



## Follow-up: The Vermont High School Class of 2012

### Postsecondary Enrollment & Completion within Four Years of Graduation

#### Executive Summary

In 2014, VSAC issued a report on the aspirations of the Vermont High School Class of 2012. The following year, 2015, VSAC issued a report on the postsecondary enrollment of the Class of 2012. This third report looks at the Class of 2012 four years after high school graduation and describes the percentage of graduates who enrolled in postsecondary education, along with the percentage who attained a degree within four years. This report also discusses some of the factors associated with the timely completion of a degree. The study provides some encouraging data about the four-year graduation rates of matriculated members of the class as a whole. However, the data also reveals wide variation in the success rates between students from different socioeconomic groups and between students attending different institutions of higher education.

**This report examines the on-time completion rates of Vermont high school graduates who began their postsecondary education full-time at a four-year school.** Vermont high school students enroll immediately in four-year institutions at a higher rate than the national or regional average. Sixty percent of Vermont high school graduates who enrolled immediately at a four-year institution graduated within four years, 13 percentage points higher than the national average. However, this success was not shared by every group in the high school Class of 2012—there was wide variation in on-time degree attainment between men and women, and between first-generation and second-generation status<sup>1</sup>, by academic preparation, by geography, and by the institution the students attended.

#### **Among those students who started full-time at a four-year school within six months of high school graduation, we found:**

- 56.4 percent of the students obtained a bachelor's degree within four years, and an additional 3.4 percent obtained an associate degree.
- The completion rate of students who started at private institutions was 67 percent. The completion rate of students who started at public institutions was 53 percent.
- Eight out of 10 students who remained at their schools for four consecutive years while being enrolled full-time attained a postsecondary degree within four years.

<sup>1</sup>In this paper, students who reported that neither of their parents had attained a four-year degree are referred to as first-generation students. Students who reported that at least one of their parents had attained at least a four-year degree are referred to as second-generation students.

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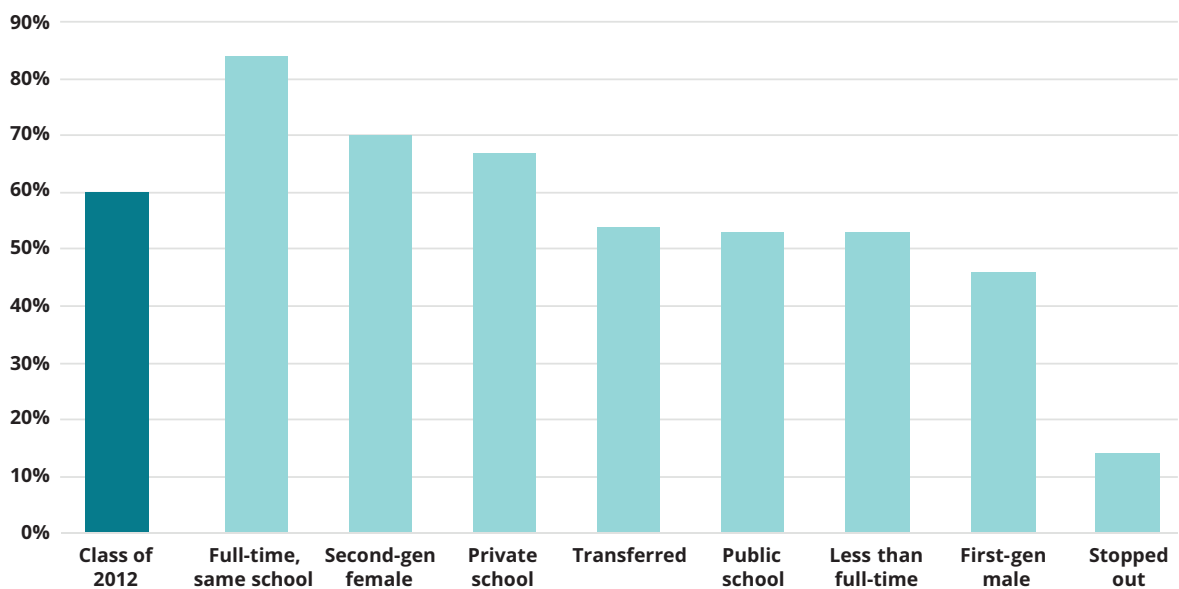
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- Only 53 percent of students who started full-time at a four-year school remained enrolled full-time for four consecutive years at the school at which they started.
- Students who transferred schools (even though they were enrolled continuously) were almost 30 percentage points less likely to graduate within four years than those who remained at their starting schools.
- Students who enrolled less than full-time (even though they were enrolled continuously) were 30 percentage points less likely to graduate within four years than those students who were enrolled continuously on a full-time basis.
- Students who left school for at least a semester were 70 percentage points less likely to graduate within four years than students who were enrolled continuously.
- Seventy percent of second-generation females completed their degrees within four years.
- Only 46 percent of first-generation males completed their degrees within four years.
- While Vermont had a higher completion rate than the national average, it also had a higher percentage of students who dropped out or stopped out of postsecondary education without a degree. At the end of four years, 22 percent of the students who began their postsecondary education had left school without attaining a degree. This was five percentage points higher than the national average.

**Figure 1. Completion rates within four years, Class of 2012**



This report is based on enrollment data from the National Student Clearinghouse and responses to the VSAC 2012 Senior Survey, which was administered to Vermont high school seniors in the spring of their senior year. Eighty-four percent of the Class of 2012 completed the survey and are represented in this report. A report on the outcomes of students who enrolled at two-year institutions will be released separately.

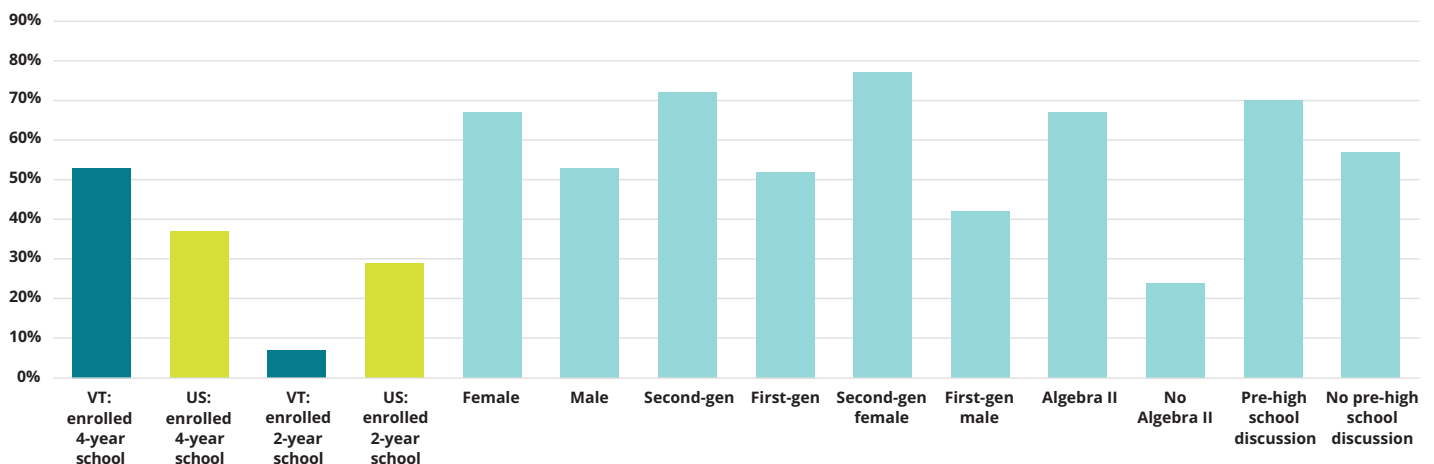
## Background

Vermont's public high school graduation rate has consistently been higher than the national average. Continuing this historic pattern, the public high school graduation rate for the Vermont High School Class of 2012 was higher than the national average (88 percent versus 80 percent). In contrast, Vermont's college-going rates among high school graduates have been lower than the national average. In 2012, the college-going rate for Vermont was 60 percent, six percentage points lower than the national college-going rate.

### Some of the highlights from our previous research, which focused on the aspiration and immediate enrollment of the Class of 2012, include:

- Vermonters enrolled at four-year institutions at higher rates than the national and regional average. Fifty-three percent of the Vermont Class of 2012 enrolled at a four-year school, and 7 percent enrolled at a two-year school. In contrast, only 37 percent of the nation's high school graduates enrolled immediately in a four-year school, while 29 percent enrolled immediately at a two-year school.
- Postsecondary enrollment varied significantly by county. Rural counties tended to have lower college-going rates. The percentage of students who continued their education ranged from 50 percent in Orange and Lamoille counties to 67 percent in Chittenden County.
- Female students were more likely than males to continue their education, 67 percent compared with 53 percent.
- Second-generation students were more likely than first-generation students to continue their education, 72 percent compared with 52 percent.
- Second-generation females (77 percent) were nearly twice as likely to continue their education when compared with first-generation males (42 percent).
- Sixty-seven percent of the graduates who completed Algebra II (or its equivalent) continued their education immediately after high school, compared with 24 percent of students who did not complete Algebra II.
- Graduates whose parents started talking to them about their post-high school plans before they entered high school were more likely to continue their education after high school (70 percent) than were graduates whose parents waited until the 9th grade or later to start those conversations (57 percent).

**Figure 2. Enrollment patterns of the Vermont High School Class of 2012**



## Introduction

Our previous research examined the factors associated with the postsecondary aspiration, enrollment, and persistence among graduates in the Vermont High School Class of 2012 (VSAC 2014, 2015). Some of the factors we identified were student's gender, parents' educational attainment, parental involvement in their children's post-high school plans, and student's academic preparation during high school. We found that females were more likely to enroll in postsecondary education. Students who had at least one parent who had attained a bachelor's degree or higher were also more likely to enroll in postsecondary education, as were students whose parents were more involved with their children's post-high school plans.

Students were also more likely to pursue postsecondary education if they did well in high school, as measured by their overall GPA. Similarly, students who completed a higher-level math class, such as Algebra II, were more likely to pursue postsecondary education and persist to a second year.

This report is our third look at this class. The purpose of this paper is to explore whether the Class of 2012 had successfully attained their degrees within four years of enrolling in postsecondary education.

There are two ways to describe the postsecondary attainment of the Class of 2012. Both are important measures of educational attainment and tell us important information about the Class of 2012. The two different measurements are outlined below and in Figure 3.

### 1) **Completion rate of those who enrolled full-time at a four-year school**

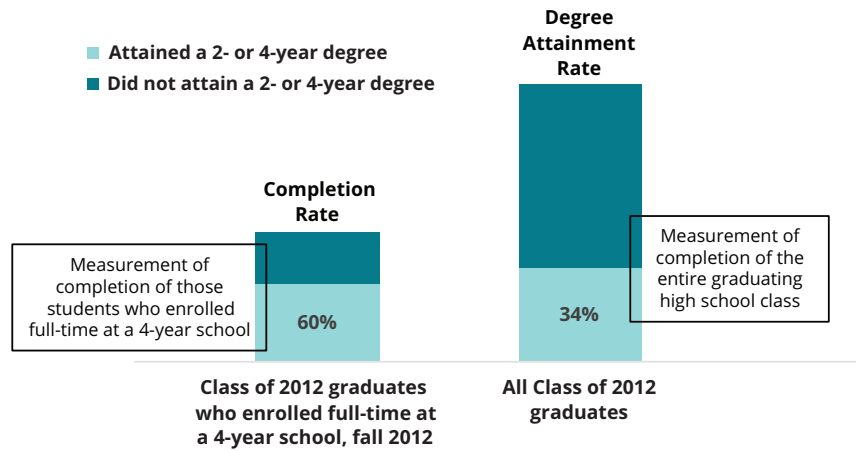
The first way to measure completion is to calculate the percentage of students who enrolled full-time at a four-year postsecondary institution and earned a degree. This is a subset of the entire graduating high school class; it includes only those students who enrolled full-time at a four-year school in the fall of 2012. This is the typical method used to measure completion. The four-year completion rate for the Class of 2012 is 60 percent.

### 2) **Degree attainment rate of the entire high school Class of 2012**

A second way to measure educational attainment is to calculate the percentage of the entire high school Class of 2012 who earned a degree. This includes the entire class, not just those who started full-time at a four-year school. This is an important metric, as it tells us how many high school graduates attained a postsecondary degree within four years. The four-year degree attainment rate for the Class of 2012 is 34 percent.

This report is separated into two sections. In Section A, we discuss the graduates of Vermont High School Class of 2012 who started full-time at a four-year school in the fall of 2012. In Section B, we take a step back and look at the entire Vermont High School Class of 2012, as well as the classes of 2008 and 2010, to gain some perspective on enrollment and degree attainment rates over time.

**Figure 3. Degree attainment rate and completion rate of the Class of 2012**



### Section A: Immediate continuers who started full-time at a four-year school

The completion rate of Vermonters who started full-time at a four-year school was 60 percent<sup>2</sup> (Figure 4), which exceeded the national average by 13 percentage points (NSC, 2018). Vermonters are attaining degrees within four years, on average, faster than their national counterparts.

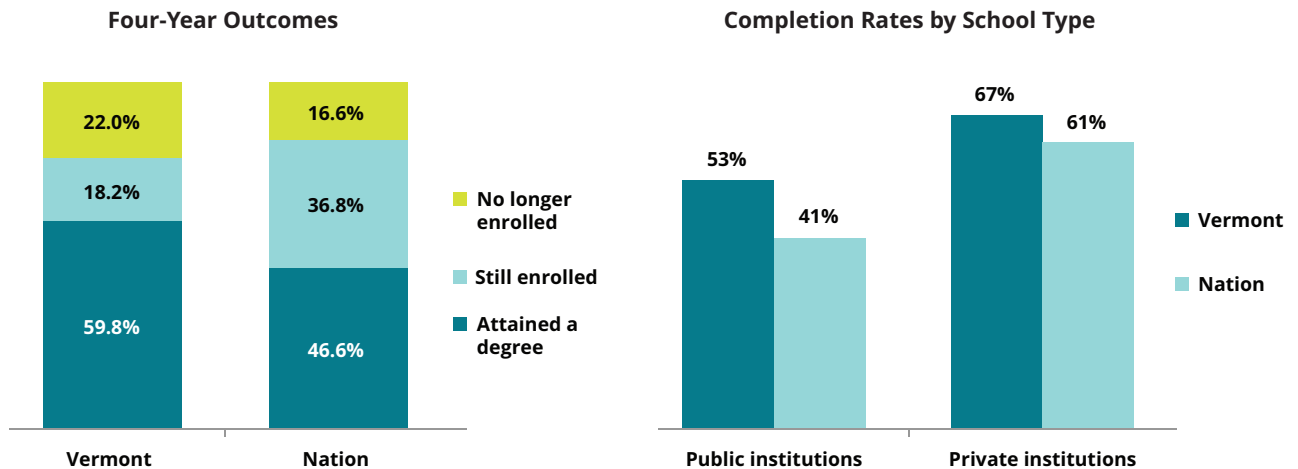
On-time graduation accrues benefits both to individual students and to the overall economy. Students who take six years to graduate borrow more to fund their additional years of school. Studies at two universities found that students who graduated in six years rather than four increased their student loan debt by nearly 70 percent (Complete College America, 2014). Students who complete on time are also able to enter the workforce sooner, providing economic and social benefits to themselves and to their communities.

One of the factors associated with a higher on-time completion rate among Vermonters was the type of school at which they enrolled. Vermont students enrolled full-time at four-year institutions at a substantially higher rate than their national counterparts. As will be discussed further, full-time enrollment at four-year institutions is associated with higher completion rates. In addition, Vermonters were more likely to enroll at private colleges, which, according to national studies (NCS, 2017), generally have higher four-year completion rates than public schools do (Figure 4). About half of the Vermont Class of 2012 graduates who enrolled at a four-year college enrolled at a private college. In contrast, the national average was 33 percent.

Vermonters (who were, again, more likely to enroll at private colleges) exceeded the national four-year completion rate at both public and private colleges (Figure 4). Among students who attended private colleges, Vermont students were six percentage points more likely to graduate within four years than the national average. And among students who attended public colleges, Vermont students were 12 percentage points more likely to graduate within four years than the national average.

<sup>2</sup> This completion rate includes students who attained either an associate degree or a bachelor's degree.

**Figure 4. Four-year outcomes rates of first-time, full-time students who started at a four-year school (includes students who transferred schools)**



Completion data from high school classes prior to the Class of 2012 suggests, however, that by the end of six years the difference between the Vermont completion rate and the national completion rate will narrow substantially. For example, the six-year completion rate for the Vermont Class of 2010 was 74.5 percent<sup>3</sup>, while the national six-year completion rate was 70 percent.

For those high school graduates who enrolled full-time at a four-year school immediately after high school graduation, over 56 percent received a bachelor's degree within four years: 51 percent from the school at which they started, and an additional 5 percent from a school different from the one at which they started. More than three percent attained an associate degree (Figure 5).

While Vermont's four-year completion rate is higher than the national average, wide inequities remain between first- and second-generation students, between males and females, and between students from different regions of the state.

In this study, we looked at some of the factors that were negatively associated with students' on-time completion: transferring schools, taking a semester off, or enrolling less than full-time for a semester or more. Other researchers have identified additional factors regarding student enrollment patterns that tend to jeopardize timely completion, such as taking 12 credits per semester rather than 15, though we were unable to evaluate these factors in this study. (Complete College America, 2014).

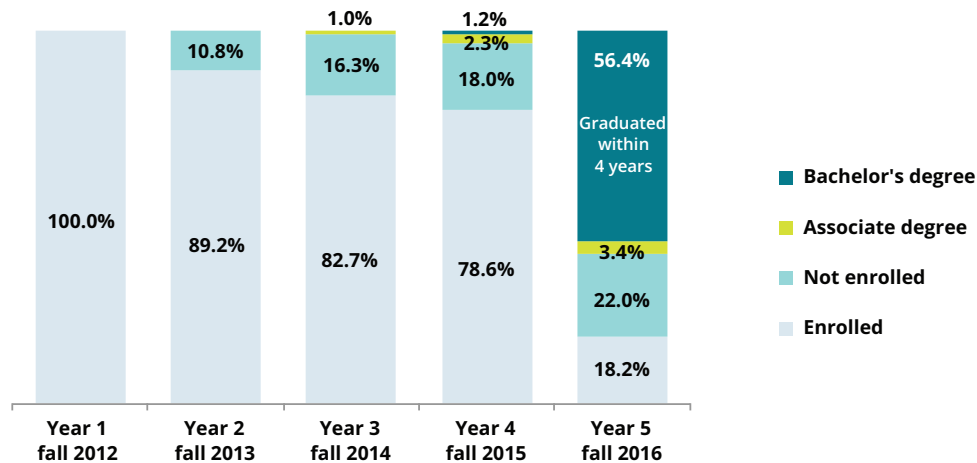
For many members of the Class of 2012, the journey through postsecondary education was not straightforward. By the start of their second year, 11 percent had dropped out and did not re-enroll at any institution, while another 10 percent had transferred to another school (Figure 5). Within four years,

<sup>3</sup> As noted previously, the college-going rate of Vermont high school graduates is lower than the national average. However, Vermonters enrolled at four-year institutions (which tend to have higher completion rates) at a higher rate than the national average. As a result, Vermont has a slightly higher percentage of high school graduates who attained a degree within six years, compared with the national average.

the number of transfers had doubled; one in five had transferred to another institution. Of even greater concern, by the fall of 2016, 22 percent of immediate continuers who had started full-time at a four-year school had left postsecondary education without attaining a degree.

**Figure 5. High school graduates who started full-time at a four-year school (n= 2,742)**

*Enrollment at the start of the academic year*



The implications for state education and economic development goals become even more clear when we consider all students from the Class of 2012, not just those who enrolled full-time immediately after high school at a four-year school. As we shall explore in Section B, when we consider all students from the class who enrolled immediately after high school, full-time or part-time, at a two- or a four-year institution, the percentage of students who left school without a degree is substantially greater. At the time of this study, 27 percent of the Class of 2012 who had enrolled immediately after high school had dropped out without receiving a degree.

This has substantial negative implications for both the individuals and their communities. The economic value of a college education accrues almost entirely when the degree is conferred. Individuals who begin a college education without earning a degree frequently accumulate debt without receiving the full economic value of their education. According to the College Board (College Board, 2015), the student loan default rate among borrowers who did not graduate was nearly three times higher than the student loan default rate among those who graduated.

Reducing the percentage of Vermonters that start college but do not attain a degree would benefit not only the individuals, but the communities in which they reside. Successfully obtaining a postsecondary degree is associated with greater levels of home ownership (Chakrabarti, 2017), better health, lower unemployment, and greater civic participation (Baum, 2013). The Lumina Foundation (Lumina, 2017), using Census data, has estimated that there are 55,000 working-age Vermont residents who have some college education but no degree.

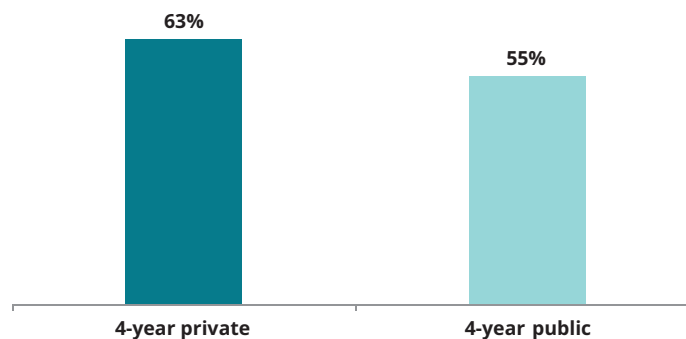
## Factors associated with college completion

Students from the Class of 2012 who enrolled full-time at four-year institutions varied in their socio-economic characteristics, their academic preparation, and other factors associated with the likelihood of achieving their academic goals successfully. In the remainder of this section, we explore the association of these factors with students' completion. In particular, we examine enrollment patterns, academic preparation, geographic region, the school at which students initially enrolled, parents' educational attainment, and the influence of parental involvement in their children's postsecondary planning.

### Enrollment patterns

Continuous enrollment and remaining at the same school for four years varied by institution. Students who started at a private college were more likely to remain at the same school full-time for four consecutive years than students who started at a public college. Of the students who started full-time at a private college, 63 percent enrolled full-time through the fall of 2015, compared with 55 percent among students who started at a public college (Figure 6). The exception to this was the University of Vermont: 74 percent of students who started at the University of Vermont full-time in the fall of 2012 returned each year for four consecutive years.

**Figure 6. Continuous full-time enrollment rates by sector**



Members of the Class of 2012 who enrolled full-time for four consecutive years at the same school had the highest completion rate: 84 percent attained a degree within four years. However, only 53 percent of those students who started full-time at a four-year school remained continuously enrolled full-time at the same school. The remainder had enrollment patterns that were associated with a decreased likelihood of graduating in four years. These included transferring schools, enrolling part-time for at least a semester, and stopping-out (Figure 7).

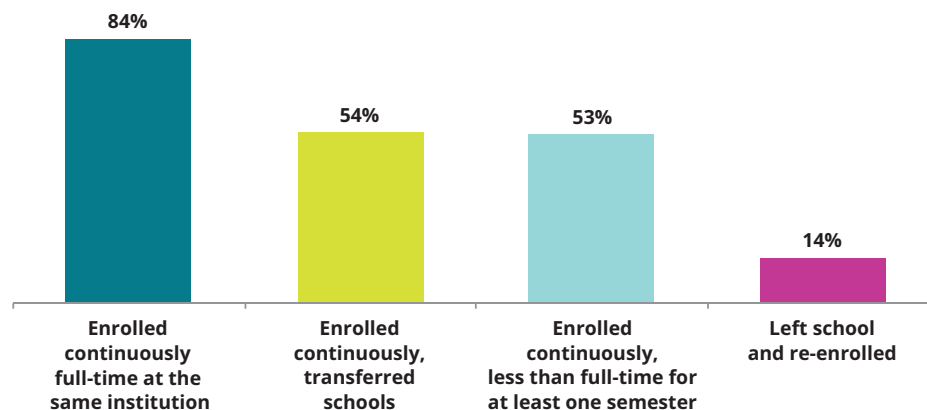
Nine percent of students in this cohort were enrolled continuously but transferred from one institution to another. The average four-year completion rate of this group of students was 54 percent. Students who transfer frequently lose credits that are not accepted by the receiving institution. This loss of credits takes a substantial social and financial toll on students' time and resources. A recent study by the U.S. Government Accountability Office (GAO, 2017) estimated that students who transferred schools lost about 40 percent of the credits that they had earned.

Federal and state policymakers across the nation have identified as a significant policy priority the elimination of barriers to transferring credits between institutions. It is also critical that institutions of higher education work with students who are considering transferring to help them understand the potential impact of loss of credits, extended time to degree, and increased student loan debt.

Another factor that decreased the average four-year completion rate was enrolling less than full-time for a least one semester. Seven percent of the students in this cohort enrolled continuously but decreased their enrollment intensity to less than full-time for at least one semester. The average completion rate of this group was 53 percent.

Taking a break from school (15 percent of the students in this cohort) had the highest association with failure to complete a degree within four years. Forty two percent of students who left after one or two semesters had not re-enrolled by the fall of 2015, and only 14 percent of the students who re-enrolled after leaving school for a semester or more attained a degree within four years. Analysis of data from the Vermont High School Class of 2010 reveals that this relationship persists beyond four years—only 22 percent of students who left school after having enrolled full-time at a four-year school attained a degree within six years.

**Figure 7. The relationship between enrollment patterns and degree completion**



So far in this report, we have identified factors—such as enrolling continuously on a full-time basis—that are associated with timely completion of a postsecondary degree once someone has enrolled in a postsecondary institution. However, the path to successfully attaining a postsecondary degree starts many years before a student ever steps into a college classroom. There are many factors associated with college enrollment and completion that occur prior to college enrollment. The factors we looked at as part of this evaluation included the coursework students completed while they were in high school and the overall high school GPA they earned. Other factors we examined included parental influence, gender, and first-generation status.

## Academic preparation

We examined three factors to characterize students' academic preparation for college-level work: completion of Algebra II, overall high school GPA, and completion of an Advanced Placement course in high school.

Algebra II has long been considered an important course to help prepare students for college-level work. "The Toolbox Revisited" (Adelman, 2006) shows not only the importance of Algebra II, but the importance of each successive mathematics course after Algebra II. According to Adelman, high school students who complete mathematics courses beyond Algebra II are more likely to earn a bachelor's degree than either those who do not complete Algebra II or those who do not complete any math beyond Algebra II.

Our survey data for the Class of 2012 is limited to whether students completed Algebra II. Starting in 2014, however, we expanded the survey to include all of the math courses that students completed while in high school. Analysis of the Class of 2014 data confirms the importance of completing higher level math courses: 79 percent of students from the Vermont High School Class of 2014 who took Algebra II but took no math course beyond Algebra II persisted to a second year of postsecondary education. Those who took at least one additional year of math beyond Algebra II had a persistence rate 14 percentage points higher, 93 percent.

Table 1 shows that taking Algebra II, earning an overall high school GPA of A, and completing an Advanced Placement course were all associated with higher rates of postsecondary degree completion. Three-quarters of students who took Algebra II and received an overall high school GPA of A attained a degree within four years. The completion rate of students who took Algebra II but had an overall high school GPA less than an A was almost 30 percentage points lower, 47 percent.

As we will discuss later in the report, first-generation males had the lowest college enrollment and completion rates. However, within this group of first-generation males, higher completion rates were associated with academic preparation: The completion rate of first-generation males who took Algebra II and received an overall GPA of A was 66 percent, while the completion rate of first-generation males who took Algebra II but had an overall high school GPA of less than an A was 38 percent.

Table 1 shows that degree completion is also associated with the completion of an Advanced Placement (AP) course while in high school. Taken together, these findings suggest ways to identify and support students in high school who are at risk of not successfully transitioning to education or training after high school; they also enable postsecondary institutions to identify, support, and target interventions toward those students most at risk of dropping out or taking more than four years to attain a degree.

Using a statistical model discussed later in this paper, we found that academic preparation, gender, and parents' educational attainment all were associated with on-time completion<sup>4</sup>. Further, we found that academic preparation had a stronger association with on-time college completion than did gender or parents' education level, when each factor is tested individually.

<sup>4</sup> The statistical model is discussed later in this report and in Appendix A. We used logistic regression to assess individually how well each of following factors predicted completion: gender, parents' education level, completion of Algebra II, high school GPA, students' perception of their parents' post-high school desires, and when parents first talked to their children about their post-high school plans. We also constructed a multivariable model to predict completion while accounting for the influence of other factors.

**Table 1. Academic preparation factors associated with postsecondary aspiration, enrollment, and completion**

FACTOR	Aspiration (at a 4-year school)	Enrollment (at a 4-year school)	Completion <sup>5</sup> (started full-time at a 4-year school)
Completed Algebra II	68%	60%	61%
Did not complete Algebra II	16%	13%	30%
Completed an Advanced Placement course	85%	76%	68%
Did not complete an Advanced Placement course	40%	34%	44%
Overall high school GPA of A	84%	76%	75%
Overall high school GPA less than A	49%	42%	46%

#### Academic preparation differences between students enrolled at different schools

Students' choice of institution differed by academic preparation. Students who started at one of the Vermont State Colleges were the least likely to report that they had completed Algebra II or an Advanced Placement course or attained an overall high school GPA of A, while students who started at the University of Vermont had the highest rates of Algebra II completion, Advanced Placement courses, and an overall GPA of A (Table 2). Eighteen percent of Vermont students who enrolled at one of the Vermont State Colleges reported that they had taken Algebra II and had attained an overall GPA of A in high school, compared with 67 percent of Vermont students who enrolled at the University of Vermont. Forty-six percent of students enrolled at a Vermont independent college reported that they had attained an overall GPA of A.

**Table 2. Students' academic preparation by sector**

STARTING SECTOR	Completed Algebra II	Completed an Advanced Placement (AP) course	Attained overall high school GPA of A	1) Completed Algebra II and 2) attained an overall high school GPA of A
University of Vermont	99%	83%	67%	67%
4-year non-Vermont private	97%	72%	57%	56%
4-year Vermont private	98%	63%	47%	46%
4-year non-Vermont public	98%	67%	38%	38%
4-year Vermont State College	91%	38%	20%	18%

<sup>5</sup> Chi-square results show a statistically significant difference in each of the factors with respect to completion: completion of Algebra II, completion of at least one Advanced Placement course, and overall high school GPA. Completion includes either a two- or four-year degree.

### Completion rates by institution, sector, and location

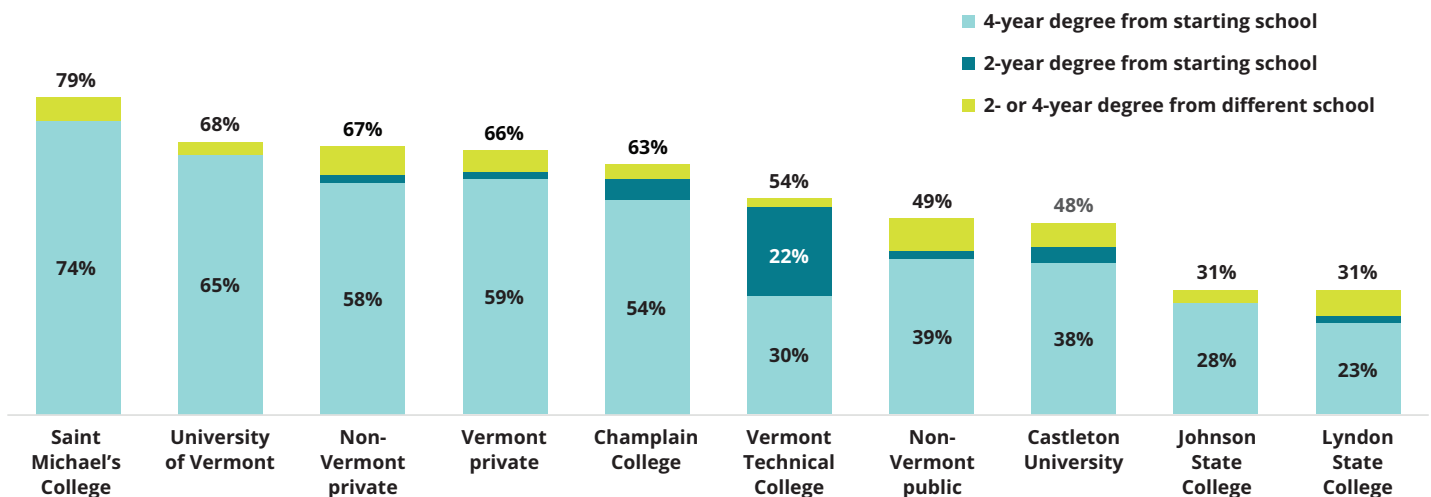
Completion rates varied by the type of institution that students attended. Related to this, we found that the types of institutions students attended differed by first-generation status. Of the students who enrolled at private institutions, 32 percent identified themselves as first-generation. By comparison, of the students who enrolled at public institutions, 43 percent identified themselves as first-generation.

We also found variation among students who enrolled at Vermont public institutions with respect to parents' education level. Although there is overlap, Vermont's public institutions tend to serve somewhat different populations of students. Sixty-one percent of the Vermont students who enrolled at one of the Vermont State Colleges identified themselves as first-generation, compared with 27 percent of the Vermont students who enrolled at the University of Vermont.

Some schools have historically had higher graduation rates than others. In order to examine this more closely, we looked at Vermont institutions that enrolled more than 50 students from the Class of 2012 in the fall of 2012. We found that students who started at Saint Michael's College had the highest completion rate. Students who started at the University of Vermont had the highest completion rate among Vermont public institutions. Vermont students who attended Castleton University had a similar completion rate as those who attended non-Vermont public institutions<sup>6</sup> (Figure 8).

**Figure 8. Completion rates for the Class of 2012 by institution/sector**

Vermont institutions with enrollments greater than 50 students from the Class of 2012 are listed individually



<sup>6</sup> Vermont Technical College (VTC) is a public institution that offers both associate degrees and bachelor's degrees. According to IPEDS, VTC awards more associate degrees than bachelor's degrees. Student responses from the Senior Survey were used to determine whether students at VTC were pursuing an associate degree or a bachelor's degree. Additionally, students' enrollment intensity was not provided to NSC by VTC. Student responses from the Senior Survey were used to determine students' enrollment intensity.

We found that students who reported similar academic preparation had different completion rates, depending on the institution and (private or public) sector where they first enrolled. In this analysis, we separated students into two groups, all of whom took Algebra II<sup>7</sup>. The first group reported an overall high school grade point average of A. The second group reported an overall high school grade point average of B<sup>8</sup>. Figure 9 shows the differences in completion rates among “A” and “B” students by institution type.

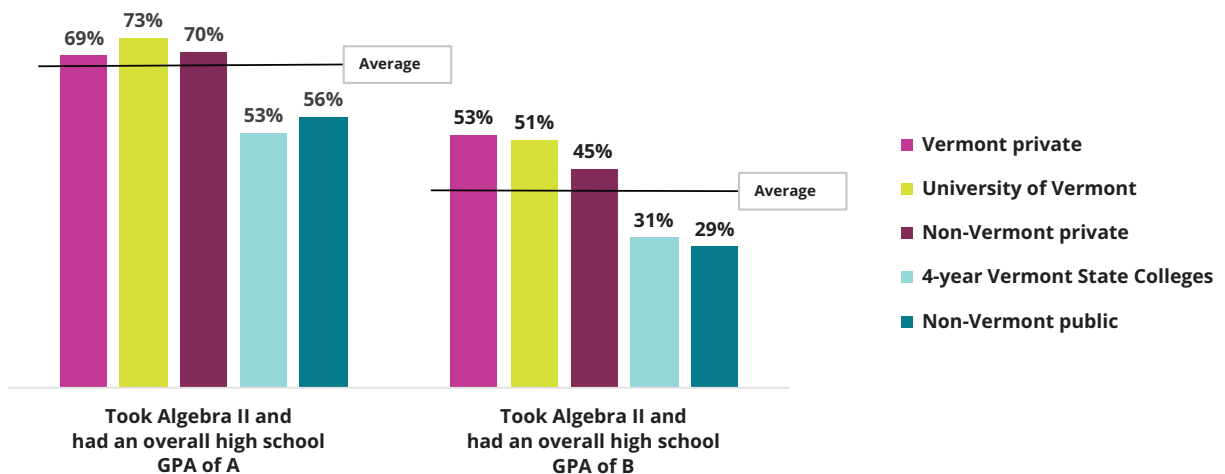
Students who took Algebra II and reported an overall high school GPA of A were more likely to have higher completion rates overall, about 28 percentage points on average: The average completion rate of students who took Algebra II and reported an overall high school GPA of A was 68 percent, compared with 40 percent among students who reported an overall high school GPA of B.

Among “A” students who started at a private institution or the University of Vermont, about seven out of 10 attained a four-degree within four years from the same school. Among “A” students who started at one of the Vermont State Colleges<sup>9</sup> or a public institution outside of Vermont, the completion rates were lower, 53 percent and 56 percent, respectively.

There were also differences in completion rates among “B” students. These ranged from 53 percent among students who started at Vermont private institutions to 29 percent among students who started at public institutions outside of Vermont. Additionally, there was variation in completion rates at the end of four years among “B” students who started one of the Vermont State Colleges: Castleton University, 36 percent; Vermont Technical College, 28 percent; Lyndon State College, 26 percent; and Johnson State College, 24 percent.

**Figure 9. Completion rates by sector and academic preparation**

Completion rates shown include four-year degrees attained from students’ starting school



<sup>7</sup> Within this cohort (students who started full-time at four-year institutions in the fall of 2012), 97 percent reported that they had completed Algebra II.

<sup>8</sup> For students who started full-time at four-year schools, 49 percent reported that they had attained an overall high school GPA of A, 46 reported that they had attained an overall high school GPA of B, and 5 percent reported that they had attained an overall high school GPA of C.

<sup>9</sup> For Figure 9, only the University of Vermont is listed by itself. All other schools, which were listed previously in Figure 8, were combined into their respective (private or public) sectors because of small sample sizes.

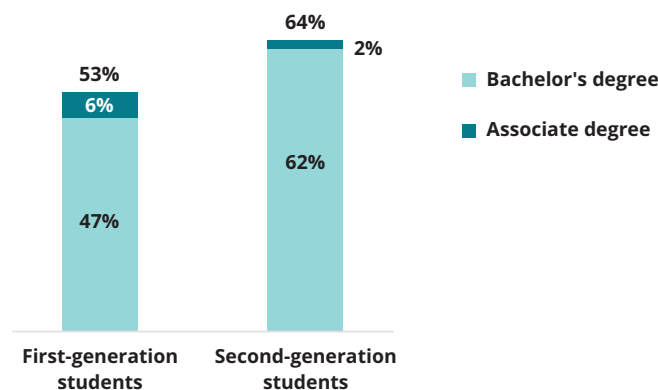
### Parents' educational levels

There is large disparity in educational attainment between first- and second-generation high school graduates. As noted earlier, we define first-generation students as those whose parents do not have a bachelor's degree, while second-generation students are defined as those with at least one parent who has attained at least a bachelor's degree. Over time, the percentage of first-generation high school graduates in each cohort has gradually decreased. In 2001, 55 percent of graduates were first-generation. In 2012, one-half of the graduates were first-generation; one-half were second-generation. In 2014, for the first time, the percentage of second-generation high school graduates was greater than the percentage of first-generation graduates, 52 percent compared with 48 percent. We expect that over time this trend will have a positive influence on college aspiration and enrollment rates.

Nonetheless, a major concern for Vermont's future is the ability to engage all students, especially first-generation students, in postsecondary education. Compared with second-generation high school graduates, fewer first-generation graduates were enrolled in college by the fall of 2012 (73 percent and 51 percent, respectively). This disparity persists in our analysis of completion. Only 53 percent of first-generation students completed a degree within four years, compared with 64 percent of second-generation students (Figure 10). First-generation students who began full-time at a four-year institution with the intention of obtaining a four-year degree were also more likely to obtain an associate degree instead, six percent compared with two percent.

**Figure 10. Completion rates by parents' educational attainment**

Of students who started full-time at a four-year school



### County of residence and parents' education level

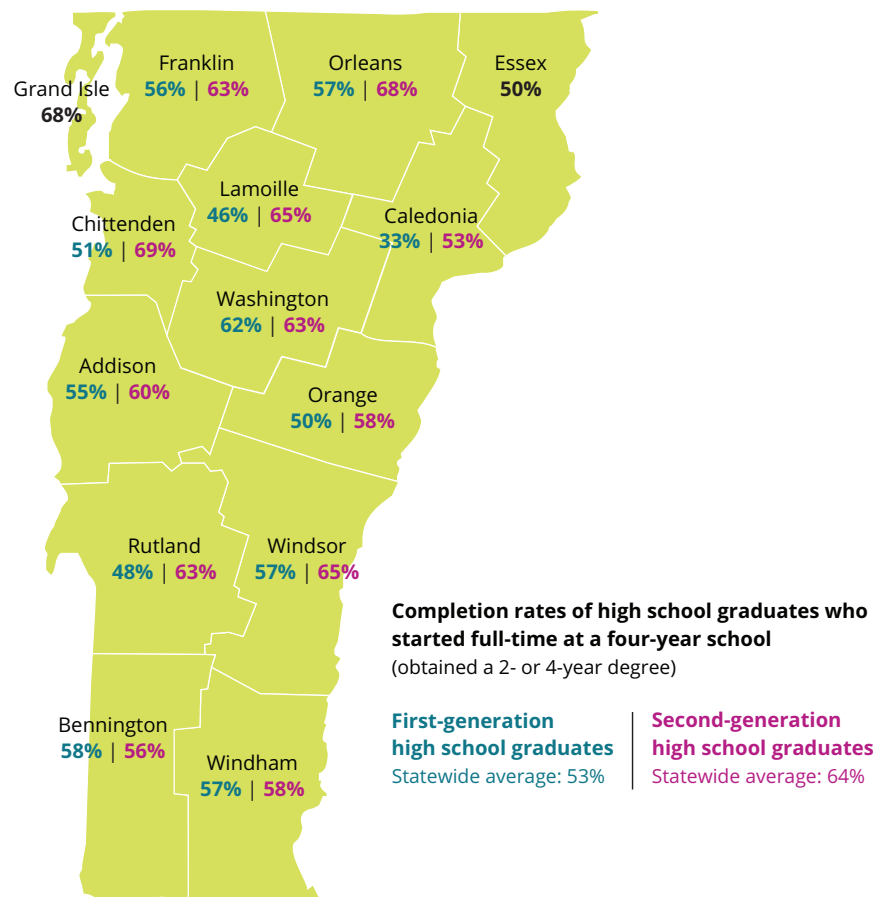
Geography continues to be strongly associated with educational opportunity in Vermont. VSAC's previous research documented wide variation in both aspirations and enrollment for first-generation students by county. These patterns persist for on-time degree completion. Among first-generation students, four-year completion rates range from a low of 33 percent in Caledonia County to a high of 62 percent in Washington County. The counties with the largest differences in on-time completion rates between first- and second-generation students (ranging from 17 to 19 percentage points) were Caledonia, Lamoille, and Chittenden counties. The counties with the smallest differences (ranging from -1.7 to 1.2 percentage points) were Bennington, Washington, and Windham counties.

Bennington County is unique in that a higher percentage of first-generation students attained a degree within four years than second-generation students did, 58 percent compared with 56 percent. However, it is important to remember that these percentages include only those who enrolled full-time at a four-year school. In Section B of this paper, we show the degree attainment rates of all high school graduates. From that perspective, the first-generation students from Bennington County had a lower degree attainment rate than second-generation high school graduates, 26 percent compared with 37 percent. This is because first-generation high school graduates are much less likely than second-generation high school graduates to enroll in postsecondary education.

Low degree attainment rates are amplified by low enrollment rates. For example, only 16 percent of all first-generation students among the Class of 2012 from Caledonia County received a degree within four years after high school, compared with 30 percent of all first-generation students among the Class of 2012 from Washington County<sup>10</sup>.

**Figure 11. Completion rates by county and parents' education level**

High school graduates who started full-time at a four-year school



<sup>10</sup> See Figure 20, "Degree attainment rates within four years of high school graduates by Vermont County and parents' education level, Class of 2012."

### Parental involvement

Parents play a critical role in helping their children formulate their post-high school plans. Students whose parents started talking with them earlier in their education about post-high school plans were more likely to continue their education than students whose parents waited until high school to start these conversations. And the role that parents play in their children's lives does not end at high school graduation. Frequently, children need emotional support and encouragement to make the transition from high school to college and to succeed in college. Parental involvement—as measured by when they started talking to their children about post-high school plans—was associated with postsecondary aspiration, enrollment, and (to a lesser extent) postsecondary completion (Table 3). Students whose parents started talking to them before the 9th grade about post-high school plans had higher four-year completion rates (63 percent) than students whose parents waited until high school to discuss those plans (58 percent).

There was also variation in students' perception of what their parents wanted them to do after high school graduation. Some students reported that their parents wanted them to continue their education after high school, while other students reported their parents wanted them to pursue other options, such as working full-time or joining the military. Students who felt their parents wanted them to pursue education after high school had higher college-going rates on average, 69 percent compared with 26 percent. Parental influence was reflected in completion rates as well. Students who felt their parents wanted them to pursue education had higher college completion rates on average, 61 percent compared with 54 percent. This suggests that parents' pre-high school conversations and clarity of expectations may have a tremendous influence on their children's postsecondary enrollment and success.

**Table 3. Parental influence factors associated with postsecondary aspiration, enrollment, and completion**

FACTORS	Aspiration (at a 4-year school)	Enrollment (at a 4-year school)	Completion <sup>11</sup> (started full-time at a 4-year school)
Parents' desire: pursue education	78%	69%	61%
Parents' desire: pursue other options	29%	26%	54%
Talked to parents before the 9th grade	72%	64%	63%
Talked to parents 9th grade or later	55%	48%	58%

<sup>11</sup> Chi-square results show a statistically significant difference in each of the factors with respect to completion. Completion includes either a two- or four-year degree.

### Statistical model

We used statistical modeling to confirm the differences in the completion rates discussed above. Details regarding methodology and results can be found in Appendix A. Initially, we tested each of the main factors with a logistic regression model to determine whether its relationship with on-time completion was statistically significant. In particular, we created models for gender, first-generation status, Algebra II completion, overall high school GPA, parental expectation toward their child's postsecondary education, and when post-high school conversations started. Each of these factors were found to be significantly associated with on-time completion on their own.

We found that some factors had a stronger relationship with college completion relative to other factors. For example, college completion had stronger associations with academic preparation factors than with either gender or parents' education level. Our model showed that the estimated odds of completing college were 72 percent lower among students who did not take Algebra II than among those who did take it and 71 percent lower among students who attained less than a high school GPA of A relative to those who attained a high school GPA of A. On the other hand, the estimated odds of completion were only 37 percent lower among males compared with females and 38 percent lower among first-generation students compared with second-generation students (Appendix A, Table A1).

In the previous sections and in the individual models discussed above, we examined how each individual factor is related to college completion, but these factors are also related to each other. For example, students whose parents began talking to them about college earlier in their education were more likely to be female, were more likely to be second-generation, and were more likely to complete Algebra II while in high school. This makes it more difficult to identify those factors that influence student success and those that appear important simply due to their association with other influential factors. Because of this, we built a multivariable logistic regression model that simultaneously uses many of the factors mentioned in this paper to predict college success. By including multiple factors within the same model, we could test whether a given factor (for example, completing Algebra II) was associated with four-year college completion even while controlling for the influence of other factors (for example, gender or parental education level).

The results from this multivariable statistical model, found in Appendix A, confirm that gender, first-generation status, Algebra II completion, GPA, and parental attitude toward postsecondary education each contribute in important ways to students' college completion.

It is important to note, however, that these are not the only factors that influence student success. A host of other factors not included in this paper are involved with students successfully navigating their postsecondary journey. These include, but are not limited to, such things as financial aid to offset financial barriers, adequate counseling and academic advising, and making satisfactory academic progress while in college.

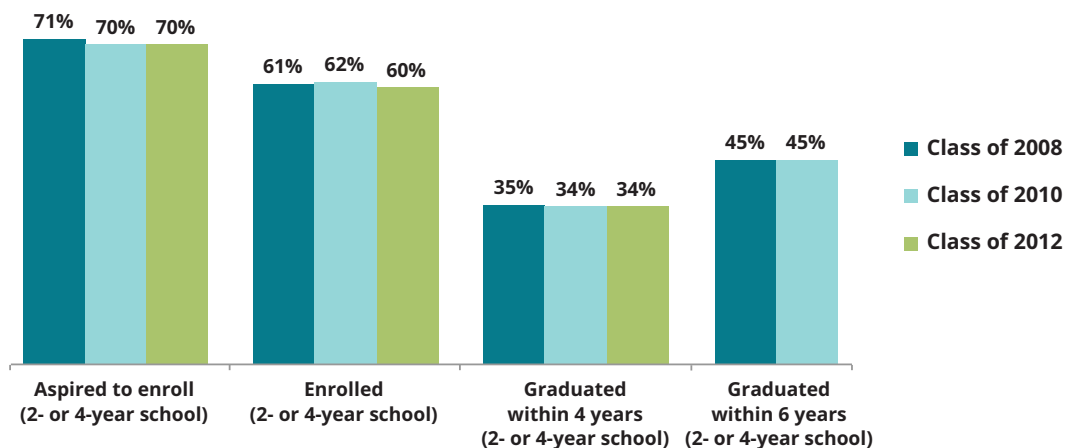
## Section B: Vermont High School Class of 2012 education outcomes

So far in this report, we have looked at the students who started full-time at four-year schools. In this section, we take a step back and look at the entire Class of 2012 to describe and evaluate their enrollment and degree attainment at two- and four-year schools within four years of high school graduation.

Since 2008, the patterns of postsecondary aspiration, enrollment, and completion among Vermont high school graduates have remained stable: About 70 percent planned to enroll at a two- or four-year school in the fall following their high school graduation, while about 60 percent actually enrolled (Figure 12). Slightly more than a third of each class we followed since 2008 has attained either an associate or bachelor's degree within four years<sup>12</sup>. After six years, 45 percent of students from both the classes of 2008 and 2010 had attained a degree<sup>13</sup>.

**Figure 12. The postsecondary aspiration, enrollment, and outcomes at two- or four-year schools**  
Vermont high school classes of 2008, 2010, and 2012

*Note: Graduation rates listed are for the entire high school class graduating class, which includes those who did not continue their education*



### Immediate and delayed enrollment of the Class of 2012

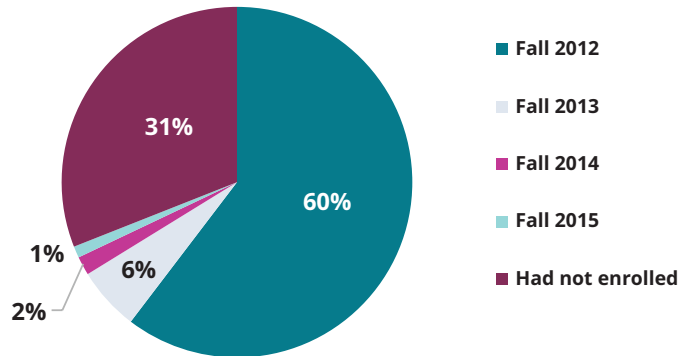
Almost seven out of 10 students from the Class of 2012 (69 percent) enrolled at a two- or four-year school within four years of graduation (Figure 13). Most, 60 percent, enrolled immediately after high school. Nine percent of the Class of 2012 delayed their enrollment by one or more semesters: Six percent enrolled after a one-year delay, and an additional three percent enrolled after a delay of more than one year. Of the people who delayed enrollment, close to half, 43 percent, were students who had planned during their senior year in high school to enroll immediately after high school.

<sup>12</sup> The VSAC Senior Survey is administered to Vermont high school seniors every other year on years ending in an even number.

<sup>13</sup> We plan to follow the Class of 2012 and report the six-year completion rate of this class.

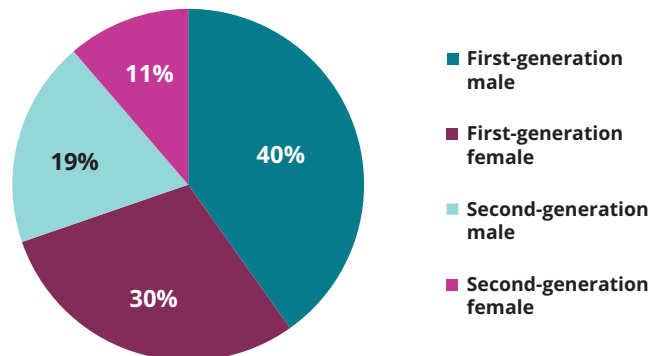
**Figure 13. Year of first postsecondary enrollment, Class of 2012**

*Enrollment at a two- or four-year postsecondary institution (n= 5,840)*



Thirty-one percent of the Class of 2012 did not enroll in postsecondary education within four years. Of the students who did not enroll within this four-year period, seven out of 10 were first-generation students (Figure 14), and four out of 10 were first-generation males.

**Figure 14. Students who had not enrolled within four years of high school graduation, by gender and parents' education level**



The longer students waited to enroll in postsecondary education following high school graduation, the more likely they were to enroll in a two-year school rather than a four-year school. Twelve percent of students who enrolled immediately after high school graduation enrolled at two-year school. The percentage increased to 40 percent for those who waited one year after high school graduation to enroll and increased to 58 percent for those who waited two or more years to enroll (Table 4).

In addition, the longer students delayed enrollment, the more likely they were to enroll at a Vermont institution. One-half of students who enrolled immediately after high school graduation enrolled at a Vermont school. This percentage increased to 57 percent for those who waited one year after high school to enroll and increased to 63 percent for those who waited two or more years. Table 4 presents a more detailed look at the ways in which students who delayed their enrollment chose different types of institutions than those who enrolled immediately after high school graduation.

**Table 4. The postsecondary enrollment by sector and enrollment starting time**

SECTOR	When education was started after high school		
	Fall 2012	Fall 2013	Fall 2014 or 2015
Vermont, two-year	9%	31%	45%
University of Vermont	14%	7%	**
Vermont State College, four-year	18%	12%	10%
Vermont, four-year private	9%	6%	**
Non-Vermont, two-year	3%	9%	13%
Non-Vermont, four-year public	14%	10%	**
Non-Vermont, four-year private	34%	24%	17%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
Count	n = 3,535	n = 342	n = 163
<b>SUBTOTALS OF THE ABOVE</b>			
2-year institution	12%	40%	58%
4-year institution	88%	60%	42%
Vermont institution	50%	57%	63%
Non-Vermont institution	50%	43%	37%

\*\* Data is not shown due to small sample sizes.

Not everyone who planned to enroll at a two- or four-year school enrolled. National estimates of what is commonly referred to as “summer melt” range from 8 to 40 percent (Castleman, 2014). For the Vermont Class of 2012, 16 percent planned to enroll in the fall of 2012 but did not. These students can be categorized in two ways—those who delayed enrollment and those who never enrolled—both of which have policy implications.

While their circumstances may have prevented them from enrolling in the fall of 2012, 30 percent of students in the summer melt group were able to enroll by the fall of 2015. As previously mentioned, we found that students who delay enrollment in postsecondary education have lower completion rates than those who start their postsecondary education immediately after high school. More work needs to be done to better understand the reasons why this group of Vermonters defers enrollment, and to help them overcome the barriers that prevent them from enrolling immediately after high school graduation.

Nearly one-third of the Class of 2012 had not enrolled in postsecondary education within four years of high school graduation. Most of these were students who did not plan to enroll in postsecondary education immediately after high school graduation (22 percent). However, nine percent were members of the summer melt group. This highlights the second challenge posed by summer melt—a significant portion of the Class of 2012 (approximately 500 students) planned to pursue higher education but never arrived.

**Figure 15. Postsecondary enrollment status within four years, Vermont Class of 2012**

*Enrollment at a two- or four-year postsecondary institution (n= 5,840)*

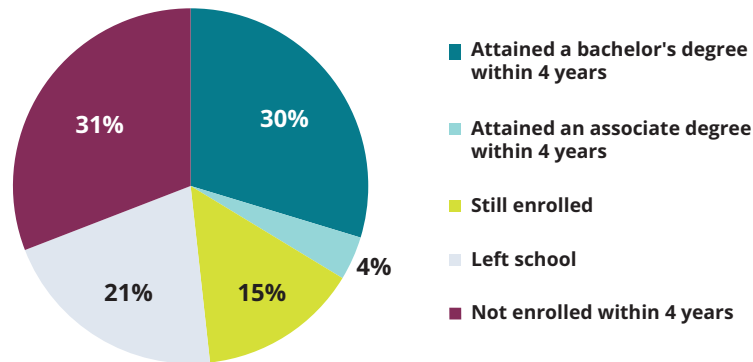
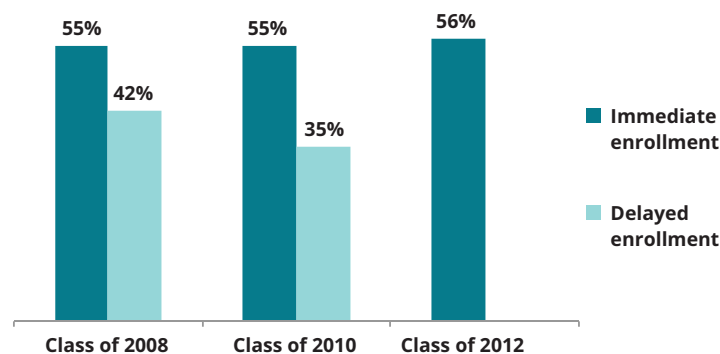


Figure 15 shows the education outcomes of the Class of 2012 by the fall of 2015, regardless of their enrollment start time. Sixty-nine percent had enrolled at a two- or four-year school within four years. Thirty percent of the entire class attained a bachelor's degree, while four percent attained an associate degree. Fifteen percent of the class were still enrolled in postsecondary education, and 21 percent had enrolled but left. Thirty-one percent of the Class of 2012 had not enrolled at a two- or four-year institution by the fall of 2015, four years after high school graduation.

Immediate postsecondary enrollment after high school graduation is associated with higher on-time completion rates. As stated earlier in this report, of those who started postsecondary education immediately after high school, 56 percent attained a bachelor's degree within four years. Looking at high school classes of 2008 and 2010, we were able to compare the on-time completion rates of students who enrolled immediately after high school with those who postponed their enrollment by one year. Students of the classes of 2008 and 2010 who postponed postsecondary enrollment by one year had dramatically lower on-time completion rates (Figure 16) even after accounting for their delayed start.

**Figure 16. On-time completion rate for bachelor's degree recipients**

*Immediate enrollment versus one-year delayed enrollment*



### Parents' education level and gender

We found a wide disparity in education aspiration and outcomes associated with gender and first-generation status (Table 5). Females were more likely than males to aspire to and enroll in postsecondary education. Likewise, second-generation students were more likely than first-generation students to aspire to and enroll in postsecondary education. When these two demographic characteristics are examined together, the disparities widen: 72 percent of second-generation females enrolled at a four-year school in the fall of 2012. In contrast, only 34 percent of first-generation males enrolled at a four-year school during the same period.

Degree attainment rates amplify these disparities. Sixteen percent of first-generation males and 30 percent of first-generation females of the Class of 2012 attained a degree within four years of graduating from high school. During this same period, 54 percent of second-generation females attained a two or four-year degree.

**Table 5. Postsecondary outcomes by gender and first-generation status, Class of 2012**

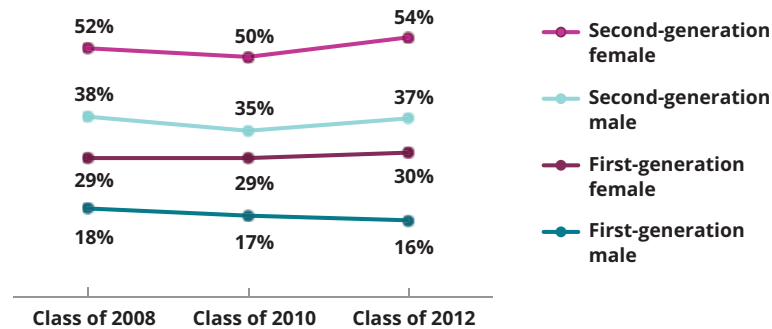
FACTOR	Aspiration (at a 4-year school)	Enrollment (at a 4-year school, fall 2012)	Completion rate <sup>14</sup> (of those who started full-time at a 4-year school)	Degree attainment (Class of 2012)
First-generation male	38%	34%	46%	16%
First-generation female	54%	48%	57%	30%
Second-generation male	72%	63%	57%	37%
Second-generation female	81%	72%	70%	54%
<b>Statewide average</b>	<b>60%</b>	<b>53%</b>	<b>60%</b>	<b>34%</b>

Figure 17 shows the persistent nature of the disparity in education outcomes associated with gender and first-generation status. Among second-generation females in the Class of 2008, 52 percent attained a degree within four years. Among second-generation females in the Class of 2012, the percentage was somewhat higher, 54 percent. For each of the years listed, first-generation males had the lowest percentage who attained a degree within four years.

<sup>14</sup> The difference between the completion rate and degree attainment rate are discussed in Figure 3 of this paper. The completion rate measures how many students who enrolled full-time at a four-year school completed a degree within four years. This measurement includes only those who started full-time at a four-year school (n= 2,742). The degree attainment rate measures how many graduates from the Class of 2012 attained a degree within four years. This measurement includes the entire class—those who continued and those who did not (n= 5,840).

**Figure 17. Four-year outcomes by gender and parents' education level**

Percentage of students who attained an associate degree or bachelor's degree



### Academic preparation: parents' education level and gender

National data suggests that first-generation students are less likely to access a high school curriculum that prepares them for the rigors of postsecondary education. The ACT recommends a core high school curriculum of four years of English and three years each of mathematics, science, and social studies. According to a national study by the ACT (ACT 2016), first-generation students are less likely than second-generation students to achieve this recommended standard<sup>15</sup>. Only 21 percent of first-generation high school graduates, compared with 42 percent of all graduates, met the ACT college readiness benchmark for mathematics.

For the Vermont Class of 2012, about one-third of students reported having taken Algebra II and having attained an overall GPA of A in high school. Second-generation students were substantially overrepresented within this group. Forty-three percent of second-generation students reported having taken Algebra II and having attained an overall GPA of A. In contrast, only 21 percent of first-generation students reported this level of academic preparation.

The data also reveals significant disparities in academic preparation when first-generation status and gender are combined so that they can be examined together (Figure 18). Only 14 percent of first-generation males and 26 percent of first-generation females took Algebra II and attained an overall GPA of A in high school. Second-generation males were more likely than either first-generation males or females to complete Algebra II and attain an overall GPA of A in high school (33 percent). However, they were substantially less likely than second-generation females (53 percent) to obtain this level of academic preparation.

<sup>15</sup> ACT defines first-generation as those students whose parents do not have any postsecondary education experience, a slightly different definition from the one used throughout this paper. Despite the nuances in definitions, the main point remains: First-generation students are not as prepared to succeed in postsecondary education at the same rates as second-generation students are.

**Figure 18. Academic preparation by parents' education level and gender**

*Note: Percentage of students who completed Algebra II and attained an overall GPA of A while in high school.*

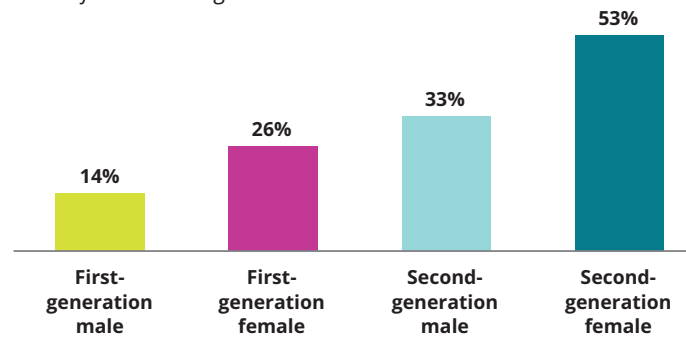
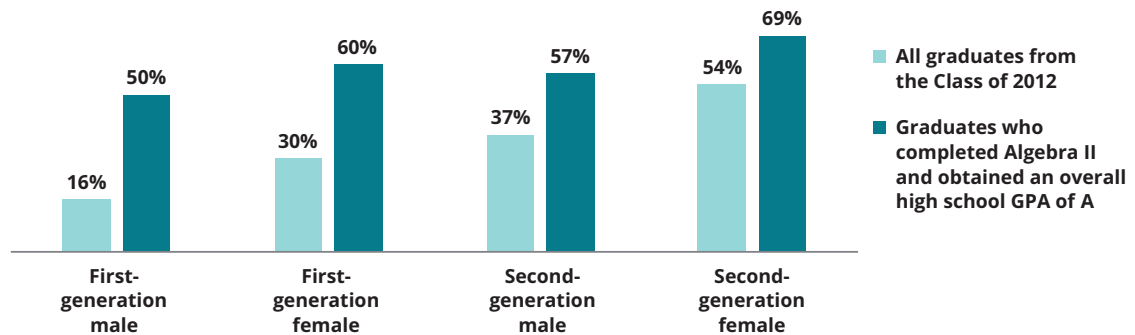


Figure 19 shows the association between academic preparation and degree attainment. For example, the overall degree attainment rate of first-generation males was 16 percent. In contrast, the degree attainment rate for first-generation males who reported taking Algebra II and receiving an overall high school GPA of A was 50 percent, more than three times higher.

**Figure 19. Academic preparation and degree attainment by parents' education level and gender**

*Note: Graduation rates listed are for the entire high school class graduating class, which includes those who did not continue their education*



Another indicator of academic preparation is completion of Advanced Placement (AP) courses. Forty-six percent of students reported successfully completing at least one AP course (Table 6). However, variations in AP course completion ranged from 18 percent in Orange County to 61 percent in Chittenden County.

Second-generation students were more than twice as likely to report completing at least one AP course as first-generation students were, 63 percent compared with 30 percent. There were also variations in AP course completion among first-generation students. For example, as was true statewide, second-generation students in Washington and Lamoille counties were more likely than first-generation students to complete at least one AP course. While the AP course completion rate was similar for second-generation students

in these two counties, 66 percent and 62 percent respectively, the AP course completion rate for first-generation students differed substantially. The AP course completion rate of first-generation students in Washington County was 38 percent, while in Lamoille County it was 13 percentage points lower, or 25 percent.

In 2013, the Vermont Legislature enacted Act 77, which expanded access to dual enrollment courses and early college programs. National research suggests that dual enrollment and early college programs have a positive impact on college access and enrollment, degree attainment, and high school achievement and completion (What Works, 2017). Analysis of the enrollment and attainment among subsequent high school classes will explore the role that dual enrollment and early college play in postsecondary enrollment and degree attainment in Vermont.

**Table 6. Completion of an advanced placement (AP) course by Vermont county and first-generation status**

VERMONT COUNTY	First-generation	Second-generation	Total
Addison	27%	58%	42%
Bennington	28%	58%	42%
Caledonia	22%	64%	39%
Chittenden	36%	75%	61%
Essex	32%	45%	36%
Franklin	36%	70%	48%
Grand Isle	42%	83%	59%
Lamoille	25%	62%	42%
Orange	17%	21%	18%
Orleans	26%	60%	37%
Rutland	33%	61%	45%
Washington	38%	66%	53%
Windham	22%	44%	34%
Windsor	27%	45%	36%
<b>Total</b>	<b>30%</b>	<b>63%</b>	<b>46%</b>

### Geographic differences in degree attainment rates in Vermont

Vermont is comprised of more than 250 towns, many of which are small communities located in rural areas; the median population of Vermont towns is just over 1,200. Rural communities in Vermont and across the nation face significant challenges—lower educational attainment, higher poverty rates, and higher unemployment rates (US Department of Agriculture, 2017).

A recent report from the National Student Clearinghouse (NSC, 2016) highlights the challenges that high school students from rural schools can face. The Clearinghouse study found that students from rural high schools have lower college enrollment rates than their peers who attended urban or suburban schools. They also found that students from rural areas were more likely to leave college after their first year. The data from the Class of 2012 suggests that these trends are also reflected in Vermont postsecondary enrollment and success. A lower percentage of high school graduates from Vermont's more rural counties successfully complete a postsecondary degree (Table 7).

Research suggests that rural students may have less first-hand exposure to a broad range of careers and professions than their peers who live in suburban or urban areas. This can limit their vision of career opportunities and, in turn, the education or training that will be required in order to pursue them. Additionally, rural students are more likely to face challenges transitioning from a high school or technical center setting to a college setting (Marcus, 2017).

Earlier in this report, for each Vermont county we showed the completion rates of students who started full-time at a four-year school. Table 7 shows the completion rates and degree attainment rates between first- and second-generation students within each county<sup>16</sup>. This table shows the variation between first- and second-generation students, and the variation between counties. For example, in Bennington County, the completion rate of first-generation students is two percentage points higher than it is for second-generation students. However, the degree attainment rate within this county reveals a more complete picture: Among all first-generation high school graduates within Bennington County, 26 percent attained a degree within four years, compared with 37 percent of second-generation graduates.

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<sup>16</sup> The completion rate is the percentage of students who enrolled full-time at a four-year school and attained a degree within four years, whereas the degree attainment rate is the percentage of high school graduates who attained a degree within four years.

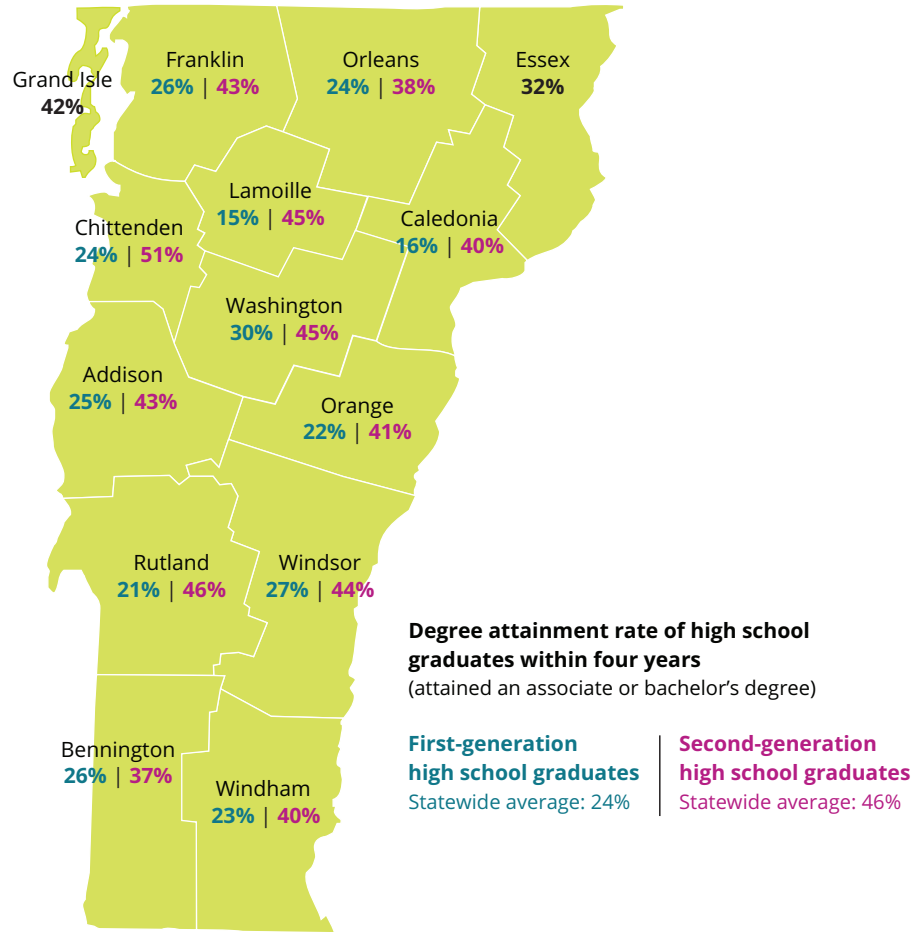
**Table 7. Completion rates and degree attainment rates by first-generation status and county**

VERMONT COUNTY	Completion rate ( <i>see figure 11</i> )			Degree attainment rate ( <i>see figure 20</i> )		
	First-generation	Second-generation	Difference	First-generation	Second-generation	Difference
Addison	55%	60%	5%	25%	43%	18%
Bennington	58%	56%	-2%	26%	37%	11%
Caledonia	33%	53%	19%	16%	40%	24%
Chittenden	51%	69%	17%	24%	51%	27%
Essex	**	**	**	**	**	**
Franklin	56%	63%	7%	26%	43%	17%
Grand Isle	**	**	**	**	**	**
Lamoille	46%	65%	19%	15%	45%	30%
Orange	50%	58%	8%	22%	41%	19%
Orleans	57%	68%	11%	24%	38%	14%
Rutland	48%	63%	16%	21%	46%	25%
Washington	62%	63%	1%	30%	45%	15%
Windham	57%	58%	1%	23%	40%	18%
Windsor	57%	65%	9%	27%	44%	16%
<b>Total</b>	<b>53%</b>	<b>64%</b>	<b>12%</b>	<b>24%</b>	<b>46%</b>	<b>22%</b>

\*\* Essex and Grand Isle data is not shown due to small sample sizes.

Figure 20 shows the degree attainment of the entire Class of 2012, not just those who started full-time at a four-year school. The degree attainment rate of first-generation students ranged from 15 percent in Lamoille County to 30 percent in Washington County. Among second-generation students, the degree attainment rate ranged from 37 percent in Bennington County to 51 percent in Chittenden County. The variation in degree attainment rates between first- and second-generation students ranged from 11 percentage points in Bennington County to 30 percentage points in Lamoille County.

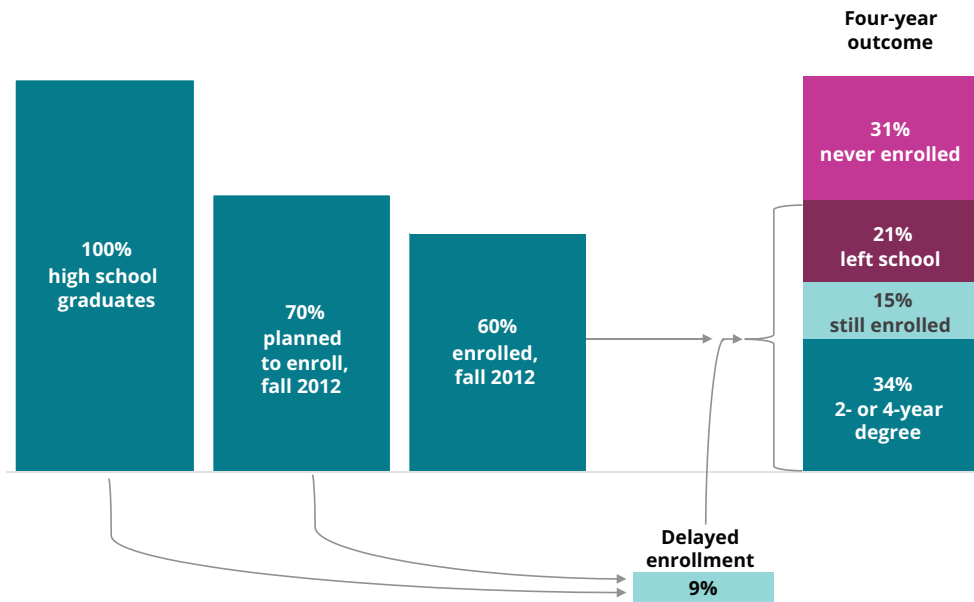
**Figure 20. Degree attainment rates within four years of high school graduates by Vermont county and parents' education level, Class of 2012**



## Discussion

This paper presents findings of the degree attainment of the Vermont High School Class of 2012 within four years of high school graduation. Figure 21 shows the path of the Class of 2012 from high school graduation to college degree, along with the four-year outcomes of the class. Seventy percent of students planned to attend a two- or four-year school in the fall of 2012, while 60 percent actually enrolled. An additional nine percent enrolled after a delay of a year or more. After four years, 34 percent of the class had attained an associate degree or bachelor's degree.

**Figure 21. Vermont High School Class of 2012 from high school graduation to college degree**



We examined college graduation from two perspectives. First, we looked at degree completion among Class of 2012 graduates who enrolled full-time in the fall of 2012 at a four-year institution. Second, we broadened our analysis to examine degree attainment of the entire Class of 2012, which included those who enrolled part-time, enrolled at a two- or four-year institution, or delayed enrollment by a semester or more. Both measures inform important, and different, public policy questions. The first statistic provides us with information about the on-time completion of students who began full-time at a four-year institution. The second provides information about how successful we are, as a state, in educating our youth.

Degree attainment rates are clearly not the same for all students. Degree completion varied significantly by students' gender, parents' education level, parental influence on students' post-high school plans, and students' academic preparation in high school. It also varied by where students lived and the kind of postsecondary institutions they chose to attend. Finally, we found that degree completion varied by students' enrollment patterns, such as transferring from one institution to another or enrolling less than full-time.

Vermont students from the Class of 2012 enrolled full-time in four-year institutions at a rate that was higher than the national average. This enrollment pattern is associated with higher rates of four- and six-year degree completion. The Vermont Class of 2012 exceeded the national degree completion rate by 13 percent at the end of four years. However, a greater portion of the Class of 2012 also dropped out or stopped out of school during this period, and the gap between the national degree completion rate and the Vermont degree completion rate closed to within 4.5 percentage points at the end of six years. Vermont students were substantially more likely to complete their degrees on-time. This yields significant individual and community benefits.

At the same time, however, a greater portion of the Class of 2012 dropped out. These students do not receive the full economic benefit of their education, are more likely to default on their student loans, and are less likely to be able to purchase a home (Chakrabarti, 2017). Finding ways to better support these students while they're enrolled, and to provide accessible paths to allow them to reenter their programs, will yield significant social and economic benefits to the state of Vermont.

We, as a state, need to ensure that our youth are prepared for the future. Researchers have estimated that by 2020, 65 percent of jobs will require education or training beyond high school (Georgetown Public Policy Institute, 2013). Our findings suggest that Vermont's stakeholders have much work to do. We need to ensure that our young people are able to pursue education beyond high school and earn postsecondary credentials that prepare them to succeed in the jobs of the future.

### **Gender and parents' education level**

As we've noted, one factor associated with postsecondary success is parental involvement and encouragement. Students whose parents began talking with them about their post-high school plans before they entered high school had higher levels of postsecondary enrollment and degree attainment than those who waited until high school to have those conversations.

Additionally, our findings show that student gender and parents' educational attainment are strongly associated with degree completion. First-generation males were the least likely to earn a degree within four years, while second-generation females were the most likely.

About one-third of the Class of 2012 did not enroll at any postsecondary institution within four years of leaving high school. Seventy percent of these non-continuers were first-generation students. We, as a state, are in danger of leaving these young Vermonters behind. Without a postsecondary degree or credential, they are less likely to be prepared for the jobs of the future and are more likely to experience poverty and unemployment (Pew Research Center, 2014).

At each point along the path to degree completion, there is opportunity to focus and leverage resources to improve postsecondary outcomes for students. To increase aspiration, enrollment, and degree completion rates, it is critically important that we continue developing and deploying resources that enable parents and other adults to begin conversations with students, especially first-generation males, about careers and postsecondary education at least by the time students enter middle school.

### **Academic preparation**

Our data shows that academic preparation is strongly associated with degree completion, suggesting that it could mitigate relationships associated with gender and parents' education level: 66 percent of first-generation males who earned an overall high school GPA of A, completed Algebra II, and started full-time at a four-year school successfully attained a degree within four years, almost 30 percentage points higher than first-generation males who had a lower high school GPA. It is critical that high school students, especially first-generation males, take the appropriate high school courses and receive adequate support to succeed in those courses.

Unfortunately, analysis of the Class of 2012 reveals dramatic equity issues. Students from the Class of 2012 report substantial variation in academic preparation by gender, generation, and geography. Male students and first-generation students were less likely to report obtaining and achieving the same level of high school academic preparation as second-generation females. There are also substantial county-level differences between first-generation and second-generation students with regard to the rate at which they report taking Algebra II and Advanced Placement courses.

In 2013, the Vermont Legislature enacted Act 77, which was designed to provide flexible pathways to all Vermont students. Among other things, this act mandated the implementation of personalized learning plans and expanded the availability of dual enrollment and early college. These policy tools are designed, in part, to mitigate some of these equity issues.

Our data suggests that first-generation students, particularly first-generation males, face significant challenges that begin early in their academic experience. First-generation students are less likely to report taking Algebra II, having a GPA of A, or taking AP courses. They are less likely to aspire to postsecondary education, and they are less likely to enroll. Once enrolled, they are less likely to complete their degrees. In fact, only 24 percent of first-generation students from the Class of 2012 received a degree within four years of graduation from high school. In contrast, 46 percent of second-generation students had obtained their degrees.

### Students' choice in enrollment intensity

We evaluated enrollment patterns associated with completion. Eighty-four percent of students who enrolled full-time continuously for four years at the same school earned an associate or bachelor's degree by the fall of 2016. However, only 53 percent of students who enrolled in the fall of 2012 had this enrollment profile.

Students who transferred schools, enrolled less than full-time for a semester or more, or took a break from school had significantly lower completion rates. The average completion rate was 54 percent for students who transferred schools, 53 percent for students who enrolled less than full-time for at least one semester, and 14 percent for students who left school and later re-enrolled.

To increase on-time graduation rates, students who either plan to enroll less than full-time or who take a break from school need to understand the ramifications of their decisions—that part-time enrollment may lead to additional semesters of school, or taking a break from school could lead to never going back. Increasing the number of years needed to complete a degree or leaving school without attaining a degree can also have profound financial ramifications—increased debt, and greater likelihood of loan repayment delinquency and default.

The Lumina Foundation estimates that there are 55,000 working-age Vermonters who have some college but no degree. Student loan defaults are highly associated with non-completion (College Board, 2015) — the average balance of a defaulted student loan is less than \$10,000 (Miller, 2017). Defaults on student loans exacerbate the challenges these students already face; a defaulted loan that is not rehabilitated has a negative impact on credit and prevents the student from obtaining subsequent federal student financial aid. More work needs to be done to understand the factors that prevent these students from maintaining their enrollment and to develop easy “on ramps” to enable these students to complete their degrees.

**A premium on successful planning**

The complexity of planning and paying for college places a social and financial premium on the ability of families to plan effectively for one of the most important investments an individual or family will make—the selection of an education or training program and the institution from which it will be received. The value proposition is multifaceted and differs for each individual. Many factors must be taken in to account—cost and financial aid; culture; program quality; and the capacity of the institution to support a student’s academic, social, and medical needs. Eighty-four percent of Vermont students who enroll full-time at a four-year institution and remain full-time at that same institution successfully obtain a degree within four years. Successfully navigating the selection and transition process yields a significant dividend in increased on-time completion rates, reduced program costs, and lower student debt.

The National Student Clearinghouse has estimated that upwards of 37 percent of all students will transfer at least once in their six-year academic careers (NSC, 2015). Data from the Class of 2012 indicates that one in five students transferred at least once during the four-year period of this study. Among the nine percent of the Class of 2012 who transferred but remained enrolled full-time for all four years, the degree attainment rate dropped to 54 percent. Another 22 percent of the class dropped out of postsecondary education entirely.

Working with students and families to help them make informed initial education choices is key to addressing this challenge. That said, students who later seek to transfer need more robust counseling to enable them to understand the potential financial and academic ramifications of their decisions and how to overcome them.

**Variation in completion rates by school and sector**

Our data shows that completion rates among Vermont high school graduates differ by institution and type of schools at which students enrolled. Students who started at private institutions (in Vermont or out of state) or at the University of Vermont had higher completion rates. Students who started at one of the Vermont State Colleges or at public institutions outside of Vermont had lower completion rates.

Students who completed Algebra II and attained an overall high school GPA of A were more likely to enroll at the University of Vermont or a private institution. Students who enrolled at these institutions were also more likely to be second-generation. Students who enrolled at one of the Vermont State Colleges or at a public institution outside of Vermont were, on average, less academically prepared and more likely to be first-generation. While students’ academic preparedness differed by institution, it is imperative that all students attain a degree in a timely manner.

We found that even among students of similar academic preparation, there were wide variations in completion rates by institution type. For example, the four-year completion rate among students who completed Algebra II and attained an overall high school GPA of A ranged from 73 percent among students who started at the University of Vermont to 53 percent among students who started at one of the Vermont State Colleges. For students who completed Algebra II and attained an overall high school GPA of B, the four-year completion rate ranged from 53 percent among students who started at a Vermont private college to 29 percent for students who started at an out-of-state public college.

### The interrelated nature of the factors

It is important to note that the factors we have discussed in the paper are interrelated: Students whose parents have attained a bachelor's degree may be more engaged with their children in planning for their post-high school years, encouraging postsecondary enrollment and ensuring their children take college preparatory high school courses. The interaction of these factors is complex, but statistical modeling affirms the need to engage students, especially first-generation students, in postsecondary education, the importance of academic preparation, and ensuring that parents have the resources to help their children prepare for postsecondary education.

### Geographic equity

Vermont is a small rural state defined by small communities, each of which exercises strong local control over the education provided to its students. Senior Survey Data from the Class of 2012 reveals variation by county in the rate at which first- and second-generation students report taking Algebra II, achieving a GPA of A, or taking an AP class. Examination of degree attainment rates of students who enroll full-time at four-year institutions reveals significant geographic variation as well. Second-generation students from Orleans County are 15 percentage points more likely to obtain their degrees within four years than second-generation students from Caledonia County are. First-generation students in Bennington County are seven percentage points more likely to obtain their degrees on time than first-generation students in Chittenden County are.

Examination of geographic equity highlights the importance of considering both completion rates and degree attainment rates. Using Bennington County as an example, first-generation students from the Class of 2012 who enrolled full-time at four-year institutions were slightly more likely than second-generation students to obtain their degrees within four years (58 percent as opposed to 56 percent). Examination of the degree attainment rate (percent of the entire class who received a degree) reveals that only 26 percent of all first-generation students from Bennington County received a degree within four-years, compared with 37 percent of second-generation students. Each analysis reveals different but equally important equity issues.

Understanding the underlying reasons for the self-reported disparities in academic preparation is beyond the scope of this paper. That said, it is striking that 75 percent of second-generation students in Chittenden County reported taking an AP course. In contrast, only 21 percent of second-generation students in Orange County reported completing an AP course.

Given the critical importance that education plays for individual economic well-being, and for state and regional economic and workforce development, these disparities are of real concern. It is important that these inequities are reflected and sometimes magnified in student enrollment and completion patterns. Academic preparation is an important predictor of postsecondary success.

### Postsecondary enrollment is the first step towards a degree

Finally, despite our focus in this paper on degree attainment, it is important not to lose sight of the 16 percent of the graduates from Class of 2012 who planned to enroll in the fall of 2012 but did not (summer melt). Some of these students (30 percent) enrolled at a later point, but most did not.

Most students will need education or training after high school in order to achieve their career and financial goals. Students who aspire to postsecondary education but drop out before they even enroll represent a lost opportunity for Vermont's institutions of higher education and for employers seeking skilled employees.

## Conclusion

Vermont has set a goal of having 70 percent of working-age adults obtain a degree or credential of value by 2025. This is an ambitious goal that was born out of economic necessity and Vermont's enduring commitment to education opportunity and equity. Two-thirds of the fastest growing, high-wage jobs in Vermont will require postsecondary education. Moreover, Vermont employers indicate that their ability to expand and compete is being hampered by their inability to hire workers with the skills they need in order to compete in a global economy.

Prior white papers examined the enrollment patterns of the Vermont High School Class of 2012. They examined the predictors of postsecondary enrollment, the reasons that students gave for choosing not to enroll, as well as the factors that influenced their decisions. Vermont faces a challenge: Too few of our students—particularly first-generation males—are enrolling in postsecondary education. This story is, however, more complicated than generally portrayed. Vermont students enroll full-time at four-year institutions at substantially higher rates than the national average. This is offset by lower enrollment in two-year institutions. This pattern, reflected throughout New England, is more pronounced in Vermont.

Our second white paper examined the early retention and transfer patterns of the High School Class of 2012. Several patterns emerged that were also reflected in this white paper—the degree to which gender, generational status, academic preparation, geography, and institution were associated with differences in continuation, transfer rates, and stop-outs.

The findings in this paper show that there is a long and difficult journey ahead of us. The goal of the state's efforts to increase postsecondary aspiration and continuation rates is to ensure that all students successfully obtain the degree or credential they need in order to achieve their career and education goals. There is positive news: At this point in their journey, a higher proportion—60 percent—of the Vermont Class of 2012 who enrolled full-time at a four-year institution have received a degree than did their national peers. Data from prior classes suggests that another 15 percent will receive their degrees over the next two years.

Unfortunately, these numbers mask underlying challenges. While it is tempting to take comfort in the fact that members of the Class of 2012 who enrolled full-time were more likely to obtain their degrees than their national peers were, 40 percent of the class who enrolled full-time at a four-year institution had not yet obtained their degrees. These students must shoulder increased costs and student loan debt while facing uncertain prospects.

A deeper look reveals the contours of significant inequities. First-generation students successfully obtained their degrees at lower rates than second-generation students. Fifty-four percent of first-generation males who enrolled full-time at a four-year institution were unable to obtain a degree within four years. Though still highly problematic for the students involved, this contrasted with 30 percent of second-generation females who were unable to obtain a degree within four years. And, as discussed in this paper, there are geographic and institutional inequities. The chance that a given student will successfully obtain his or her degree on time is also associated with the county in which he or she went to high school and the college he or she chose to attend.

The challenge for Vermont is to ensure that all students—regardless of gender, generational status, the part of Vermont they call home, or the institution they choose to attend—are able to obtain their degrees and able to obtain their degrees on time. This is true at all times, but Vermont's current demographic challenges lend an added sense of urgency. We need every Vermonter to be educated and trained to be able to compete in a global economy using 21st century skills.

## Appendix A: Statistical Model Methodology and Interpretation

### Assessing statistical significance of factors individually

To gain a better sense of the strength of the associations between college completion within four years and the primary factors discussed in this paper, we used logistic regression to assess individually how well completion could be predicted by each of six factors: gender, first-generation status, Algebra II completion, GPA, parental attitude towards postsecondary education, and when parents first talked with students about post-high school plans. Table A1 displays results for each factor, based on individual logistic models that each used four-year completion as the response variable and a given factor as the predictor variable. The odds ratio here is a measure used to compare the relative success of two groups in completing college. An odds ratio of 1.0 means that the groups were equally successful, an odds ratio less than 1.0 means that the first group was less successful than the second group, and an odds ratio greater than 1.0 means that the first group was more successful than the second group. The further an odds ratio is from 1.0 in either direction, the greater the relative difference in the odds of completing college for the two groups being compared. As an example of how to interpret these results, consider Table A1. The odds ratio of 0.63 for gender implies that the estimated odds of postsecondary completion was 37% (100%–63%) lower among males compared with females. If we look at Algebra II completion, we see a relatively smaller odds ratio of 0.28, indicating a relatively larger difference in odds of college completion. Specifically, the odds of completing college were 72% (100%–28%) lower among students who did not complete Algebra II than among those who did complete the course. The 95% confidence intervals are a reminder that these odds ratios are estimates; nonetheless, we can say with high confidence that the true odds ratio is somewhere between a certain range of values. Note that this range of plausible values still lies below 1.0 for all factors.

The individual coefficients, standard errors, and Wald statistics obtained from each univariable model are presented for reference and reproducibility. The column furthest to the right shows the p-values from statistical tests measuring how likely it is that the observed difference between the two groups could have occurred simply by chance. For our purposes, we consider p-values below 0.05 to show significant evidence of a difference in completion rates between the two groups being compared. Note that all factors were found to be statistically significant.

Each of the results in Table A1 is consistent with results already presented in the report. For example, Table 3 shows that completion among those whose parents desired that they pursue something other than education after high school was seven percentage points lower than those whose parents desired that they pursue education. Similarly, the logistic model with parental desire as the predictor and completion as the outcome indicated that the odds of completion were 26% lower among those whose parents desired that they pursue something other than education.

The results in Table A1 also reveal that some estimates were quite similar in magnitude (e.g. gender and first-generation status), while others were very different (e.g. high school GPA and parents' desire). While it may be convenient to make conclusions based on these individual assessments of the factors, we can gain a clearer picture of the data by accounting for the fact that these factors are not independent of one another.

**Table A1. Estimated odds ratios, confidence intervals, and p-values for factors that predict four-year college completion, assessed individually**

FACTORS	Odds ratio	95% confidence interval	Coefficient	Standard-error	Wald statistic	p-value
Gender: male (vs. female)	0.63	(0.54, 0.74)	-0.462	0.0787	-5.86	<0.001*
First-generation (vs. second-generation)	0.62	(0.53, 0.73)	-0.477	0.0814	-5.86	<0.001*
Did not complete Algebra II (vs. completed Algebra II)	0.28	(0.18, 0.44)	-1.264	0.2301	-4.94	<0.001*
Overall high school GPA of less than A (vs. overall high school GPA of A)	0.29	(0.25, 0.34)	-1.239	0.0835	-14.84	<0.001*
Parents' desire: other (vs. parents' desire: education)	0.74	(0.61, 0.91)	-0.298	0.1031	-2.89	0.004*
Talked to parents before the 9th grade	0.80	(0.68, 0.94)	-0.221	0.0810	-2.72	0.006*

\* Statistically significant at the 0.05 level

### The interrelated nature of factors associated with postsecondary enrollment

To gain a more complete understanding of factors that predict college success, we next constructed a statistical model that would predict whether a student completed college within four-years, based on multiple factors that could be known at the time of enrollment. This model would both increase prediction accuracy when compared with the univariable models discussed above, as well as account for the interrelatedness existing between the factors themselves.

To build the model, we used a method called Purposeful Selection (Hosmer, Lemeshow, & Sturdivant, 2013). This process involved examining and comparing competing multivariable models that contained some or all of the following factors: type of institution, gender, first-generation status, Algebra II completion, overall high school GPA, students' impression of what their parents wanted them to do after high school, region of residence, and when parents started talking to their children about postsecondary plans. The resulting model, chosen to be predictive and parsimonious, contained all of the above variables except the measure of when parents talked to students, which was eliminated because it was not a significant predictor of college completion in conjunction with the other variables.

Table A2 provides the results for this multivariable model. The results may be interpreted in the same way as those in Table A1, except that now we may for say, for example, that the odds of completion among males was 34% less than the odds among females, *while holding all other factors constant*. It is best not to directly compare the relative sizes of odds ratios from within the same model, but rather to understand that each factor presented below was still able to predict completion even when we accounted for the influence of all other variables in the model. Note that region of residence and type of institution were included as control variables in the model, but they are not intended as predictor variables themselves. Therefore, odds ratios and confidence intervals for these variables are omitted from Table A2.

**Table A2. Odds ratios, confidence intervals, and p-values for factors that predict four-year college completion, assessed jointly**

FACTORS	Odds ratio	95% confidence interval	Coefficient	Standard-error	Wald statistic	p-value
Gender: male (vs. female)	0.66	(0.55, 0.78)	-0.420	0.0872	-4.81	<0.001*
First-generation (vs. second-generation)	0.77	(0.64, 0.92)	-0.262	0.0920	-2.85	0.004*
Did not complete Algebra II (vs. completed Algebra II)	0.45	(0.28, 0.74)	-0.798	0.2502	-3.19	0.001*
Overall high school GPA of less than A (vs. overall high school GPA of A)	0.37	(0.31, 0.45)	-0.988	0.0910	-10.85	<0.001*
Parents' desire: other (vs. parents' desire: education)	0.78	(0.62, 0.97)	-0.253	0.1132	-2.23	0.025*
Fall 2012 sector (vs. UVM)						
4-year Vermont State College	--	--	0.495	0.1510	-3.28	0.001*
4-year Vermont private	--	--	0.234	0.1782	1.31	0.189
4-year non-Vermont public	--	--	-0.480	0.1536	-3.12	0.002*
4-year non-Vermont private	--	--	0.113	0.1269	0.89	0.373
Region of residence (vs. Franklin, Grand Isle, Lamoille, Orleans, Washington)						
Caledonia, Essex, Orange	--	--	-0.327	0.1632	-2.00	0.045*
Chittenden	--	--	0.063	0.1201	0.52	0.602
Addison, Rutland	--	--	-0.126	0.1345	-0.94	0.348
Bennington, Windham, Windsor	--	--	-0.058	0.1319	-0.44	0.660

\* Statistically significant at the 0.05 level

Finally, we tested for potential interaction, or effect modification, among the factors in the multivariable model. Table A3 contains the results of the final model that includes interaction effects. This model revealed a significant interaction between high school GPA and parental desire, such that the degree to which one of these variables predicts completion is dependent on the other variable. Specifically, when looking only at those students with a GPA of A, the odds of completion were estimated to be 40% less among those whose parents did not desire education, compared with those whose parents did desire education. However, among those with a GPA less than A, there was no significant association between parental desire and the odds of completion. In other words, parents' desire was a better predictor of success among "A" students than among "B," "C," and "D" students. Because the interaction between GPA and parental desire is statistically significant, the odds ratios for each of these two variables should be interpreted only within the context of the other, as indicated in Table A3.

The final model in Table A3, which accounts for both interaction and interrelatedness among factors, can correctly classify students' four-year college completion status with approximately 71% percent accuracy, as measured by the area under the ROC curve. This number can be interpreted as follows: 71% of the time, the model assigns a higher probability of college completion to an individual who actually completed college within four years than to an individual who did not complete college within four years. This suggests that the model has value in predicting four-year college completion.

In addition, we used the Hosmer-Lemeshow test to assess the goodness of fit of the final model, or how well the estimated probabilities of completion matched the actual outcomes of students. The test yielded a test statistic of 6.09 and a p-value of 0.637, which indicates that the model fits the data well (a non-significant p-value is desirable with the Hosmer-Lemeshow test). Model fit was further confirmed through the use of regression diagnostics, including Pearson Chi-Square, Deviance, and Cook's Distance (details available from the authors on request).

All analyses related to the statistical model were conducted using R version 3.3.3 (R Core Team, 2017). Several R packages were used for specific parts of the analyses, including *dplyr* (Wickham, Francois, Henry, & Müller, 2017) for data management, *lme4* (Zeileis & Hothorn, 2002) for conducting likelihood ratio tests to compare models, *Resource Selection* (Lele, Keim, & Solymos, 2017) for the Hosmer-Lemeshow test, *pROC* (Robin et al., 2011) for creating the ROC curve, and *LogisticDx* (Dardis, 2015) for calculating and visualizing diagnostic statistics.

**Table A3. Odds ratios, confidence intervals, and p-values for factors that predict four-year college completion, assessed jointly and including interaction**

FACTORS	Odds ratio	95% confidence interval	Coefficient	Standard-error	Wald statistic	p-value
Gender: male (vs. female)	0.66	(0.55, 0.78)	-0.422	0.0873	-4.83	0.001*
First-generation (vs. second-generation)	0.77	(0.64, 0.92)	-0.265	0.0921	-2.87	0.004*
Did not complete Algebra II (vs. completed Algebra II)	0.44	(0.27, 0.72)	-0.814	0.2504	-3.25	0.001*
Overall high school GPA of less than A (vs. overall high school GPA of A)			1.068	0.0996	-10.73	<0.001*
Parents' desire: other (vs. parents' desire: education)			0.518	0.1693	-3.06	0.002*
Interaction of parents' desire and high school GPA	--	--	-0.462	0.2243	2.06	0.039*
Parents' desire, other among:						
High school GPA less than A	0.95	(0.53, 1.70)				
High school GPA A	0.60	(0.43, 0.83)				
Fall 2012 sector (vs. UVM)						
4-year Vermont State College	--	--	-0.497	0.1512	-3.29	0.001*
4-year Vermont private	--	--	0.226	0.1783	1.27	0.205
4-year non-Vermont public	--	--	-0.481	0.1538	-3.13	0.002*
4-year non-Vermont private	--	--	0.118	0.1271	0.93	0.353
Region of residence (vs. Franklin, Grand Isle, Lamoille, Orleans, Washington)						
Caledonia, Essex, Orange	--	--	-0.324	0.1632	-1.98	0.047*
Chittenden	--	--	0.063	0.1202	0.52	0.602
Addison, Rutland	--	--	-0.126	0.1346	-0.94	0.348
Bennington, Windham, Windsor	--	--	-0.059	0.1319	-0.45	0.654

\* Statistically significant at the 0.05 level

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## Appendix B: Methodology

The data used for this report came from three sources. The first source was the Vermont Student Assistance Corporation (VSAC) Senior Survey. Every two years, VSAC conducts a nonrandom survey of Vermont high school seniors attending public and private high schools. For the Class of 2012, a total of 5,902 out of 6,958 graduating seniors (85 percent) participated in the Senior Survey. Postsecondary enrollment data of the Class of 2012 was based on 5,853 usable records of the 5,902 participants that were submitted to the National Student Clearinghouse (NSC). NSC enrollment data was supplemented with information from VSAC's Vermont Grant Program proprietary database, which contains students' enrollment information.

A four-page survey was administered to high school seniors at their high schools by school staff. Each school chose the day of the survey's administration, as early as March 2012 or as late as graduation practice. Student participation was voluntary but encouraged. Only data from students who graduated (as confirmed by graduation rosters) was included in the analysis. Data from adult graduates, GED recipients, residents of other states, and foreign exchange students who attained a high school diploma were not included in these analyses.

Students' enrollment data was obtained primarily from the NSC. The NSC collects enrollment information from more than 3,600 colleges and universities—96 percent of all students enrolled in public, private nonprofit, and private for-profit two- and four-year institutions in the United States. The NSC also includes enrollment verification for nearly 150 institutions located outside of the U.S. While we primarily relied on the NSC for students' postsecondary enrollment information, we supplemented enrollment information by using VSAC's Vermont Grant Program proprietary database. For the Class of 2012, in the fall of 2012, nearly 150 records that were not verified by NSC were identified by VSAC's database as being enrolled.

Enrollment in postsecondary training programs of less than two years (such as certificate programs, apprenticeships, or other types of nondegree education) is not typically reported by the NSC and was not included in this report. Therefore, the enrollment rates included in this report likely understate the totality of students who continued some form of postsecondary training or education.

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