persistence, which may be attributable to the large share of dual credit students also taking Advanced Placement courses.

Another theme from the above analysis is the importance of financial aid and financial aid knowledge, including completing the FAFSA and meeting with your counselor about scholarships. The influence of these meetings extends beyond getting into college, and appears to impact one year persistence in the case of students who initially enroll in a 4-year college.

This chapter examines the association of 11th and 12th grade courses and activities on college enrollment and persistence and establishes that, in most cases, the effects of these courses and activities are mediated by academic performance in the first two years of college. However, these associations do not provide context for potential changes in policy or modifications to decisions students take during the last two years of college, essentially identifying potential effects of forcing all student to take all of the courses identified in the literature as being associated with college enrollment. This type of work is conducted in the following chapter.

## **CHAPTER V. THE CUMULATIVE AND MARGINAL EFFECTS OF SELECT 11TH AND 12TH GRADE COURSEWORK AND ACTIVITIES ON POSTSECONDARY ENROLLMENT**

Work in Chapter IV identified factors associated with postsecondary enrollment and one year persistence. This chapter uses marginal effects to modify the assumptions of the previous chapter's Model 4. This allows researchers to investigate the extent to which changes in course-taking and other behaviors by students might influence their postsecondary enrollment and one year persistence outcome. Additionally, in this chapter, as in the previous chapter, researchers account for all other variables in the model including controls such as family background, student characteristics, high school graduation, as well as mediating variables including academic performance in the 9<sup>th</sup> and 10<sup>th</sup> grades.

### **Cumulative Effects**

To provide a sense of the relative importance of each of categories examined in this report, researchers used multinomial logistic regression and a post-estimation technique called AMPE (discussed in Chapter 2) to modify only the variable or variables of interest in the equation to find out the change in the predicted probability of an outcome of interest. Rather than examine the effect of all variables included in the model, this section takes the view that school districts and community stakeholders possess limited resources. This section takes a set of the variables found to be statistically associated with college enrollment and persistence across multiple models including taking advanced coursework, visiting with a counselor about scholarships, improving overall GPA in the last two years of high school, and all of the college preparation activities including completing the FAFSA, going to a college fair, taking an SAT/ACT preparation course and visiting a college. Since most of these courses and activities have been shown to have an influence for multiple outcomes (direct to college, enrolling within a year and one-year persistence) and for more than one population of students (all surveyed students, surveyed HLF students and surveyed BPGPA students) this section simplifies the previous chapter's analysis and determines the extent to

which changing student participation in each of these categories could influence postsecondary enrollment and persistence outcomes.<sup>11</sup>

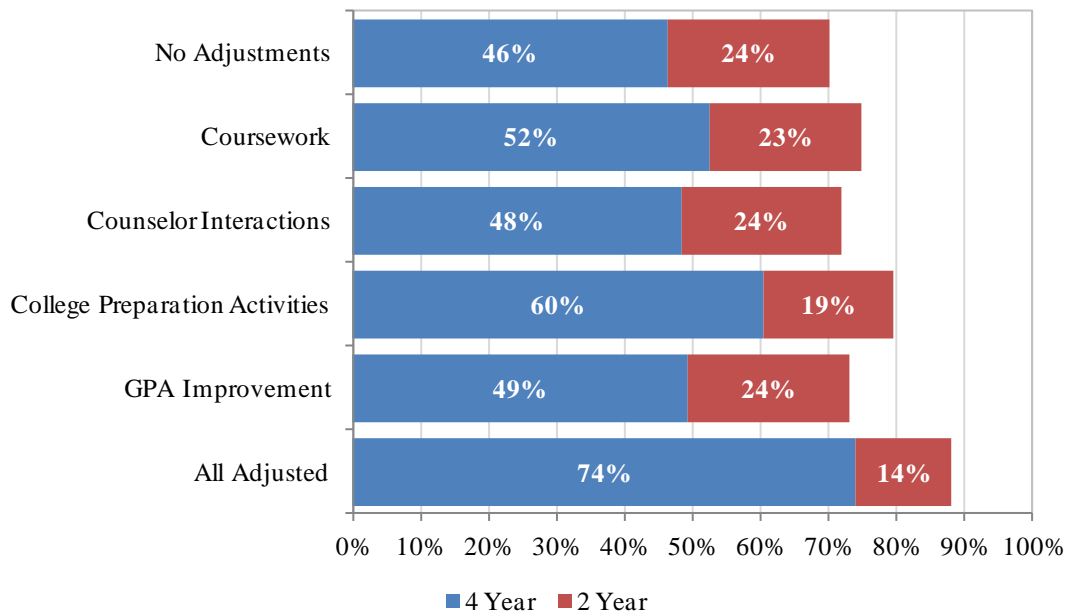
Figure 2 provides the predicted regional enrollment rate (no adjustments) by type of college (4-year and 2-year). Note that this predicted regional direct to college enrollment rate (70%) is for surveyed students and closely matches the actual direct to college enrollment rate for surveyed students (72%). The second bar on Figure 2 is the calculated enrollment rates if all students took both advanced math and Advanced Placement courses; the model predicts that if all students took both of these courses, the regional enrollment rate would rise to 75%, an improvement of about 5% points. This process is then repeated for counselor interactions. The model predicts that if all students met with their counselor about scholarships, the regional direct to college enrollment rate would increase by 2%. If students engaged in all college preparation activities, including completing the FAFSA, attending a college fair, taking an SAT/ACT preparation course and visiting a college, the predicted enrollment rate would rise to 79%. If all students improved their GPA during the last two years of high school, the predicted enrollment rate is 73%. Finally, assuming that students take all of the courses and engage in all of the activities mentioned above (all adjusted), the predicted regional direct to college enrollment rate is 88%. This final bar is an incredibly difficult threshold to pass as it assumes that all students take all of the courses and engage in all of the activities and so the predicted enrollment rate serves as a sort of maximum possible enrollment rate for the population examined.

Each of these figures hint at the many competing forces at play: improving college preparation activity participation noticeably improves 4-year direct to college enrollment rates, but also reduces 2-year enrollment rates. This offset is due to the fact that students are making several choices as they transition into college, either choosing to enroll in a 4-year college or a 2-year college or not enroll at all; the model predicts that some students who now go to a 2-year college would, with some additional college preparation work, choose to enroll in a 4-year college.

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<sup>11</sup> This section examines direct to college enrollment for all three surveyed populations examined and one year persistence for the entire surveyed population. The results provided in the direct to college and persistence sections are representative of results not shown.

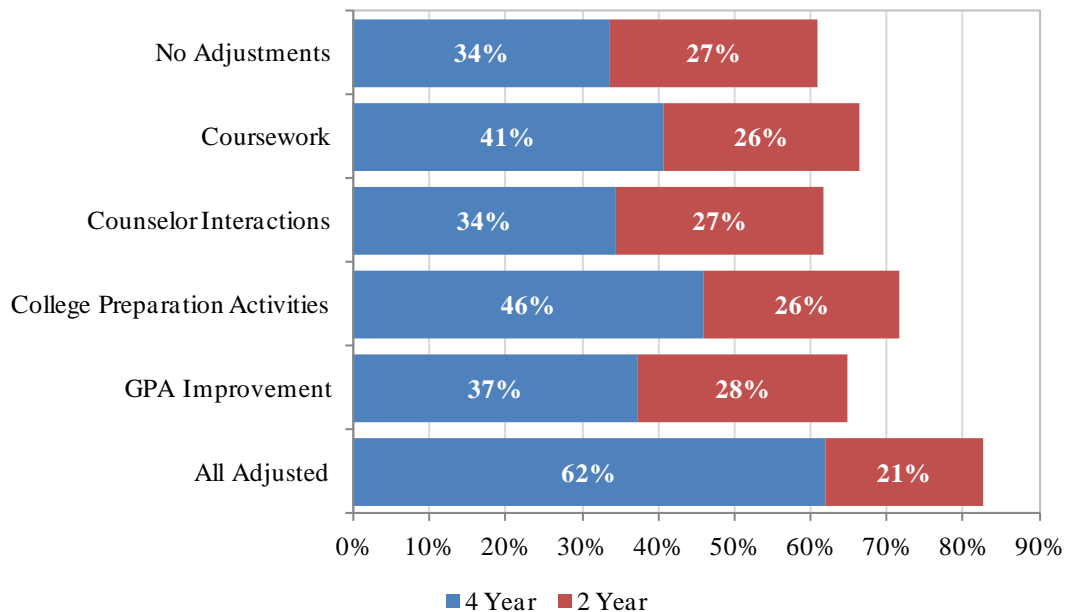
**Figure 2. Potential Cumulative Effects of 11th and 12th Grade Coursework and Activities on Direct to College Enrollment**



Sources: National Student Clearinghouse and Student Futures Project data.

Figure 3 shows the same information, but for Hispanic, low income or first generation students. The predicted enrollment rate from the model (61%) is very close to the actual enrollment rate for the surveyed population of HLF students (62%). The model predicts that increasing the share of students participating in college preparation activities will likely have a positive impact on direct to college enrollment. For HLF students, engaging in all of these activities and courses has a very large influence (21% points) on the predicted direct to college enrollment rate (83%), compared to the predicted enrollment rate under current conditions (62%).

**Figure 3. Potential Cumulative Effects of 11th and 12th Grade Coursework and Activities on Direct to College Enrollment for Hispanic, Low Income or First Generation Students**

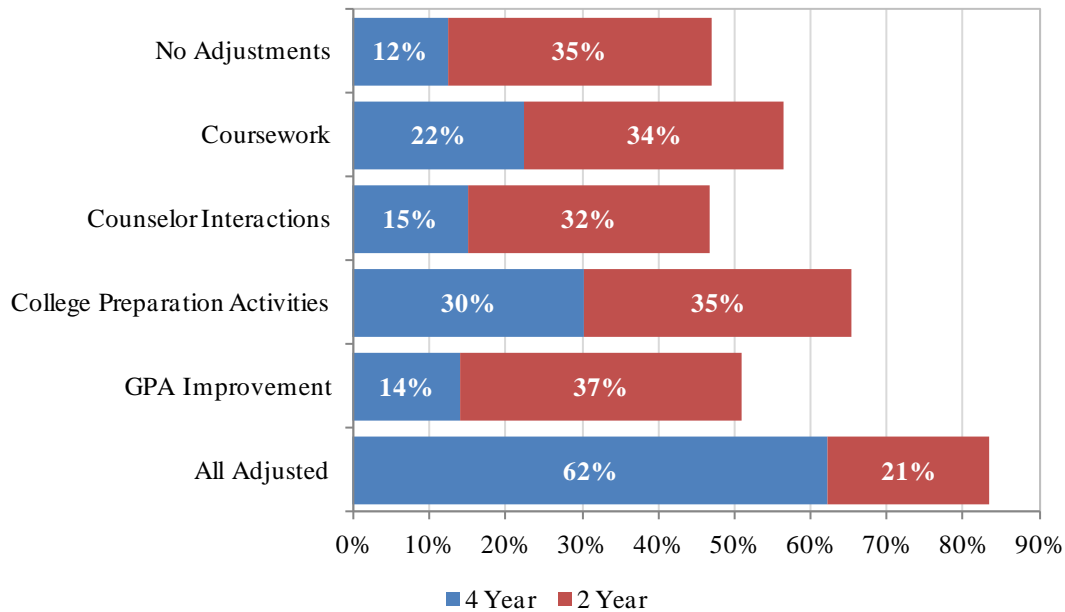


Sources: National Student Clearinghouse and Student Futures Project data.

Examining the predicted direct to college enrollment rates for students whose GPA in the 10th grade was between 70-80% (Figure 4), shows that the model's predicted enrollment rate without any adjustments (47%) is close to the actual enrollment rate (49%) for this population of surveyed students. Students with this particular academic background are much more likely to enroll in a 2-year college than a 4-year college. The model predicts that engaging in any single category of courses or activities is unlikely to change this; however, increasing the share of students engaging in coursework and college preparation activities shows a marked increase in the share enrolling in a 4-year college. Since these students tended to participate at lower rates than other examined populations at these activities (Table 6), particularly completing the FAFSA and visiting a college, as well as the large predicted improvement in 4-year enrollment rates, there is significant room for improving supports for these students. However, considering the currently low participation rates in many of these

activities and high school course choices, the predicted direct to college enrollment rate of these students if they completing all courses and activities (83%) is unlikely to be achieved.

**Figure 4. Potential Cumulative Effects of 11th and 12th Grade Coursework and Activities for Students with a GPA between 70-80% at the End of the 10th Grade**

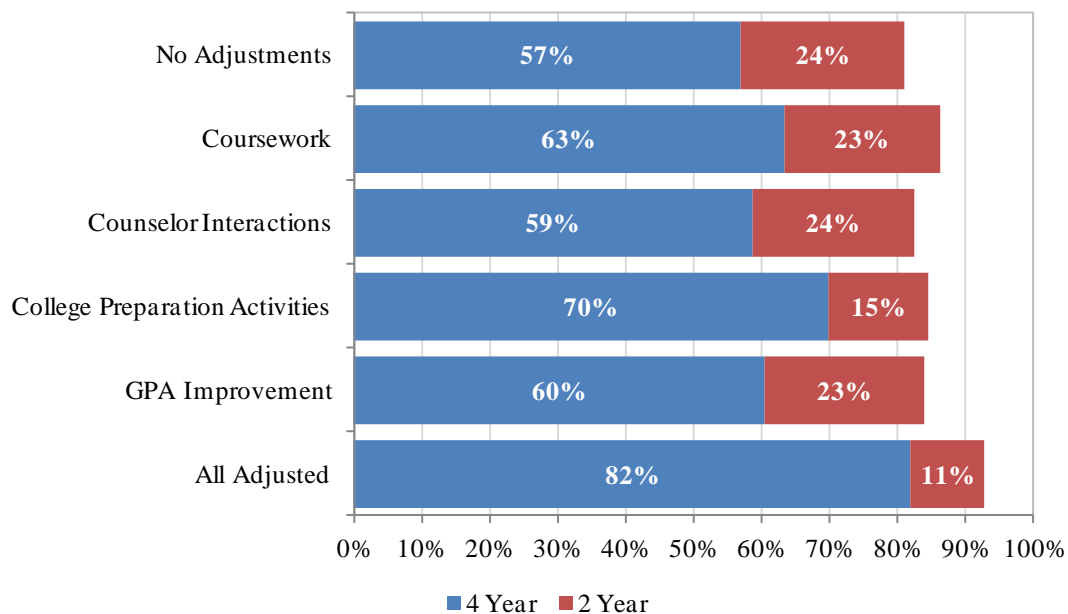


Sources: National Student Clearinghouse and Student Futures Project data.

As demonstrated in Chapter IV, some of the activities and coursework associated with enrolling in college are also related to persisting in college once a student has enrolled. A key question for local stakeholders and researchers is the extent to which efforts to increase college access influence college persistence. Figure 5 hints that increasing participation in the courses and activities identified earlier in this chapter either slightly improves or does not change one year persistence rates.



**Figure 5. Potential Cumulative Effects of 11th and 12th Grade Coursework and Activities on One Year College Persistence**



Sources: National Student Clearinghouse and Student Futures Project data.

Increasing participation in suggested coursework and other activities in the 11th and 12th grades will likely improve college access for students from all of the populations examined. Coursework and college preparation activities tend to show larger predicted gains in enrollment than improving GPA or meeting with a counselor about scholarships, though the most powerful combination is to engage in all of these courses and activities. This improvement in college access is unlikely to significantly influence one year college persistence for those who enrolled in college within a year.

### **Marginal Effects**

Using the model to predict marginal effects also allows researchers to more subtly ask specific questions of the model and to provide policy relevant responses. In examining coursework, this report began with a number of usual suspects and then whittled these down to advanced math and Advanced Placement. But not all local schools have the capacity to build access to both of these types of courses. Advanced math teachers often need significant

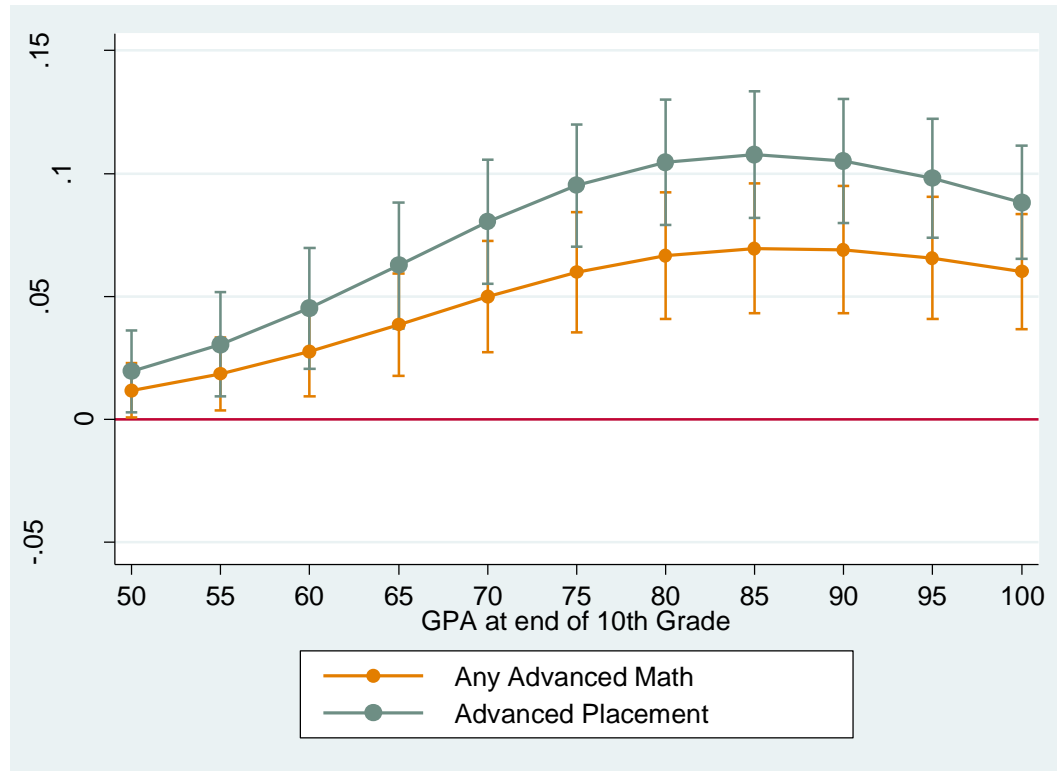
preparation, including for some courses a major or minor in mathematics. There are a broader range of Advanced Placement courses to teach, but here too, teachers must receive special training in order to qualify to teach these courses. Teachers with these qualifications are in demand because they are relatively small in number. For school principals intent on building these programs and counselors discussing coursework choices with students at the end of their 10th grade, it is important to know if one of these two options is better than the other. In fact, the marginal effect of taking an advanced math class and not taking an Advanced Placement class is the same as the marginal effect of not taking an advanced math class and taking an Advanced Placement class.<sup>12</sup> Thus, schools with limited resources should focus on providing at least one of the options. Students that choose either option and students are likely to see benefits. Furthermore, at schools able to provide both of these options, counselors can discuss coursework options that meet the need of student interests.

The benefits of taking these courses vary by GPA at the end of the 10th grade (Figure 6). This figure shows the average marginal effects of taking a specific type of course on predicted 4-year enrollment. Thus, if all students in the region with a GPA of about 80% at the end of the 10th grade take an Advanced Placement course these students would see their enrollment rate rise 10% points compared to if none of them took an Advanced Placement course. Since some students already take an Advanced Placement course, these predicted effects represent the largest possible influence of course taking for the region. The figure is instructive in other ways, as well. The confidence intervals of each of these lines (the bars extending out from the lines) that cross throughout this figure show that the average marginal effect of taking an advanced math course and the average marginal effect of taking an Advanced Placement course are not statistically different for students with the same GPA at the end of the 10th grade. Furthermore, the influence of taking these courses on predicted 4-year enrollment rises as 10th grade GPA increases, but reaches their peak effect with a GPA of roughly 85%. However, students with a GPA between 70-80% are also likely to see significant benefits from taking one or both of these courses.

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<sup>12</sup> The marginal effect of taking both course types is statistically different than taking either type on its own. These results are the results of pairwise comparisons of margins and account for multiple tests using the Bonferroni adjustment.

**Figure 6. Average Marginal Effects for Coursework in the 11th and 12th Grades by GPA at End of 10th Grade**



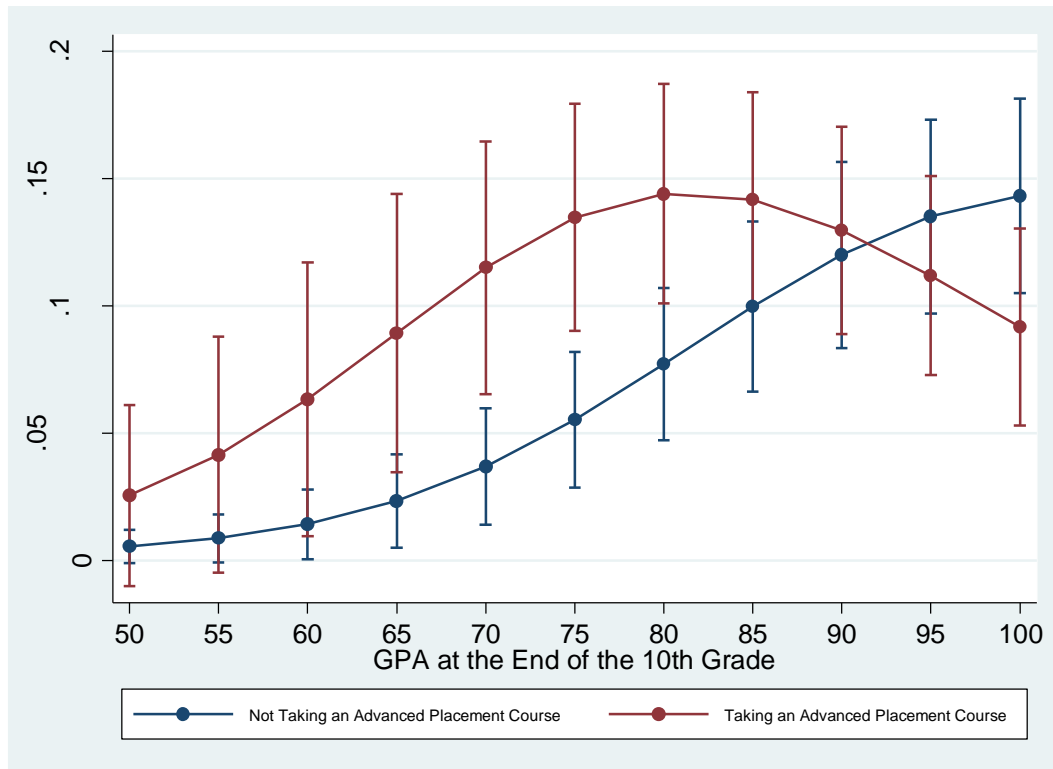
Source: Student Futures Project data.

Researchers examined other potential combinations of courses and activities to determine if their predicted marginal outcomes were statistically different. This investigation shows that some flexibility in helping counselors and students filter their 11th and 12th grade course and activity choices. The marginal effect on 4-year enrollment of taking an advanced math course, an Advanced Placement course, completing the FAFSA and improving overall GPA in the last two years of high school is equivalent to taking any of these three options in combination with each other. Thus, counselors can suggest various combinations to students that are likely to improve their chances of successful enrollment in college, depending on individual circumstances and preferences.

The predicted effects of these combinations of courses and activities are not evenly distributed across students with different academic performance records from their first two years of high school. Figure 7 shows the average marginal effect of completing the FAFSA for individuals who either took an Advanced Placement course or did not take an Advanced

Placement course. Note that the predicted effect of completing the FAFSA on 4-year enrollment generally increases as a student's 10th grade GPA increases. The effect of completing the FAFSA on predicted 4-year enrollment is the same across most students, regardless of whether they took an Advanced Placement course (since the confidence intervals overlap). Students with a 10th grade GPA just under 70% to just under 80% who take an Advanced Placement course have a significantly higher predicted effect on 4-year enrollment than students who do not take an Advanced Placement course (since their confidence intervals do not cross). This result closely parallels the relationship between taking an advanced math course and completing the FAFSA. Students at the end of the 10th grade with passing, but not stellar, GPAs still receive significant effects on predicted 4-year enrollment from advanced coursework, particularly in combination with completing the FAFSA.

**Figure 7. Average Marginal Effects for Completing the FAFSA**



Source: Student Futures Project data.

## **Summary**

The importance of taking advanced coursework, engaging in college preparation activities, meeting with a counselor and improving academic performance in the last two years of high school could all likely play some role in improving college enrollment outcomes. Importantly, there is some significant evidence in this report to suggest that engaging in multiples of these 11th and 12th grade courses likely improve enrollment outcomes more than engaging in any course or activity on its own. However, all students need not do everything in order to improve their chances of enrolling in college, as there is some evidence that students who choose three options among taking two types of advanced courses, improving overall GPA and completing the FAFSA would likely receive the same effect as if they chose all four.

## CHAPTER VI. CONCLUSION

Using multinomial logistic regression and adjusted marginal predicted effects utilizing linked data from the Student Futures Project and the National Student Clearinghouse, this report finds that the 11th and 12th grade activities and courses examined in this report are closely linked to postsecondary enrollment and persistence. Nearly all of these factors are associated with postsecondary enrollment, even when accounting for academic performance in the first two years of high school. These courses and activities do not work in isolation, as the effects of several of these courses and activities are mediated when including them all in the model. Findings within this report include the following:

- ❖ Students who are Hispanic and/or low income and/or would be the first generation to go to college from 2008 through 2011 all enrolled in college at lower rates than their counterparts.
- ❖ Students with a GPA between 70-80% at the end of the 10th grade enroll in college at lower rates than students with a GPA about 80%.
- ❖ Since Algebra 2 was required for the recommended plan in Texas, over 90% of the class of 2010 took this course.
- ❖ In the region, 81% of students who received dual credit also took an Advanced Placement course.
- ❖ Only 51% of students who took a CATE course completed the FAFSA, compared with 59% of students who took Algebra 2 and 67% of students who took an Advanced Placement course.
- ❖ Hispanic, low income or first generation students are more likely to get help on more than one college related topic from their counselor than their counterparts.
- ❖ Hispanic, low income or first generation students and students with a GPA between 70-80% at the end of their 10th grade not only participate less frequently in key courses and activities known to be related to enrolling in college, those who do participate in these courses and activities are less likely to engage in multiples of them.
- ❖ When accounting for other 11th and 12th grade courses and activities, Algebra 2 is not positively associated with college enrollment for Hispanic, low income or first generation students.
- ❖ The following factors are associated with enrolling within a year from high school graduation for all populations examined:
  - Taking an advanced math course,
  - taking an Advanced Placement course,

- improving overall GPA,
  - completing the FAFSA,
  - taking an SAT/ACT preparation course and
  - visiting a college while in high school.
- ❖ The model predicts that increasing participation in these activities increases the share of students enrolling in college after high school graduation.
  - ❖ The marginal effect of taking either an advanced math class or an Advanced Placement class is the same.
  - ❖ The influence of taking advanced math and/or Advanced Placement on predicted 4-year enrollment rises as 10th grade GPA increases, but reaches their peak effect with a GPA of roughly 85%.
  - ❖ The marginal effect on 4-year enrollment of taking an advanced math course, an Advanced Placement course, completing the FAFSA and improving overall GPA in the last two years of high school is equivalent to taking any of these three options in combination with each other.
  - ❖ Students with a 10th grade GPA just under 70% to just under 80% who take an Advanced Placement or advanced math course have a significantly higher predicted effect on 4-year enrollment than students who do not take an Advanced Placement course.

The work of this report adds to similar evidence in literature on the effect of 11th and 12th grade courses and activities on college enrollment. Adelman (1999, 2006) found that the quality and academic intensity of secondary curriculum played the strongest role in predicting college enrollment. This report finds that, for students in Central Texas, taking advanced curriculum courses influences initial enrollment (both direct to college enrollment and enrollment within a year of graduating high school) as well as one year persistence. While Giani, Alexander and Reyes (2012) determined a positive and statistically significant effect of taking dual courses on postsecondary enrollment and completion in Texas using quasi-experimental methods, this effect was not in evidence in for the group examined in this report. However, as 83% of students who took dual credit also too an Advanced Placement test, the regional population of students likely differs from that of the rest of Texas. Klopenstein and Thomas (2006) found that for Texas, taking an Advanced Placement test was not associated with early college success. This report shows that for the population examined, there is an association with initial enrollment and one year persistence for students who take an Advanced Placement course, regardless of whether they took the Advanced Placement exam and controlling for factors such as student and family educational

background. Long, Iatarola and Conger (2009), using data from Florida, found a lower return for students from backgrounds that have been traditionally less likely to enroll in college. While this report did not test the difference between these returns, it shows that, accounting for academic and family background, taking advanced math courses are positively associated with postsecondary enrollment for Hispanic, low income or first generation students, though this effect is, in part, mediated by academic performance in the first two years of high school.

It is important to note that the methods used in many of the studies above included rigorous quasi-experimental methodologies. These methodologies are particularly appropriate when examining the influence of a single high school program or course on student postsecondary enrollment outcomes, though they are less effective in exploring the relationship across multiple programs and courses. Additionally, no dataset contains all the information needed to readily account for all possible factors related to students' decisions. The data used in the Texas studies cited above includes a host of valuable, diverse and colossal quantity of administrative data available in the Texas Educational Research Center; however, some characteristics, such as parent educational background and student college intentions, are not collected at schools as so are absent from these analyses. Future SFP work should attempt to replicate these students to further clarify and understand student postsecondary transitions.

### **Recommendations**

These findings lead to several recommendations related to when college preparation services should begin to target students, and what types of students should be targeted. Additionally, course and activity recommendations that demonstrated consistency across models and across types of students are also included. Finally, process recommendations are also discussed.

- ❖ **Engage students at the beginning of their 11th grade year.**

One of the key questions for regional stakeholders is when to target students for services related to postsecondary enrollment. Findings in this report suggest that engaging the student at the beginning of their 11th grade year could produce significant impact on regional college enrollment rates.

- ❖ **Supports and services should target Hispanic, low income or first generation, and students whose GPA at the end of the 10th grade was between 70-80%.**



Another key question for regional stakeholders is how to identify students that might need academic or college process supports. This report finds demonstrates that these two populations of students are readily identifiable at the end of the 10th grade and likely to receive significant benefit from academic and college preparation supports.

❖ **Require students to take Algebra 2 as their default graduation program.**

In the policy environment of 2010, all students were required to take Algebra 2. This report finds that taking Algebra 2 is positively associated with postsecondary enrollment for most students, and is not negatively associated with college enrollment for any population of students. Additionally, many of the advanced courses demonstrated in this report require knowledge obtained in taking an Algebra 2 class.

❖ **Integrate financial aid concepts into CATE course curriculums.**

Only 51% of students who took a CATE course completed a FAFSA, the lowest rate of any course studied. These students are relatively easy to target within these classrooms and providing college financial aid and enrollment information would be beneficial.

❖ **Encourage all students to engage in the following courses and activities:**

- **An advanced math course,**
- **An Advanced Placement course,**
- **Improve overall GPA after 10th grade,**
- **Complete the FAFSA,**
- **Take an SAT/ACT preparation course and,**
- **Visiting a college while in high school.**

Time and again, participation in these activities is found to be related to postsecondary enrollment, across all populations examined and accounting for factors such as parental background, student characteristics, high school of graduation, academic background prior to the 9th grade, even including academic performance in the first two years of high school and any and all other 11th and 12th grade courses and activities.

❖ **Encourage participation in these courses and activities, but be mindful of student preferences and flexible in pursuing student participation in multiples of these activities.**

Students from backgrounds that have traditionally been less likely to enroll in college tend not only to participate in these activities at lower shares than their peers, but also in engaging in multiples of these activities. However, participating in each of these activities does not necessarily imply greater and greater returns for each additional course or activity. For example, the marginal effect of taking only an Advanced Placement course is equivalent to that of taking only an advanced math course.

❖ **Survey students about their college intentions as early as possible and continue to ask these questions over time.**

While this report provides recommendations regarding targeting students after their 10th grade year, one key factor not know about many students in the region at that

time is their intention or interest in going to college or their plans for after high school if they do not intend to go to college. Surveying these students earlier might enable better targeting efforts which could improve regional enrollment rates.

### **Plans for the Future**

This analysis provides evidence of the importance of 11th and 12th grade courses and activities on postsecondary enrollment and one year persistence. Much of the critical data related to college enrollment activities, such as applications and completing the FAFSA were collected using survey data. Currently, the region has some access to additional data for analysis including administrative data such as FAFSA completion. Future analyses will likely include these new data. Additionally, future analytical reports will likely include additional cohorts of high school graduates.

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## APPENDIX A: TECHNICAL APPENDIX

This section describes how the dataset was constructed, provides information on the means of the data and outlines the process used to weight the data for survey non-response.

### Construction of Datasets

The research datasets are constructed from Student Futures Project data collected by participating school districts, through a senior survey by schools districts and the Ray Marshall Center (RMC), quarterly earnings from Texas Workforce Commission's Unemployment Insurance Wage Data, and postsecondary enrollment and persistence data from the National Student Clearinghouse (NSC). The Student Futures Project has conducted research on the transitions of high school graduates in the Central Texas region since 2006. Previously conducted research included a conceptual model of high-school-to-college transitions as well as analyses transitions from previous cohorts. Influential administrative and survey variables, while in this report include 11th and 12th grade courses and activities, control and mediating variables, were already shown to be associated with postsecondary enrollment were outlined in these previous reports. A thorough discussion of these variables, their initial reason for inclusion and how they are calculated for the Student Futures Project can be found in previous reports and Table A-1 at the end of this section provides their means.<sup>13</sup>

#### *National Student Clearinghouse*

Postsecondary enrollment outcomes were derived using National Student Clearinghouse data. The NSC's Student Tracker system provides information on attendance and completion data for over 3,300 postsecondary institutions. NSC data incorporated into the SFP dataset came from an existing agreement with the Ray Marshall Center (RMC) and NSC (in which RMC staff obtained high school graduate information from school districts and then submitted it to NSC).

#### *Texas Workforce Commission (TWC) Unemployment Insurance (UI) Wage Data*

TWC produces quarterly wage data detailing earnings for individuals working in Texas. The Ray Marshall Center currently maintains these records back to 1990 and receives quarterly data on a regular basis. Wages in the senior year were calculated by summing

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<sup>13</sup> Previous reports are available on the project website: <http://www.centexstudentfutures.org>.

non-zero wages for any and all jobs collected for an individual in the fall prior to graduation and the spring of graduation for each class. Wages for individuals who had no reported UI wages over this time period were set to zero.

### **Weighting: Adjusting For Survey Non-response**

Only in exceptionally rare cases do surveys of human subjects ever enjoy a 100% response rate from those surveyed. Non-response is simply a fact of life. To clarify terminology, it is important to point out that "non-response" in the language of survey research refers both to missing cases ("unit non-response", targeted subjects who fail to return the survey) and to missing responses to specific questions ("item non-response"). Here we restrict ourselves solely to the problem of unit non-response. No effort was made in this study to impute values for missing responses to specific survey questions.

Summary statistics based on raw survey responses are perfectly reliable if non-responding cases are missing completely at random. With no systematic difference between respondents and non-respondents, means or regression coefficients based on respondents alone serve as unbiased estimates for the population as a whole. Bias arises to the extent that non-respondents are "different" in important ways from respondents.

The standard approach for correcting survey data for potential biases due to unit non-response is to assign post-survey weights to each observed case in proportion to that respondent's affinity to non-respondents. Weighting observations makes it possible to go beyond merely reporting summary survey statistics for those who respond; it allows us to draw valid inferences for the entire target population of interest. Constructing post-survey weights requires access to information on a set of characteristics common to both respondents and non-respondents that, by assumption, are relevant predictors of whether an individual completes the survey or not. These variables are typically jointly cross-tabulated by response/non-response; weights are then calculated for the respondents in proportion to the number of non-respondent cases in each cell of the multidimensional cross-tabulation (Little and Rubin, 2002).

An attractive alternative method for constructing weights makes use of the predictions from a logistic regression, or logit, model. This is the approach employed in this study. The logit model expresses survey response (1=respondent, 0=non-respondent) as a function of a vector of information drawn from administrative records on all students in the relevant universe. The predicted values derived from the model are interpreted as students'

individual propensities to respond to the survey. The inverse of these propensity scores can serve directly as post-survey weights that are assigned to observed cases to correct for potential bias due to non-response. A respondent with a small propensity score shares affinities with a non-respondent; data from such a respondent are consequently assigned a higher weight to compensate for data missing from his/her kindred, but non-responding, counterparts. This alternative approach for generating weights borrows from recent advances in the quasi-experimental matching of treatments to controls (Moffitt et al., 2004) and offers attractive statistical properties for coping with non-response bias in surveys (Schonlau et al., 2004; Little and Vartivarian, 2004). It has the additional practical advantage of accommodating a larger number of individual characteristics than is possible with more traditional approaches (all of which are subject to problems of sparsely populated cells in high-dimensional cross-tabulations) to strengthen internal validity.

For the current study, student propensity scores were estimated for each high school. The specific variables used to predict survey response included coursework, academic performance after the 10th grade year and student characteristics. The validity of the propensity score approach to weighting for non-response is enhanced as scores for respondents and non-respondents share: (1) similarly shaped distributions, and; (2) generous overlap in their respective values. Falling short of either, or both, of these validation criteria suggests that there are additional unobserved factors explaining non-response that have not been adequately accounted for by the logistic regressions. Smoothed histograms of propensity scores at the school district level for those school districts that provided the necessary administrative data all revealed nearly overlap in the propensity scores for respondents and non-respondents. The distributions across response/non-response categories were also remarkably similar in shape. Results calculated using weights are very similar to results not using weights

To enhance the robustness of the propensity scores (and ultimately the weights), scores for the respondents were first sorted and split into deciles. The mean score in each decile was then assigned to all respondents in the corresponding bin (Little and Rubin, 2002; Dehejia and Wahba, 2002). These "coarsened" propensity scores were then inverted to create initial weights. The final step was to adjust the weights proportionally so that they summed to the actual number of seniors in each high school. This post-stratification adjustment makes it possible to draw valid inferences from summary statistics down to the high school level providing that there are sufficient degrees of freedom to do so.

**Table A-1. Means of Variables, by Research Sample**

	Survey Sample		HLF		BPGPA	
	Enroll 6436	Persist 5016	Enroll 2959	Persist 2062	Enroll 1117	Persist 647
<i>Ethnicity</i>						
Asian	6%	6%	4%	5%	3%	3%
African American	8%	8%	9%	9%	15%	17%
Hispanic	31%	28%	67%	67%	46%	41%
White	53%	55%	18%	17%	35%	37%
<i>Parental Education</i>						
Neither parent has any college	22%	18%	47%	44%	32%	25%
Either parent has some college	20%	20%	21%	21%	23%	25%
Either parent has Bachelor's degree or higher	58%	62%	32%	35%	45%	50%
<i>Income Status</i>						
Not Low Income	77%	81%	50%	54%	64%	69%
Free Lunch	17%	13%	37%	32%	29%	25%
Reduced Lunch	6%	6%	13%	14%	7%	6%
<i>Gender</i>						
Male	50%	48%	48%	45%	60%	58%
Female	50%	52%	52%	55%	40%	42%
<i>How Long Ago Did You Start Thinking About College?</i>						
As long as I can remember						
As a child	9%	9%	9%	10%	7%	7%
In middle/junior high school	16%	15%	19%	18%	21%	20%
In high school	21%	18%	30%	26%	37%	35%
Never	2%	1%	2%	1%	3%	1%
<i>Extracurricular Activities</i>						
Music	29%	30%	25%	27%	20%	21%
Theater/drama	20%	20%	18%	19%	21%	24%
Dance	20%	21%	22%	23%	21%	21%
Sports	58%	60%	57%	60%	55%	58%
Speech/debate	24%	24%	25%	25%	28%	29%
Academic clubs	29%	32%	24%	27%	17%	19%
No school-based extracurricular activities	11%	10%	15%	13%	20%	17%
Participated in non-school-based extracurricular acti	82%	84%	78%	81%	72%	76%
<i>Typical Number of Weekly Hours Spent Working</i>						
None						
1-10 hours	23%	24%	21%	21%	25%	26%
11+ hours	37%	36%	43%	42%	41%	39%
Income Senior Year (Missing=\$0.00)	\$878	\$842	\$1,055	\$1,038	\$1,045	\$1,058
Special Education	4%	3%	5%	3%	11%	8%
Gifted	13%	15%	9%	11%	3%	3%
HS Math Credit in MS	36%	41%	21%	25%	13%	17%
HS Foreign Language Credit in MS	40%	43%	34%	37%	25%	29%
Failed a 9th Grade Course	18%	15%	23%	19%	51%	49%
<i>Typical Number of Weekly Hours Spent Studying</i>						
None	8%	6%	9%	7%	14%	12%
1-5 hours	48%	46%	55%	53%	60%	59%
6-10 hours	26%	28%	24%	27%	18%	19%
11+ hours	18%	20%	12%	14%	8%	10%

Source: Student Futures Project data.



## Technical Appendix Bibliography

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