Common Measures Handbook

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The mission of the National College Access Network (NCAN) is to improve access to and success in postsecondary education for disadvantaged and underrepresented students and those who are the first generation in their families to attend college. NCAN does this by supporting a network of state and local college access programs that provide counseling, advice, and financial assistance; sharing best practices among the network; providing leadership and technical assistance; and helping establish new college access programs.

NCAN college access programs serve students and families in almost every state and the District of Columbia. NCAN member programs work in inner cities, rural communities and suburbs. Through hands-on advising and financial assistance, NCAN programs share a commitment to inspiring and motivating young men and women to obtain a college education and help them pay the tuition. For assistance in establishing a college access initiative in your community or state, please contact us.

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Introduction

Education, and specifically the college access and success field, has become increasingly focused on using data to measure impact and evaluate results. Programs collect all kinds of data, from financial aid night sign-in sheets to topics discussed in meetings with students to students' postsecondary enrollment patterns. Taking the time to collect and use this data for program improvement is great, but programs often aren't speaking the same language or looking at the same metrics, or they aren't considering metrics that have a connection to postsecondary enrollment and completion. In order to provide guidance to the field about which metrics matter most, the National College Access Network released the Common Measures, a set of member-developed and research-backed college access and success indicators in 2012.

NCAN's Common Measures are a blueprint for the outcome metrics that members should track because (a) many other members track them; and (b) research shows that they are leading indicators on the pathway to college enrollment and completion. The Common Measures are separated into "essential" and "if available" indicators that point to their relative importance, as well as categorized under broad headings like academic, financial aid, and persistence indicators. Additionally, the Common Measures strongly suggest which student demographic information programs should collect so that program data can be disaggregated and examined by student subgroup.

This Common Measures Handbook is an accompanying resource for using the Common Measures. It expands on the list of indicators with insights on exactly how to collect and track each metric, where each metric can be sourced, and what the relevant research is that justifies the metric's inclusion in the Common Measures. This handbook is a living document. As the Common Measures expand (or contract), as further research shapes our understanding of these metrics' implications, and as members weigh in on best practices for collecting and tracking these data, please expect this document to be further updated. We welcome members' feedback on how this handbook, and the other tools in our Data and Evaluation Toolkit, can be improved to more easily support our members' critical missions of serving first-generation, low-income students.

Note for New Users

Users or organizations who are beginning on a path toward becoming data-driven should do their best to not be intimidated by this handbook. Rome was not built in a day, and neither will be a mature set of processes around the Common Measures. These metrics build from each other according to a student's path toward postsecondary education. Another thing to consider is that some of these measures are more time-intensive to collect and calculate than others. Thinking about the timing of when you can collect data and how that timing fits in with making that data actionable is also important.

It may be helpful to consider which data are close at-hand or easily accessible, think about how the timing of that data collection fits in with the questions the data will answer, begin tracking the metrics that correspond to those data and that timeline, and build from there. Under no

circumstances should the length of this guide be a deterrent to getting started on what is an extremely important and helpful process!

Sample Entry

The intention behind the Common Measures Handbook is for members to use it as a reference to better understand metrics they are already tracking and/or will consider tracking in the future. Each of the Common Measures has an entry below containing the following fields:

Name of Measure

- **Importance:** Either "Essential" or "If Available," according to the priority members should place on collecting a particular metric
- **Calculation Notes:** How are the data stored? What is the format of the field in which the data are stored? Is it binary (e.g., yes/no), categorical (e.g., red, white, blue, green), continuous (e.g., 1-500), or text (e.g., student case notes).
- **Data Sources:** Suggestions for where programs can find data related to a given metric
- **Notes/Errata for Tracking:** Some thoughts about the process of collecting and managing a given metric and any necessary related metrics. These thoughts vary by advice given by other programs to different suggestions made for collecting data on the same metric.
- **What Does Research Say?** What is the research justification for including the metric in the Common Measures? These sections are meant to give examples (in laymen's terms) of the findings of two to three studies examining the metric's impact. Preference is given to experimental and quasi-experimental research design and peer-reviewed research. This section is not exhaustive for any given metric, and there is often other research available in the field. Additionally, some data may be somewhat dated; as new research is introduced to the field on a given metric, it will be added to this section. This section is intended to help programs better understand the reasons behind collecting a given data point.

A Note on Levels of Analysis

NCAN's Common Measures are presented as program-level metrics (e.g., the percentage of students who have submitted and completed the FAFSA). This is because these metrics are research-backed milestones of how a program's students overall are progressing toward college enrollment and completion. In contrast to this level of analysis, this handbook's description of each metric is written from the perspective of how data would be managed for the individual student. (e.g., has the student completed and submitted the FAFSA?) There are at least two reasons for this.

First, as programs continue to build or grow their data systems, students are the unit level of analysis. Any analyses of schools, advisors, cohorts, sites are built from aggregating student-level data according to various statistics. If a program knew, for example, that 55 percent of its students had taken the ACT but it wanted to know that figure for students of different races, the program would not be able to answer that question without student-level data. We choose to describe each metric on the fundamental level on which program-wide metrics are built: the student level.

Second, one of the frequent challenges cited by programs with comparing their metrics to other programs' metrics are that apples and apples are not being compared. This is often (but certainly not always) a question of denominators: Which students are being counted? At what points and under which conditions? When are students removed from the denominator? These are questions that this Handbook will likely address in the future, but for now it remains focused on the question of how to count milestones for individual students rather than for subgroups or entire cohorts. With that process more clearly laid out, it will be easier to prescribe how to aggregate these data for inter-program comparisons in the future.

As always, we welcome your continued input and thoughts about the most useful ways to approach data measurement and analysis.

Access Indicators

Academic Indicators

Student is on track to complete a common core/rigorous college prep curriculum as defined by their state

- **Importance:** Essential
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** Student transcripts, district student information systems, state department of education (for district-level statistics)
- **Notes/Errata for Tracking:** Collect in June, varies from state-to-state, should be examined in conjunction with students' course planning. Of the essential indicators, this is likely the most difficult to collect given its multi-part nature and the difficulty programs often face in sourcing this data. Programs should first determine if the state(s) in which they operate define a rigorous college prep curriculum. If such a standard does not exist, then it may be helpful to use the standards in neighboring states, their state's public university system or flagship's academic admissions requirements, or the standards in the research below. In order to track this data, it may be useful to add a memo/notes field into whatever platform a program uses to collect and manage student data. In that field, the program can load a student's most recent course-taking pattern and then make the determination in a separate binary field whether or not the students' courses meet the definition of rigorous. Maintaining the two fields will likely be useful because one serves as a reference about the courses in which a student is currently enrolled and the other allows for a quick analysis/summation of how many students program-wide are on-track to participate in a rigorous curriculum.
- **What Does Research Say?**
    - In a study using data from the 1995-96 Beginning Postsecondary Students (BPS) Survey, 79 percent of students who participated in a "rigorous" high school academic curriculum were continuously enrolled in their initial postsecondary institution three years after first enrolling. This contrasted with 62 and 55 percent of students who completed "mid-level" or "core" curricula, respectively. The study defined a "core" curriculum as four years of English, three each of mathematics, science, and social studies, while a "rigorous" curriculum included four years of English and mathematics (including pre-calculus or higher), three each of a foreign language, social studies, and science (including biology, chemistry, and physics), and at least one Advanced Placement course or exam taken. A mid-level curriculum fell somewhere between "core" and "rigorous." Students taking a rigorous curriculum were also less likely to transfer than their counterparts and were more likely to stay on-track for a bachelor's degree. Even after controlling for demographic characteristics and SAT scores, "the results suggest that completing a rigorous academic curriculum in high school may help students overcome socioeconomic

disadvantages such as low family income and parents with no college experience, as well as helping those who get a poor start in college (whether academic or social) and decide to transfer."[1]

- Another study using the 1995-96 Beginning Postsecondary Students (BPS) Survey found that students who enrolled in a rigorous curriculum (defined the same as above) "significantly increased their chances of either being enrolled at their initial institution 3 years later or making a lateral transfer to a comparable institution and of attaining a college degree." The rigorous curriculum benefit, which was nearly a 10 percentage point increase in the likelihood of persisting and being on-track for a bachelor's degree, persisted even after demographic and socioeconomic indicators were taken into consideration.[2]
- Researchers used data from the Florida Department of Education on over 100,000 students who were in 8th grade in the 1998-99 academic year and progressed normally to high school graduation during the 2002-03 academic year and over 30,000 students who enrolled in a 4-year Florida public institution within four years of completing high school or earning a GED. Students who took "Level-3" math course, i.e., "a mix of honors, upper-level, AP, International Baccalaureate (IB), and Pacesetter courses," had 10th grade test scores that were a standard deviation higher than those who did not take a Level-3 math course, were 25 percentage points more likely to graduate from high school, and 45 percent more likely to attend a 4-year college. The authors used propensity score matching (a statistical technique) to isolate the effect of taking rigorous courses among students who were otherwise similar. They found that students who took a Level-3 mathematics course in the first two years of high school saw an average boost of 9.5 percentage points in the probability of on-time high school graduation and in enrolling in a four-year college. The authors conclude, "Even though the performance returns differ, with a few exceptions, taking any rigorous course in the first 2 years of high school improves outcomes." Finally, the authors found that although the relationship between course-taking and outcomes was largely the same across demographic groups, Hispanic, Black, and low-income students tended to see "slightly higher increases in their high school graduation rates (and for poor students, increases in their 2-year college enrollment rates) when they take rigorous courses by the 10th grade."[3]

High School GPA

- **Importance:** Essential

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[1] Horn, L., & Kojaku, L.K. (2001). *High school academic curriculum and the persistence path through college: Persistence and transfer behavior of undergraduates 3 years after entering 4-year institutions.* Retrieved from http://nces.ed.gov/pubs2001/2001163.pdf

[2] Warburton, E.C., Bugarin, R., & Nunez, A. (2001). *Bridging the gap: Academic preparation and postsecondary success of first-generation students.* Retrieved from http://nces.ed.gov/pubs2001/2001153.pdf

[3] Long, M. C., Conger, D., & Iatarola, P. (2012). Effects of high school course-taking on secondary and postsecondary success. *American Educational Research Journal*, *49*(2), 285-322. doi:10.3102/0002831211431952

- **Calculation Notes:** Continuous (the value for this variable should include the full range of possible GPAs for the student's high school, typically 0.0 to 4.0)
- **Data Sources:** Student report cards or transcripts, guidance departments, student self-reporting (very likely unreliable)
- **Notes/Errata for Tracking:** Maintain separate student-level continuous variables for weighted (if offered at a given high school) and unweighted GPA as well as a binary variable that says whether or not a student's GPA is above 2.0. It may also be helpful to maintain separate fields where GPA by school year can be collected; this would assist with demonstrating a student's four-year trajectory. Some programs may even have the desire, access to data, and staff time to track this metric quarterly. The frequency with which programs update this variable is dependent on their program model and capacity. Some programs may only have the data availability or the staff bandwidth to update each quarter or semester while others may be able to track students' projected course grades on an intra-semester basis. Regardless, GPA should be tracked in some way, shape, or form if at all possible given its connection to and correlation with other student outcomes.
- **What Does the Research Say?**
    - A study of a sample of about 80,000 students admitted to the University of California system found that a student's high school GPA was "consistently the strongest predictor of four-year college outcomes for all academic disciplines, campuses and freshman cohorts in the UC sample." Beyond that, the authors were surprised to find that the ability of high school GPA to predict postsecondary GPA beyond the first year of college: high school GPA accounted for more variance in the fourth year of college than the first.[4]
    - After analyzing NELS:88 data, Adelman found there was a steady decline in the percentage of students completing a bachelor's degree as they moved down class rank and high school GPA quintiles. 78.8 percent and 59.1 percent of students in the top two quintiles completed a bachelor's degree, while 40.3, 25.7, and 13.0 percent, respectively, did so in the bottom three.[5]
    - In a large, nationally representative sample of students attending four-year institutions, students' GPAs were moderately correlated (0.36) with these students' first year postsecondary GPAs.[6]
    - A literature review from the University of Chicago Consortium on Chicago SchooL Research examined the connection between students' non-cognitive characteristics and academic performance. The review concludes in part, "The best ways to

[4] Geiser, S., & Santelices, M. V. (2007). *Validity of high-school grades in predicting student success beyond the freshman year: High-school record vs. standardized tests as indicators of four-year college outcomes.* Center for Studies in Higher Education, University of California, Berkeley. Retrieved from http://files.eric.ed.gov/fulltext/ED502858.pdf

[5] Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college.* Retrieved from https://www2.ed.gov/rschstat/research/pubs/toolboxrevisit/toolbox.pdf

[6] Barbuti, S. M., Kobrin, J. L., Patterson, B. F., Shaw, E. J., & Mattern, K. D. (2008). *Validity of the SAT for predicting first-year college grade point average (2008-5).* Retrieved from http://research.collegeboard.org/sites/default/files/publications/2012/7/researchreport-2008-5-validity-sat-predicting-first-year-college-grade-point-average.pdf

improve students' perseverance and strengthen their academic behaviors is through academic mindsets and learning strategies. This is the central point emerging from our review. Academic behaviors and perseverance reflect the level of students' engagement in their work— the degree to which they are coming to class, completing assignments on time, participating, studying, trying to master material, taking time to do challenging work, and sticking with a task until it is done well. Students who do these things get higher grades, and students who do not do them struggle academically. This becomes increasingly true as students transition from the middle grades to high school and on to college."[7]

- A study of student-level data from a statewide community college system found that "high school GPA has a strong association with college GPA; students' college GPAs are approximately 0.6 units below their high school GPAs. High school GPA also has a strong association with college credit accumulation. A student whose high school GPA is one grade higher will have accumulate approximately four extra credits per semester." [8]

Student enrolled in AP courses

- **Importance:** If available
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** Guidance departments, school-/ district-level data, student self-reporting, for states and districts, check state-level reporting.[9] District-level reports are also available also available to administrators.[10]
- **Notes/Errata for Tracking:** This is another metric for which it will likely be useful to pair a yes/no field with a memo/notes field. The binary field can be used to quickly determine whether a particular student is (or has) enrolled in an AP course; this field will also be useful for program-wide analysis. The particular AP courses in which a student has enrolled can be listed in a notes/memo field. In this list, a student's AP test results can also be recorded (see next variable "Student earned a 3 or greater on any AP test").
- **What Does Research Say?**
  - A study considered almost 200,000 students from 110 colleges and universities across the United States; in this sample, white students comprised the largest proportion of all three groups (no AP, AP score of 1 or 2, AP score of 3-5), and Hispanic and Africa American students "made up a significantly larger proportion of the AP English Language (1, 2) group as compared to the AP English Language (3,

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[7] Farrington, C. A., Roderick, M., Allensworth, E., Nagaoka, J., Keyes, T. S., Johnson, D. W., & Beechum, N. O. (2012). *Teaching adolescents to become learners: The role of noncognitive factors in shaping school performance--A critical literature review.* Consortium on Chicago School Research. Retrieved from https://consortium.uchicago.edu/sites/default/files/publications/Noncognitive%20Report.pdf

[8] Belfield, C., & Crosta, P. M. (2012). *Predicting success in college: The importance of placement tests and high school transcripts.* Teachers College at Columbia University Community College Research Center. Retrieved from http://ccrc.tc.columbia.edu/publications/predicting-success-placement-tests-transcripts.html

[9] See, for example: http://profiles.doe.mass.edu/state_report/ap.aspx

[10] See: http://professionals.collegeboard.com/testing/ap/scores/reporting/for-districts

4, 5) group." The study found that "after controlling for the effects of prior academic performance, students earning a 3, 4, or 5 on one of the AP Exams tended to outperform students who received lower AP scores, as well as students who did not take any AP Exams, with regard to [first year GPA], retention, and institution selectivity. Moreover, students who took an AP Exam but earned a low score (1 or 2) attended more selective institutions and were more likely to return for their second year of college than the No AP group." This research related to AP Biology, Calculus, English Language, and US History).[11]

- A study of a program incentivizing AP performance in Texas found that offering cash incentives to students and teachers "led to more AP test taking, higher scores on college entrance exams (SAT and ACT), and a five percent increase in the share of students enrolling in college." Lead AP teachers received $3,000-10,000 in annual salary bonuses and were eligible for $2,000-5,000 according to student performance. Pre-AP teachers received an annual supplement of $500-1,000 per year. Students received fee reductions and $100-500 for each score of 3 or above on an eligible AP exam. [12]
- Considering a sample of over 1.5 million students, the authors found that "AP participation was related to college enrollment, even after controlling for student demographic and ability characteristics and high school level predictors. For example, the odds of attending a 4-year postsecondary institution increased by at least 171% for all three AP participation groups (taking either one AP exam, two or three AP exams, or four or more AP exams) as compared to students who took no AP exams."[13]

Student earned a 3 or greater on any AP test

- **Importance:** If available
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** Guidance departments, school-/ district-level data, student self-reporting, for states and districts, check state-level reporting[14]. District-level reports are also available to administrators.[15]
- **Notes/Errata for Tracking:** The program-level indicator is the percentage of students earning a 3, 4, or 5 on any AP test. If students are taking multiple AP exams and they earn multiple 3s, 4s or 5s, they should still be counted only once in the numerator of this

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[11] Mattern, K.D., Shaw, E.J., & Xiong, X. (2009). *The relationship between AP exam performance and college outcomes.* Retrieved from https://research.collegeboard.org/sites/default/files/publications/2012/7/researchreport-2009-4-relationship-between-ap-exam-performance-college-outcomes.pdf

[12] Jackson, C. K. (2010). A little now for a lot later: A look at a Texas Advanced Placement incentive program. *Journal of Human Resources, 45*(3), 591-639. doi:10.3368/jhr.45.3.591

[13] Chajewski, M., Mattern, K. D., & Shaw, E. J. (2011). Examining the role of Advanced Placement® exam participation in 4-year college enrollment. *Educational Measurement: Issues and Practice*, *30*(4), 16-27. doi: 10.1111/j.1745-3992.2011.00219.x

[14] For example: http://profiles.doe.mass.edu/state_report/ap.aspx

[15] See: http://professionals.collegeboard.com/testing/ap/scores/reporting/for-districts

calculation. Collection for this metric is similar to the "Student is enrolled in AP courses" metric above. A yes/no variable should be maintained for program-wide data analysis, and a student's scores on individual AP exams can be listed in a separate notes/memo field.

- **What Does Research Say?**
    - A study of almost 200,000 students from 110 colleges and universities across the United States found that "after controlling for the effects of prior academic performance, students earning a 3, 4, or 5 on one of the AP Exams tended to outperform students who received lower AP scores, as well as students who did not take any AP Exams, with regard to [first year GPA], retention, and institution selectivity. Moreover, students who took an AP Exam but earned a low score (1 or 2) attended more selective institutions and were more likely to return for their second year of college than the No AP group." This research related to AP Biology, Calculus, English Language, and US History).[16]
    - A study of a program incentivizing AP performance in Texas found that offering incentives to students and teachers "led to more AP test taking, higher scores on college entrance exams (SAT and ACT), and a five percent increase in the share of students enrolling in college."[17]
    - Using a sample of over 4.5 million students, the authors examine students who were just above and just below the passing score threshold (i.e., regression discontinuity analysis). They found that students who pass an AP exam are one to two percentage points (per exam) more likely to complete a bachelor's degree within four years of enrolling. The effect of earning a passing score was smaller on six-year degree completion rates. The authors note that, "Together, these results suggest that at the margin of passing, earning AP credit primarily influences time to degree but not ultimate degree attainment."[18]

Student enrolled in dual credit courses

- **Importance:** If Available
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** Guidance departments, school-/district-level data, student self-reporting
- **Notes/Errata for Tracking:** This handbook's reviewers agree that both "dual credit" and "concurrent enrollment" programs should be tracked under this metric. In both cases, these programs find high school students earning both high school and college credit prior to their graduation from high school, regardless of whether the coursework physically takes place on a college campus or not. Reviewers indicated that separating the two kinds of programs was

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[16] Mattern, K.D., Shaw, E.J., & Xiong, X. (2009). *The relationship between AP exam performance and college outcomes.* Retrieved from https://research.collegeboard.org/sites/default/files/publications/2012/7/researchreport-2009-4-relationship-between-ap-exam-performance-college-outcomes.pdf

[17] Jackson, C. K. (2010). A little now for a lot later: A look at a Texas Advanced Placement incentive program. *Journal of Human Resources, 45*(3), 591-639. doi:10.3368/jhr.45.3.591

[18] Smith, J., Hurwitz, M., & Avery, C. (2015). *Giving college credit where it is due: Advanced Placement exam scores and college outcomes (No. w21147).* Retrieved from http://www.nber.org/papers/w21147

likely not worth the burden. It may be helpful for programs to track this metric in a fashion similar to AP exams, i.e., one binary variable for "did the student enroll in at least one dual credit course?" and an accompanying variable for "did the student earn credit in at least one dual credit course?"

- **What Does Research Say?**
    - Dual enrollment participation in the state of Florida was positively related to the following outcomes: likelihood of earning a high school diploma, college enrollment and full-time college enrollment, persistence to the second semester of college, higher GPA one year after high school graduation, persistence in college two years after high school graduation, and more credits earned three years after high school graduation. From the same study, dual enrollment participation in New York City was positively related to: pursuit of a bachelor's degree, higher first-semester GPA, more credits earned 3.5 years after high school graduation.[19]
    - Data from the NELS:88/2000 longitudinal study indicated that dual enrollment was associated with the greater likelihood of enrollment into, and persistence in, college. When compared with their peers, dual enrollment students were 12% more likely to enter college within seven months of graduation and 11% more likely to remain enrolled through the second year of college. Dual enrollment students who entered college within seven months of graduation from high school were between 16% and 21% more likely to earn a bachelor's degree than non-participants.[20]
    - Another study considered data from both the NELS:88 and the BPS:2004. An (2013) found that dual enrollment had a positive impact on college degree attainment, even after controlling for student, family, and school factors.[21] The effect was an increase in 8 and 7 percentage points in any postsecondary degree and bachelor's degree completion, respectively. The effect still held for students whose parental education levels were some college or below. The study found that the majority of these gains were for students who dual enrolled in two courses; beyond this mark there was little additional benefit.[22]
    - Speroni (2011) employed a quasi-experimental method to compare high school students in Florida who were just above and below a test score cutoff for dual credit program eligibility. Using a regression-discontinuity design, the author finds no effect of dual enrollment on high school or college outcomes in general. However, students

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[19] Karp, M. M., Calcagno, J. C., Hughes, K. L., Jeong, D. W., & Bailey, T. R. (2007). *The postsecondary achievement of participants in dual enrollment: An analysis of student outcomes in two states*. Teachers College at Columbia University Community College Research Center. Retrieved from http://ccrc.tc.columbia.edu/publications/dual-enrollment-student-outcomes.html

[20] Swanson, J. L. (2008). *An analysis of the impact of high school dual enrollment course participation on post-secondary academic success, persistence and degree completion*. Retrieved from http://www.gcsdblogs.org/Swanson/wp-content/uploads/2010/10/Dual-Enrollment-Course-Participation-and-the-Impact-on-Student-Persistence-in-College.pdf

[21] An, B. P. (2012). The impact of dual enrollment on college degree attainment do low-SES students benefit? *Educational Evaluation and Policy Analysis*, *35*, 57-75. doi: 10.3102/0162373712461933

[22] *Ibid.*

just barely eligible for college algebra were substantially more likely to enroll and graduate from college than those just below the cutoff.[23]

Student earned a C or better in Algebra II

- **Importance:** If available
- **Calculation Notes:** Binary (yes/no); Categorical (see notes/errata)
- **Data Sources:** Guidance departments, school-/district-level data or information systems, report cards, transcripts, student self-reporting
- **Notes/Errata for Tracking:** At its core, this metric is a basic binary variable around whether or not a student has passed Algebra II, but as the research cited below shows, there are benefits to pursuing and passing higher level math coursework in high school. For this reason, a categorical variable that displays the highest level math course completed the student may be more useful. This variable could include, for example, Algebra I, Geometry, Algebra II, Trigonometry, or Calculus in a dropdown menu. This would still allow for the easy querying/sorting of students by this metric. Another approach would be to track course enrollment with a categorical variable (as described) or in case notes (similar case notes might be employed to track the rigorous coursework metric). Then another indicator could be employed for a math grade of less than C in Algebra II. The takeaway here is that there are a number of ways to track this variable according to a program's needs.

  Worth noting is that with many states participating in the Common Core State Standards, course names are shifting away from those described above. In this case, a program may want to use the name of the highest grade-equivalent math level that a student has passed (e.g., Math 10, Math 11 Honors, etc.)
- **What Does Research Say?** Research around this variable is somewhat outdated based on the sources of data upon which it is based. As Algebra II has become a more prevalent requirement for high school graduation, its effectiveness as a postsecondary success indicator has become somewhat diluted, and research on other higher-level math courses (e.g., trigonometry) as a replacement indicator is lacking. With those caveats in mind, there is research that shows a link between completion of Algebra II in high school and postsecondary enrollment and completion. For example:
    - One study found a significant effect of Algebra II on students' bachelor's degree attainment. After controlling for student and school characteristics, completers of Algebra II were 12 percent more likely to earn a bachelor's degree than students who completed only Algebra I and Geometry.[24]
    - Researchers used data from the Florida Department of Education on over 100,000 students who were in 8th grade in the 1998-99 academic year and progressed

[23] Speroni, C. (2011). *Essays on the economics of high school-to-college transition programs and teacher effectiveness.* Columbia University Academic Commons. Retrieved from http://academiccommons.columbia.edu/item/ac:174239
[24] Rose, H., & Betts, J. R. (2001). *Math matters: The links between high school curriculum, college graduation, and earnings.* Public Policy Institute of California. Retrieved from http://www.ppic.org/content/pubs/report/R_701JBR.pdf

normally to high school graduation during the 2002-03 academic year and over 30,000 students who enrolled in a 4-year Florida public institution within four years of completing high school or earning a GED. Students who took "Level-3" math course, i.e., "a mix of honors, upper-level, AP, International Baccalaureate (IB), and Pacesetter courses," had 10th grade test scores that were a standard deviation higher than those who did not take a Level-3 math course, were 25 percentage points more likely to graduate from high school, and 45 percent more likely to attend a 4-year college. The authors used propensity score matching (a statistical technique) to isolate the effect of taking rigorous courses among students who were otherwise similar. They found that students who took a Level-3 mathematics course in the first two years of high school saw an average increase of 0.25 standard deviations in state test score performance, a boost of 9.5 percentage points in the probability of on-time high school graduation, and an increase in the probability of enrolling in a four-year college. The authors found that although the relationship between course-taking and outcomes was largely the same across demographic groups, Hispanic, Black, and low-income students tended to see "slightly higher increases in their high school graduation rates (and for poor students, increases in their 2-year college enrollment rates) when they take rigorous courses by the 10th grade."[25]

- An examination of NELS:88/94 data found that first generation students who completed a higher-level math course (e.g., trigonometry, calculus) were about twice as likely to enroll in a four -year college within two years of graduation compared with those whose highest math level was algebra 2 (64 percent vs. 34 percent).[26]

Student graduated high school in four years

- **Importance:** If available
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** Guidance departments, school-/district-level data, student self-reporting (verify the diploma)
- **Notes/Errata for Tracking:** Handbook reviewers suggest that this metric may not be as straightforward as it seems. At the most basic, this metric requires a binary (yes/no) variable for whether or not a student graduated within four years of starting. This does require knowing when a student began high school (which can be accomplished either with a separate variable for year or with a "cohort year" variable if a program uses one elsewhere). Alternative approaches to collecting this metric include tracking the year of high school graduation; in combination with the freshman high school year, this allows programs to determine students who complete high school early or who require longer than four years (both of these can be tracked with additional binary variables). Finally, it may also be useful

[25] Long, M. C., Conger, D., & Iatarola, P. (2012). Effects of high school course-taking on secondary and postsecondary success. *American Educational Research Journal*, *49*(2), 285-322. doi:10.3102/0002831211431952

[26] Horn, L., & Nuñez, AM. (2000). *Mapping the road to college: First-generation students' math track, planning strategies, and context of support.* Retrieved from http://nces.ed.gov/pubs2000/2000153.pdf

for programs to collect the type of credential a student receives (high school diploma or GED), although this is not explicitly one of the Common Measures. None at this time.

- **What Does the Research Say?**
    - An examination of data from the National Education Longitudinal Study of 1988 (NELS:88), a descriptive study, considered the high school graduating class of 1992's outcomes eight years later, in 2000. On-time high school graduates were more than twice as likely to have at least some postsecondary education than late high school graduates or GED recipients and over four times more likely to have some postsecondary education than high school dropouts. On-time completers were 3.5 times more likely to attain at least an associate's degree than late graduates.[27]
    - For students who do not graduate high school on-time, one of the alternative pathways available is the attainment of a General Educational Development (GED) certification. GED recipients' outcomes are not the same as on-time high school graduates' outcomes. For example, 35 percent of traditional high school graduates from the class of 2004 had not received a postsecondary credential and were not enrolled by June 2009 while this was true for about 50 percent of GED passers from 2003-04.[28] Of those same two groups, 34 percent of GED passers had received a postsecondary credential by June of 2009, but 51 percent of traditional high school graduates had done so.[29] Given the differential outcomes between students who graduate high school on-time and GED recipients, it is important to do everything possible to keep students on the path toward on-time graduation.

Testing Indicators

Student has taken the SAT

- **Importance:** Essential
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** The College Board, guidance departments, school-/district-level data
- **Notes/Errata for Tracking:**
    - The level of detail desired by the program will dictate the way in which this metric is collected and tracked.
    - A binary yes/no field on whether the student has ever taken the SAT will suffice for some, but further options include collecting the exam date, total score, and score by section. These last two are especially useful for seeing if a student met "college-

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[27] Hull, J. (2009). *Better late than never? Examining late high school graduates.* Center for Public Education. Retrieved from http://www.centerforpubliceducation.org/Main-Menu/Staffingstudents/Better-late-than-never-At-a-glance/Better-Late-than-Never-Examining-late-high-school-graduates-.html

[28] Zhang, J., Guison-Dowdy, A., Patterson, M. B., & Song, W. (2011). *Crossing the bridge: GED credentials and postsecondary educational outcomes.* Retrieved from http://www.gedtestingservice.com/uploads/files/95f7a61fcdb34260dd41d1914a89ddd0.1MB)

[29] Guison-Dowdy, A., & Patterson, M. B. (2011). *Journeys through college: Postsecondary transitions and outcomes of GED test passers.* Retrieved from http://eric.ed.gov/?id=ED541697

ready" benchmarks (see below). Programs can keep track of the highest score across each section after each time a student completes an exam.
    - Tracking whether a student has taken the SAT multiple times may also be useful to demonstrate improvement; this can be accomplished by repeating the fields above and entering subsequent administrations of the exam (ideal for, for example, calculating the average score the second time around and comparing it to the first) or creating a memo/text field (which will make queries/analysis across students/programs very difficult but will provide the most detail for a given student).
- **What Does the Research Say?**
    - In a large, nationally representative sample of students attending four-year institutions, students' SAT scores, in conjunction with their high school GPAs, were most highly correlated with these students' first year postsecondary GPAs. SAT math and reading, without high school GPA, were a worse fit for first year postsecondary GPA.[30]
    - In studies of postsecondary cohorts from 2006-2010, high school GPA and SAT scores were found to be correlated with first-year postsecondary GPA. Additionally, controlling for high school GPA, increasing SAT scores were found to be incrementally valid for predicting first-year GPA. High school GPA and SAT score together was also found to be strongly correlated (over 0.60) with postsecondary GPA in years 1-4. Perhaps unsurprisingly, SAT scores were also found to be positively correlated with both retention and graduation.[31]
    - SAT critical reading and writing scores were also found to correlate strongly with a student earning a B or higher in postsecondary English coursework and average English course grades. A similar correlation was determined between a student's SAT math score and similar postsecondary math measures.[32]
    - A literature review of large-scale studies, studies with national samples, and meta-analyses found that a "preponderance of the evidence" supported the ideas that standardized tests like the SAT and the ACT are "generally valid for their intended uses in predicting a wide variety of aspects of short-term and long-term academic and job performance," that that validity is not due to socioeconomic variables, that "coaching is not a major determinant of test performance," that the tests "do not generally exhibit bias by underpredicting the performance of minority group

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[30] Barbuti, S. M., Kobrin, J. L., Patterson, B. F., Shaw, E. J., & Mattern, K. D. (2008). *Validity of the SAT for predicting first-year college grade point average (2008-5)*. Retrieved from http://research.collegeboard.org/sites/default/files/publications/2012/7/researchreport-2008-5-validity-sat-predicting-first-year-college-grade-point-average.pdf

[31] Mattern, K. D., & Patterson, B. F. (2014). *Synthesis of recent SAT validity findings: Trend data over time and cohorts (2014-1)*. Retrieved from http://research.collegeboard.org/sites/default/files/publications/2014/6/Synthesis-of-Recent-SAT-Validity-Findings.pdf

[32] Mattern, K. D., Patterson, B. F., & Kobrin, J. L. (2012). *The validity of SAT scores in predicting first-year mathematics and English grades (2012-1)*. Retrieved from https://research.collegeboard.org/sites/default/files/publications/2012/7/researchreport-2012-1-sat-predicting-1st-year-mathematics-english-grades.pdf

members," and that test-taking motivation is not a major variable impacting test performance.[33]

Student has taken the ACT

- **Importance:** Essential
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** ACT, guidance departments, school-/district-level data
- **Notes/Errata for Tracking:** The level of detail desired by the program will dictate the way in which this metric is collected and tracked. A binary yes/no field on whether the student has ever taken the ACT will suffice for some, but further options include collecting the exam date, total score, and score by section. These last two are especially useful for seeing if a student met "college-ready" benchmarks (see below). Tracking whether a student has taken the ACT multiple times may also be useful to demonstrate improvement; this can be accomplished by repeating the fields above and entering subsequent administrations of the exam (ideal for, for example, calculating the average score the second time around and comparing it to the first) or creating a memo/text field (which will make queries/analysis across students/programs very difficult but will provide the most detail for a given student).
- **What Does the Research Say?**
    - "Both high school GPA and ACT Composite score were effective in predicting success at the 2.00, 2.50, and 3.00 levels of first-year GPA; high school GPA was somewhat more accurate than ACT Composite score at these levels. High school GPA was not an effective predictor of success at higher levels of first-year GPA, however. For example, even a 4.00 high school GPA corresponded to very low probabilities of success at the 3.25, 3.50, and 3.75 levels of first-year GPA. Moreover, high school GPA values below 3.00 provided little differentiation among students across first-year GPA levels. ACT Composite score predictions, in contrast, were effective at all first-year GPA levels…. These results suggest that ACT Composite scores provide greater differentiation across levels of achievement than do high school GPAs in terms of students' probable success during their first year in college."[34]
    - A literature review of large-scale studies, studies with national samples, and meta-analyses found that a "preponderance of the evidence" supported the ideas that standardized tests like the SAT and the ACT are "generally valid for their intended uses in predicting a wide variety of aspects of short-term and long-term academic and job performance," that that validity is not due to socioeconomic variables, that "coaching is not a major determinant of test performance," that the tests "do not generally exhibit bias by underpredicting the performance of minority group

[33] Sackett, P. R., Borneman, M. J., & Connelly, B. S. (2008). High stakes testing in higher education and employment: appraising the evidence for validity and fairness. *American Psychologist*, *63*(4), 215-227. doi:10.1037/0003-066X.63.4.215
[34] Noble, J., & Sawyer, R. (2002). *Predicting different levels of academic success in college using high school GPA and ACT composite score.* Retrieved from https://www.act.org/research/researchers/reports/pdf/ACT_RR2002-4.pdf

members," and that test-taking motivation is not a major variable impacting test performance.[35]

Student has taken PSAT/Aspire

- **Importance:** If available
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** The College Board, ACT, guidance departments, school-/district-level data
- **Notes/Errata for Tracking:** Data could be tracked in a number of ways depending on the prevalence of either exam in the program's service area and/or the level of detail the program feels it needs. If both PSAT and Aspire are prevalent in a program's service area, a separate column for participation in each would be helpful if the program wants to monitor trends in its student population. If either the PSAT or Aspire is not as prevalent in the service area, tracking one or the other is less important.
- **What Does the Research Say?**
    - In a study of over 1.8 million high school sophomores and juniors who took the PSAT/NMSQT in 2007 and 2008 and then completed an AP exam in May 2009 or May 2010, students' PSAT/NMSQT scores were found to be "moderately to strongly correlated with scores on AP exams with the exception of AP world languages and AP Studio Art exams." The authors caution that the sample for this study was relatively stronger academic achievers than the general population.[36]
    - A different team of researchers examined samples totaling over 1.2 million students who took the PSAT and/or SAT to create 10th and 11th grade PSAT/NMSQT score benchmarks that are associated with a 65 percent chance of meeting the 11th-Grade PSAT benchmark or SAT benchmark, respectively. This reference can be used as an early indicator of how a student might fare on the SAT and, by extension to some degree, in college.[37] These benchmarks built from findings from an examination of almost 600,000 juniors who took the PSAT and then the SAT later in the same academic year; this study found that scores between SAT and PSAT/NMSQT sections were highly and positively correlated: 0.87for critical reading, 0.88 for mathematics and 0.83 for writing.[38]

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[35] Sackett, P. R., Borneman, M. J., & Connelly, B. S. (2008). High stakes testing in higher education and employment: appraising the evidence for validity and fairness. *American Psychologist*, *63*(4), 215-227. doi:10.1037/0003-066X.63.4.215

[36] Zhang, X., Patel, P., & Ewing, M. (2014). *AP® potential predicted by PSAT/NMSQT® scores using logistic regression (No. 2014-1)*. Retrieved from http://research.collegeboard.org/sites/default/files/publications/2014/10/ap-potential-predicted-by-psat-nmsqt-scores-logistic-regression.pdf

[37] Proctor, T. P., Wyatt, J. N., & Wiley, A. (2010). *PSAT/NMSQT indicators of college readiness (2010-4)*. Retrieved from https://research.collegeboard.org/sites/default/files/publications/2012/7/researchreport-2010-4-psat-nmsqt-indicators-college-readiness.pdf

[38] Proctor, T. P., & Kim, Y. (2010). *Score change for 2007 PSAT/NMSQT test-takers: An analysis of score changes for PSAT/NMSQT test-takers who also took the 2008 PSAT/NMSQT test or a spring 2008 SAT test (RN-41)*. Retrieved from http://research.collegeboard.org/sites/default/files/publications/2012/7/researchnote-2010-41-score-change-2007-psat.pdf

- Another study of over 800,000 students found moderate to strong correlations between PSAT/NMSQT scores and high school academic indicators like "academic intensity" (a measure of whether students enrolled in more advanced coursework in a given subject area), GPA, and participating in honors courses.[39] Still another study of over 400,000 students found that the relationship between PSAT/NMSQT score had a linear relationship with first-year postsecondary GPA.[40]
- A brief examining 9,000-11,000 grade 11 students who took the ACT in 2014 or 2015 approximately a year after completing the ACT Aspire in 2013 or 2014 in grade 10 determined strong correlations between ACT Aspire scores and ACT scores.[41]
- Before the ACT Plan was phased out in 2014, research was conducted to determine the Plan cut scores that corresponded to a 50-75 percent chance of earning a score of 3 or higher or a 50 percent chance of earning a score of 4 or higher on AP exams that related to curricular content. After the phasing in of ACT Aspire, the Plan cut scores were linked to the new ACT Aspire exam, and this brief serves as a useful estimator of whether a student is likely to be successful in AP exams or not.[42]

Student exceeds national "college-ready" benchmark scores

- **Importance:** If available
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** The College Board, ACT, guidance departments, school-/district-level data
- **Notes/Errata for Tracking:** The College Board releases a total score benchmark for the SAT as well as individual benchmarks for each subject area, but as of this edition of this Handbook, benchmarks have not yet been established for the new SAT. The ACT provides benchmarks for each of the four subject areas but not a total benchmark.[43] In order to track this metric, a student's actual scores need to be known/recorded somewhere. There are a number of ways to approach collecting this metric depending on the level of detail preferred by the program.
    - A single binary variable for whether the student has met college readiness benchmarks in each subject of the exam he or she has taken. For example, if a student took the ACT, mark yes if the student met or exceeded the benchmark for English composition, algebra, social sciences, and biology, but no otherwise.

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[39] Milewski, G. B., & Sawtell, E. A. (2006). *Relationships between PSAT/NMSQT scores and academic achievement in high school (2006-6)*. Retrieved from http://research.collegeboard.org/sites/default/files/publications/2012/7/researchreport-2006-6-psat-nmsqt-scores-academic-achievement-high-school.pdf

[40] Marini, J., Mattern, K. D., & Shaw, E. J. (2011). *Examining the linearity of the PSAT/NMSQT-FYGPA relationship (2011-7)*. Retrieved from http://research.collegeboard.org/sites/default/files/publications/2012/8/researchreport-2011-7-linearity-relationship-psat-1st-year-gpa.pdf

[41] Allen, J. & Liu, R. (2015). *How do grade 10 ACT Aspire scores relate to grade 11 ACT scores? (2015-7)*. Retrieved from https://www.act.org/research/researchers/briefs/pdf/2015-7.pdf

[42] Radunzel, J., Mattern, K., & Allen, J. (2015). *ACT Aspire scores associated with AP exam success: A preliminary linkage.* Retrieved from https://www.act.org/research/policymakers/pdf/ACT-Aspire-Scores-AP-Exam.pdf

[43] See: http://www.act.org/content/act/en/education-and-career-planning/CollegeandCareerReadinessStandards/benchmarks.html

- If the student took the SAT, a binary variable for whether the student's total score has met the "college-ready" benchmark.
- Multiple binary variables, one each for whether the student's individual section scores meet the "college-ready" benchmarks for each section of the ACT and/or SAT. (This is a level of detail that many programs likely will not desire.)

In any case, the student's highest scores (whether combined or by section) should be used for this variable.

- **What Does the Research Say?**
  - Previous research on the pre-2005 SAT determined the benchmark scores associated with a 65 percent probability of a student obtaining a first-year postsecondary GPA of either 2.7 (1180 composite score) or higher or 2.0 or higher (800 composite score).[44] Further research on the SAT administered from 2005 to 2015 determined benchmark scores for that version. The benchmarks associated with a 65 percent change of attaining a first-year postsecondary GPA of 2.67 included 1550 composite or 500 for each section.[45] In an examination of over 1.4 million SAT takers from the class of 2007 attending 3,100 two- and four-year institutions, students who met the SAT college readiness benchmarks were more likely to enroll in a four-year institution than those who did not (78 percent vs. 46 percent) and one-third less likely to enroll in a two-year institution. 25 percent of students who did not meet these benchmarks did not enroll in any postsecondary institution while 14 percent of students who met these benchmarks failed to enroll. Another analysis of over 58,000 students from the high school class of 2007 attending 91 postsecondary institutions found that students meeting SAT benchmarks were about 10 percentage points more likely to persist to the second year than those that did not (91.4% vs. 81.3%) and about 15 percentage points more likely to persist into the third year (84.7% vs. 69.3%).[46] Further research validated the association of meeting college readiness benchmarks within six years.[47]
  - "The ACT College Readiness Benchmarks are the ACT® College Readiness Assessment scores associated with a 50% chance of earning a B or higher grade in typical first-year creditbearing college courses. The Benchmarks also correspond to

[44] Kobrin, J.L. (2007). *Determining SAT benchmarks for college readiness (RN-30)*. Retrieved from http://research.collegeboard.org/publications/content/2012/05/determining-sat-benchmarks-college-readiness
[45] Wyatt, J., Kobrin, J., Wiley, A., Camara, W. J., & Proestler, N. (2011). *Development of a college readiness benchmark and its relationship to secondary and postsecondary school performance (No. 2011-5)*. Retrieved from http://research.collegeboard.org/sites/default/files/publications/2012/7/researchreport-2011-5-sat-college-readiness-benchmark-secondary-performance.pdf
[46] *Ibid.*
[47] Mattern, K.D., Shaw, E.J., & Marini, J. (2013). *Does college readiness translate to college completion? (2013-9)*. Retrieved from http://research.collegeboard.org/sites/default/files/publications/2014/1/research-note-2013-9-college-readiness-college-completion.pdf

an approximate 75% chance of earning a C or higher grade in these courses."[48] The section benchmarks correspond to some common first-year courses: ACT English and English Composition I, ACT Mathematics and College Algebra, ACT Reading and social science courses, and ACT Science and Biology. A study of tens of thousands of students across 90 to 136 institutions of a variety of types from across the country set the benchmarks at 18 for English, 22 for mathematics and reading, and 23 for science.[49]

Admissions Indicators

Student has completed at least one college admissions application, by school type

- **Importance:** Essential
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** The College Board, ACT, guidance departments, school-/district-level data, college access advisors, parents (potentially unreliable, verify with screenshot of confirmation of submission), student self-report (potentially unreliable, verify with screenshot of confirmation of submission)
- **Notes/Errata for Tracking:** The basic indicator here is a simple yes/no around whether or not a student has completed at least one admissions application. Programs are encouraged to also track school type using one or more additional variables according to their required level of detail. Examples of additional variables with which to capture school type include:
    - One variable with choices: 2-year institution, 4-year institution
    - One variable with choices: private, non-profit; public; private for-profit
    - One variable with choices: full-time, part-time, not currently enrolled
    - If a program's data platform will allow it, one variable with a drop-down menu of combinations between 2-year or 4-year and different sector options
    - A memo/text field could be used to list the specific institutions to which a student has applied and the characteristics of those institutions.

  Once the variables are decided upon and constructed, use multiple variables in a given query to find outcomes or enrollment status for a given combination of type and sector

  Handling the data for students who have applied to multiple institutions is more complicated. NCAN suggests recording the highest level school to which a student has submitted an application (e.g., if a student has applied to both a 2-year and a 4-year institution, mark 4-year for this variable). If the system a program is using allows for multiple individual entries into the field for institutions to which a student has applied, this is the best approach, otherwise use the memo/text field as described above.

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[48] Allen, J. (2013). *Updating the ACT college readiness benchmarks (2013-6)*. Retrieved from https://www.act.org/research/researchers/reports/pdf/ACT_RR2013-6.pdf

[49] *Ibid.*

- **What Does the Research Say?**
    - Using data from the nationally representative Education Longitudinal Study: 2002 (ELS), Klasik finds that only about 55 percent of students applied to a four-year college despite being minimally academically prepared, having bachelor's degree aspirations in 10th and 12th grades, and taking the SAT or ACT.[50] Klasik also finds that just 72 percent of students who are minimally qualified for college actually apply.[51] A similar study, using the National Education Longitudinal Study of 1988, found that among students who had bachelor's degree aspirations in 10th grade, were at least minimally academically prepared, and had taken the ACT or SAT, 66 percent of students with no risk factors applied to a four-year institution while 35 percent of students with any risk factors did so. Risk factors were defined as "low SES quartile, average grades of C's or lower from sixth to eighth grade, changed schools two or more times (other than natural progression), lived in a single parent family in eighth grade, had one or more older siblings who dropped out of high school, or held back a grade by 1988."[52] Finally, 21 percent of students in the lowest socioeconomic quartile applied to college while 76 percent did so in the highest quartile, and even after controlling for influencers of enrollment, there was still a gap of over 26 percentage points between students in these two quartiles.[53]
    - In a study comparing low-income students from urban Boston high schools served by a college access program to students from high schools in Boston suburbs, researchers found that while almost 87 percent of seniors intended to attend a two- or four-year institution the following year (65 percent specifically to a four-year institution), just 18 percent had applied to a college by fall of their senior year.[54]

Number of college admissions applications completed by student

- **Importance:** If available
- **Calculation Notes:** Continuous (whole number value ranging from 0 to program-determined maximum)
- **Data Sources:** The College Board, ACT, guidance departments, school-/district-level data, conversations between advisors and students, parents (potentially unreliable, verify with screenshot of confirmation of submission), student self-report (potentially unreliable, verify with screenshot of confirmation of submission)

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[50] Klasik, D. (2012). The college application gauntlet: A systematic analysis of the steps to four-year college enrollment. *Research in Higher Education*,*53*(5), 506-549. doi:10.1007/s11162-011-9242-3

[51] *Ibid.*

[52] Horn, L. J. (1997). *Confronting the odds: Students at risk and the pipeline to higher education*. Retrieved from http://nces.ed.gov/pubs98/98094.pdf

[53] Cabrera, A. F., & La Nasa, S. M. (2001). On the path to college: Three critical tasks facing America's disadvantaged. *Research in Higher Education*,*42*(2), 119-149. Retrieved from http://www.jstor.org/stable/40196425

[54] Avery, C., & Kane, T. J. (2004). Student perceptions of college opportunities. The Boston COACH program. In *College choices: The economics of where to go, when to go, and how to pay for it* (pp. 355-394). University of Chicago Press. Retrieved from http://www.nber.org/chapters/c10104.pdf

- **Notes/Errata for Tracking:** Programs should maintain an overall count of schools to which a student applied. If the data system a program is using allows them to enter multiple schools into the same field, counting these (and noting school type) is the best approach, otherwise use the memo/text field as described in "Student has completed at least one college admissions application, by school type."
- **What Does the Research Say?**
    - Data from a subset (N=5,970) of the nationally representative Educational Longitudinal Study shows that "students applying to one, two and three colleges are admitted by at least one four-year institution 64, 89 and 94 percent of the time, respectively."[55] Of students who apply to only one college and are admitted, just 69 percent choose to actually enroll, compared to 79 and 86 percent of students who apply to two and three institutions, respectively.[56] Additionally, although the average number of college applications submitted per student is slightly over three, students in the lowest socioeconomic quartile submit 2.67 on average while students in the highest quartile submit 3.70.[57]

Student has visited a college campus to which he or she applied

- **Importance:** If available
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** The College Board, ACT, guidance departments, school-/district-level data, from college and universities that track which students go on official visits (may be difficult to obtain and may also be incomplete if the student visits informally)
- **Notes/Errata for Tracking:** This is an indicator on which NCAN will likely issue guidance in the future in terms of establishing a common definition of what constitutes a "campus visit." For now, programs should determine what their criteria for a campus visit are: meeting with an admissions counselor? Taking a campus tour? Day trips vs. overnights? Attending a class? All or some combination of the above? Once those criteria are decided upon, the metric itself is a straightforward yes/no for whether or not a given student has completed this activity. Do note, however, that in order to track this metric there is the need for an associated field that includes the list of schools to which a student has applied. Notes in a memo/text field (as suggested for the "Student has completed at least one college admissions application, by school type" measure) may be the best way to track this metric, in addition to the binary metric that says whether or not a student has visited *any* campus to which he or she applied.
- **What Does the Research Say?**

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[55] Smith, J. (2011). *Can applying to more colleges increase enrollment rates?* Retrieved from https://research.collegeboard.org/sites/default/files/publications/2014/9/research-brief-can-applying-to-more-colleges-increase-enrollment-rates.pdf

[56] *Ibid.*

[57] *Ibid.* For more information on research in this area, see: http://research.collegeboard.org/sites/default/files/publications/2015/1/college-board-research-brief-review-role-college-applications-postsecondary-outcomes.pdf

- In an analysis of over 3,000 students receiving GEAR UP services in North Carolina who graduated from high school in 2011, students who enrolled in postsecondary education received on average four more service hours in the "college visits/college student shadowing" service category than students who did not enroll.[58]
- In an evaluation of the COACH program in Boston, which brought college students into public high schools to provide college access services, 49% of students who visited a college enrolled in any college while 33% who did not visit a college enrolled. Unfortunately, the sample size in this study was low (153 students), external validity was poor, and the difference between the percentages was not statistically significant.[59]
- Unfortunately, further research about the impact of campus visits on enrollment and success outcomes is scant at this time. NCAN will update this section as further investigation and future research warrant.

Student accepted into at least one higher education institution

- **Importance:** If available
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** Guidance departments, parents (potentially unreliable), student self-report (potentially unreliable, verify with screenshot of confirmation of acceptance or paper copy of admission)
- **Notes/Errata for Tracking:** Tracking this variable is going to differ depending on the type of data system employed. For programs with more advanced client-relationship management (CRM) systems, it may be possible to build a subfield for acceptance into any institution to which a student had applied. For those without a CRM, acceptance to any higher education institution is an easy binary field to track, but for students who have applied to multiple institutions, this information is again perhaps best captured in a memo/text field. As with other measures employing a memo/text field, using *only* this field makes it difficult to analyze the "accepted into at least one institution" across an entire program, which is what necessitates the additional binary field. Programs should consider whether or not they include open enrollment community colleges in this category; if they do, that inclusion may inflate the program-level percentage of students accepted. Capturing whether a student was only accepted into an open enrollment institution may be a signal for institutional undermatching.
- **What Does the Research Say?**
    - The inclusion of a student being accepted into a postsecondary institution is an obvious pre-requisite to enrolling in a postsecondary institution. For this reason,

[58] Tillery, C. Y. (2013). *The summative impact of college access interventions: A program evaluation of GEAR UP North Carolina* (Doctoral dissertation, Appalachian State University, Boone, NC). Retrieved from https://libres.uncg.edu/ir/asu/f/Tillery,%20Christina_2013_Dissertation.pdf

[59] Avery, C., & Kane, T. J. (2004). Student perceptions of college opportunities. The Boston COACH program. In *College choices: The economics of where to go, when to go, and how to pay for it* (pp. 355-394). University of Chicago Press. Retrieved from http://www.nber.org/chapters/c10104.pdf

research is limited on this metric. With that said, in a national survey of over 1800 college-qualified students, 95 percent of college-goers were accepted into a college while just 12 percent of non-college goers were accepted.[60] Additionally, a study using data from the Education Longitudinal Study: 2002 (ELS) found that "no student was accepted to a college without having applied, and no student enrolled without having both applied and been accepted."[61]

- Despite the scant research on this particular milestone, it is worth noting that high school students who fail to be accepted by any postsecondary institution may have to seek pathways that lead to success at lower rates (e.g., not enrolling within six months to a year of high school graduation, enrolling in a two-year institution with open enrollment). Additionally, research on the number of applications submitted indicates that applying to more schools increase the chances of being accepted and enrolled. For these reasons, this metric is worth tracking so that college access programs have a sense of their students' next steps and can intervene where necessary to present more options and keep students on track.

Financial Aid Indicators

Note: Because these indicators and the research supporting their inclusion in the Common Measures are related, we include one "What the Research Says" that encompasses all four variables at the conclusion of this section.

Student has submitted and completed a FAFSA form

- **Importance:** Essential
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** School-/district-level data[62], local college access programs, student self-reported data, state education agency (receive student-level data from FSA), U.S. Department of Education/FAFSA Completion Project[63]
- **Notes/Errata for Tracking:**
  - Programs should maintain two separate variables: one for when a student *submits* their FAFSA and another when the Student Aid Report (SAR) is received, which indicates that there are no problems with the submission and that the FAFSA is now "*complete*." A student who submits the FAFSA but does not correct any resulting errors is not eligible for federal student aid. Programs may also want to add additional related indicators for whether a student has set up their FSA ID or

[60] Hahn, R. D., & Price, D. (2008). *Promise lost: College-qualified students who don't enroll in college*. Retrieved from http://www.ihep.org/sites/default/files/uploads/docs/pubs/promiselostcollegequalrpt.pdf
[61] Klasik, D. (2012). The college application gauntlet: A systematic analysis of the steps to four-year college enrollment. *Research in Higher Education*,*53*(5), 506-549. doi:10.1007/s11162-011-9242-3
[62] "FAFSA® Completion by High School." Retrieved from https://studentaid.ed.gov/sa/about/data-center/student/application-volume/fafsa-completion-high-school
[63] *Ibid.*

whether the student has been selected for verification, as both of these are obstacles in the financial aid process.
    - If your program examines (or would like to examine) year-over-year or month-over-month FAFSA completion progress, it will also be necessary to collect the date of submission and completion as additional variables.
- **What Does the Research Say?** See "What the research says about financial aid (and indicators related to it)" at the end of this section.

Student received a financial aid award letter

- **Importance:** Essential
- **Calculation Notes:** Binary (yes/no) or memo (see notes/errata)
- **Data Sources:** Local college access programs, student self-reported data (from award letters)
- **Notes/Errata for Tracking:**
    - If used in the binary format, this variable can be used to mark if and when a student receives a financial aid award letter from any postsecondary institution for a given academic year.
    - If a student has applied to multiple institutions, it may be helpful to have this field be in a memo or text format in which can write which institutions have sent an award letter.
    - Note that a memo/text field is much more difficult than a binary variable field to incorporate into a search, query, or data set, and so it may be helpful to maintain both fields: a binary variable in which to record whether a student has received a financial award letter from *any* institution and a memo/text field that can be more detailed.
    - This metric was previously described as "student awarded financial aid," but note that a student may receive a financial letter that only says that he or she is eligible for unsubsidized loans. In this case, a student has not been awarded financial aid, but they have received their financial aid award letter. This caused the change of the metric to "student received a financial award letter."
    - At the program level, to determine the percentage of students receiving financial aid, all students who received grant aid, work study, or subsidized loans can be included in the numerator, and the denominator would the total number of students in the given cohort/class year/group the program is considering.
- **What Does the Research Say?** See "What the research says about financial aid (and indicators related to it)" at the end of this section.

Amount of financial aid awarded to student, by aid type

- **Importance:** If available
- **Calculation Notes:** Multiple numeric columns or memo (see notes/errata)

- **Data Sources:** Local college access programs, student self-reported data (from award letters)
- **Notes/Errata for Tracking:** How this measure is recorded depends in large part on the level of detail that a program needs and which questions the program would like to be able to answer. The below are some suggestions for how to record this metric:
    - Multiple numeric indicators in which dollar amounts of financial aid can be rewarded for each of a few types: grants (which could be broken down into Pell, internal (program-awarded) scholarships, state scholarships/grants, other external scholarships, and/or other depending on which are available to a given program's students), loans (which could be broken down into federal subsidized, federal unsubsidized, and/or private), federal work study, and other. In this case, it is likely helpful to have another column for the total amount of financial aid awarded, which would be automatically calculate as a sum from all of the individual columns/fields that were created. This approach becomes much more usable after a student has selected the institution that they will attend; it is unwieldy for displaying data about multiple award packages. Note that in the future NCAN will likely issue further guidance about whether to include loans, non-grant aid, and parents loans in this financial aid award total; programs are encouraged to follow their own decision here but clearly describe what types of aid are in the "total" figure.
    - If a student has yet to select the institution that they will attend, a memo/text field may be more useful than individual numeric columns. This is because a lot of text can be stored in this field and comparisons can be easily made *for that student*. Note that this format is poor for examining this metric at the program level.
    - Once a student has selected the institution to which they will matriculate, it will be easier for programs to incorporate award data into searches and queries if the award package from a student's selected institution is incorporated into the format in the bullet above.
- **What Does the Research Say?** See "What the research says about financial aid (and indicators related to it)" at the end of this section.

Student completed supplementary scholarship application(s)

- **Importance:** If available
- **Calculation Notes:** Binary (yes/no) or continuous (0-100) field plus a memo/text field (see notes/errata)
- **Data Sources:** Local college access programs, guidance counselors, student self-reported data
- **Notes/Errata for Tracking:** Programs may want to track this data in a variety of ways, but some suggestions include:
    - A binary variable that indicates whether a student has completed *any* supplementary scholarship applications

    - A continuous variable that indicates the number of supplementary scholarship applications completed by a student
    - Total value of supplementary scholarships awarded
    - Paired with any of the above, a memo/text field describing the name of the scholarship, its monetary value, and any other critical information would be a useful reference.
- **What Does the Research Say?** See "What the research says about financial aid (and indicators related to it)" at the end of this section.

What the research says about financial aid (and indicators related to it):

Each of the four indicators above is related to the process of applying for and securing financial aid. Rather than attempting to parse the research for any of the individual measures, below (and for the Financial Aid Indicators in the Success section) we describe what research says about the importance of financial aid for enrolling in, persisting through, and completing postsecondary education.

- A study using data from the Education Longitudinal Study: 2002 (ELS) found that "application for financial aid is positively associated with enrollment at any four-year college—leading to a 55 percent increase in the chances a student will enroll in any four-year college than students who did not apply for financial aid" but also notes that applying for financial aid also resulted in a 48 percent reduction to the likelihood that a student would enroll in a highly selective four-year institution, even controlling for family income.[64]
- "Estimates based on data from the 2011-12 National Postsecondary Student Aid Study (NPSAS) indicates that 30 percent of students who failed to file a FAFSA, one third would have qualified for a Pell grant."[65]
- "Faced with this unmet need, low-income students select two-year institutions rather than four-year options, reduce their attendance from full-time to part-time, live off campus rather than on campus, and work longer hours. All of these behaviors significantly reduce the probability that they will persist to completion of a four-year degree."[66]
- In a study of more than 37,000 first-time, first-year students enrolled in 2- or 4-year institutions in Oho during the 1999-00 academic year, a $1,000 increase in Pell grant receipt improved first-year persistence by 2 to 4 percentage points.[67]
- A similar study examined over 7,000 high school seniors in the 2000-01 academic year who were enrolled in a Florida postsecondary institution and were within $1,000 of the eligibility

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[64] Klasik, D. (2012). The college application gauntlet: A systematic analysis of the steps to four-year college enrollment. *Research in Higher Education*,*53*(5), 506-549. doi:10.1007/s11162-011-9242-3

[65] Page, L. C., & Scott-Clayton, J. (2015). *Improving college access in the United States: Barriers and policy responses (No. w21781).* Retrieved from http://www.nber.org/papers/w21781

[66] Tinto, V. (2004). *Student retention and graduation: Facing the truth, living with the consequences.* Pell Institute for the Study of Opportunity in Higher Education. Retrieved from http://files.eric.ed.gov/fulltext/ED519709.pdf

[67] Bettinger, E. (2004). How financial aid affects persistence. In *College choices: The economics of where to go, when to go, and how to pay for it* (pp. 207-238). University of Chicago Press. Retrieved from http://www.nber.org/chapters/c10101.pdf

cut-off for the Florida Student Access Grant. This study found that grant recipients' continuous enrollment through their first spring semester increased by 4.3 percentage-points per $1,000 of additional grant eligibility; therefore, their likelihood of earning a bachelor's degree within six years increased by 4.6 percentage points with $1,000 of grant eligibility; and students eligible for an additional $1,000 in aid earned 2.1 more credits in their first three years than students who did not receive the additional aid.[68]

- The Opening Doors Louisiana study used random assignment in a sample of more than 500 low-income individuals aged 18-34. These individuals were eligible to receive up to $2,000 for college. Among those who were in the treatment group, there was a 3.2 percentage-point increase in retention per $1,000 of additional financial aid. Additionally, students in the treatment group earned 1.5 credits in their first year and 1.7 credits in their second year per $1,000 increase in aid. Finally, receipt of additional financial aid increased full-time enrollment in the treatment group over the control group by 9.3, 20.3, and 10.7 percentage-points in the first, second, and third semesters, respectively.[69]
- Another study used random assignment to examine nearly 15,000 students in Wisconsin who had attended a state public high school, were enrolled full time in a public state university, and who had unmet need after completing the FAFSA and qualifying for a Pell Grant. Students in the treatment group of this study were eligible for up to an additional $3,500 for up to five years through the Wisconsin Scholars Grant. Grant recipients saw their second-year retention increase by 2.5 percentage-points and were 2.4 percentage-points more likely to earn 12 or more credits by the end of their second semester. Overall, an additional $1,000 in additional total financial aid was associated with a 2.8 to 4.1 percentage-point increase in second year retention.[70]
- Two Canadian studies, both using random assignment of treatment, offer conflicting evidence about the impact of additional aid. One study of over 3,000 Canadian citizens enrolled full-time in a postsecondary institution and identified as at-risk based on placement instruments found that an additional $1,000 of financial aid increased recipients' persistence rates by 2.3 percentage points.[71] Another study of over 1,500 first-time, full-time college students with high school GPAs outside of the top quartile found that additional grant aid had little effect on credit accumulation or persistence.[72]

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[68] Castleman, B. L., & Long, B. T. (2013). *Looking beyond enrollment: The causal effect of need-based grants on college access, persistence, and graduation (No. w19306)*. Retrieved from http://gseacademic.harvard.edu/~longbr/Castleman_Long_-_Looking_Beyond_Enrollment_-_draft_Oct2012.pdf

[69] Richburg-Hayes, L., Brock, T., LeBlanc, A., Paxson, C. H., Rouse, C. E., & Barrow, L. (2009). *Rewarding persistence: Effects of a performance-based scholarship program for low-income parents.* MDRC. Retrieved from http://www.mdrc.org/sites/default/files/rewarding_persistence_fr.pdf

[70] Goldrick-Rab, S., Harris, D., Kelchen, R., & Benson, J. (2012). *Need-based financial aid and college persistence experimental evidence from Wisconsin.* Retrieved from http://www.finaidstudy.org/documents/goldrick-rab%20harris%20benson%20kelchen.pdf

[71] MacDonald, H., Malatest, R., Assels, R., Bround, R., et al. (2009). *Final impacts report: Foundations for success.* Retrieved from http://malatest.com/CMSF%20FFS%20-%20FINAL%20Impacts%20Report.pdf

[72] Angrist, J., Lang, D., & Oreopoulos, P. (2009). Incentives and services for college achievement: Evidence from a randomized trial. *American Economic Journal: Applied Economics*,*1*(1), 136-163. doi:10.1257/app.1.1.136

- For more information on research relating to the effects of financial aid on academic success, consult Welbeck et al. (2014), Table 1.[73]

Core Demographic Data

First Generation College-Going

- **Importance:** Essential
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** Student self-report
- **Notes/Errata for Tracking:** There is no universal definition of a "first generation college student," and at this time NCAN does not prescribe the use of one definition over another. Different programs use different definitions. Most of the research below defines "first generation" as a student's parents having no education beyond the high school level. However, some programs take a more expansive view and define "first generation" as neither parent having attained a bachelor's degree. In general, the student-level characteristic "first generation college student" is a proxy for whether or not a student or their family is likely to be familiar with the college enrollment, matriculation, persistence, and completion process. Until further guidance is issued, programs are encouraged to use their own definition of this characteristic while being mindful of the definitions used in the research below.
- **What Does Research Say?**
    - After analyzing NELS:88 data, Adelman found that "the probability of completing a bachelor's degree is reduced by roughly 21 percent for first generation students." This research defined "first generation" as neither parent having attended a postsecondary institution.[74]
    - Using data from the National Education Longitudinal Study examining high school graduates from the class of 1992, the authors found that 59 percent of students whose parents had no college education had enrolled in a postsecondary institution within two years. Meanwhile, 75 percent of students whose parents had some college experience and 93 percent of students whose parents had at least one bachelor's degree enrolled in the same period.[75]

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[73] Welbeck, R., Diamond, J., Mayer, A., & Richburg-Hayes, L. (2014). *Piecing together the college affordability puzzle: Student characteristics and patterns of (un) affordability. MDRC.* Retrieved from: https://www.luminafoundation.org/files/publications/ideas_summit/Piecing_Together_the_College_Affordability_Puzzle.pdf

[74] Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college.* Retrieved from https://www2.ed.gov/rschstat/research/pubs/toolboxrevisit/toolbox.pdf

[75] Chen, X., & Carroll, C. D. (2005). *First-generation students in postsecondary education: A look at their college transcripts.* Retrieved from http://nces.ed.gov/pubs2005/2005171.pdf

- For more on access issues and interventions for first-generation college students, consider Tym et al. (2004)[76] and Jenkins, Miyazaki, and Janosik (2009).[77]

Free/Reduced Lunch Status

- **Importance:** Essential
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** Student self-report, parents, school/district information system
- **Notes/Errata for Tracking:** Eligibility for the National School Lunch Program has long been used in education as a proxy for identifying low-income students. Because of "Community Eligibility" in the NSLP, more students are qualifying for free and reduced price lunches. The National Center for Education Statistics notes that, "in 2012, just over half of public school children were eligible for free/reduced price lunches. In contrast, the actual poverty rate of public school students was 22 percent."[78] Programs should be aware of how this indicator is shifting as a proxy for poverty. Despite this, in comparison to other proxies, like parents' income as a percentage of the poverty level, students' free/reduced lunch status remains a relatively less burdensome indicator to collect.
- **What Does Research Say?**
  - Using data from the High School & Beyond national sample of sophomores in 1980, the authors find a 24 percentage point completion gap between the students with the highest socioeconomic status and the lowest.[79]
  - Using a national (though not nationally representative) sample from the high school graduating classes of 2008, 2012, and 2014, the National Student Clearinghouse found that enrollment, persistence, and completion rates were all lower for students from low-income high schools than for students from higher-income high schools.[80]

Race/Ethnicity

- **Importance:** Essential
- **Calculation Notes:** Categorical (multiple selections)
- **Data Sources:** Student self-report, parents, school/district information system
- **Notes/Errata for Tracking:** Different programs track race and ethnicity in different ways according to their needs. For our Benchmarking Project, NCAN follows the U.S. Census and asks members to report race as one of American Indian or Alaska Native, Asian, Black,

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[76] Tym, C., McMillion, R., Barone, S., & Webster, J. (2004). *First-generation college students: A literature review.* Retrieved from http://files.eric.ed.gov/fulltext/ED542505.pdf

[77] Miyazaki, Y., & Janosik, S. M. (2009). Predictors that distinguish first-generation college students from non-first generation college students. *Journal of Multicultural, Gender and Minority Studies*, *3*(1). Retrieved from http://www.scientificjournals.org/journals2009/articles/1429.pdf

[78] Snyder, T. & Musu-Gillette, L. (2015, April 16). Free or reduced price lunch: A proxy for poverty? [Blog post]. Retrieved from http://nces.ed.gov/blogs/nces/post/free-or-reduced-price-lunch-a-proxy-for-poverty

[79] Cabrera, A. F., Burkum, K. R., & La Nasa, S. M. (2005). Pathways to a four-year degree. In A. Seidman (Ed.), *College student retention: Formula for student success*, 155-214. Retrieved from http://files.eric.ed.gov/fulltext/ED482160.pdf

[80] National Student Clearinghouse Research Center. (2015). *High school benchmarks 2015: National college progression rates.* Retrieved from https://nscresearchcenter.org/hsbenchmarks2015/

Multiracial, Pacific Islander, or White. Additionally, for ethnicity, we ask participating programs to report whether or not a student is Hispanic. If more detail is needed, programs serving large Hispanic or Asian populations, for example, may want to further categorize students by their (or their parents') country of origin.

- **What Does Research Say?**
    - After analyzing NELS:88 data, Adelman found that, "Of student demographic characteristics, only one—socioeconomic status—was significantly associated with degree completion, though in a modest manner. Gender and race/ethnicity were never significant in the logistic narrative, even though some indirect effects of these key demographic characteristics would probably be found in other statistical models. When each race/ethnicity group was treated as an independent variable, the basic story did not change."[81] With that said, postsecondary attainment gaps still exist between students of different racial and ethnic groups.[82,83]

ESL Status

- **Importance:** Essential
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** Student self-report, parents, school/district information system
- **Notes/Errata for Tracking:** Programs should keep track students' ESL status according to how the student's school or school district classifies the student. It may also be helpful for students who are ESL to maintain another field recording the student's primary language.
- **What Does Research Say?**
    - "Despite the difficulties in accurately defining a dropout rate for EL students, given the threats outlined above, researchers repeatedly show that EL students are more likely to drop out than native English speakers, or even fluent English speaking language minority students (Kim and Herman 2009; Olsen 2010; Silver, Saunders, and Zarate 2008; Watt and Roessingh 1994). Whether EL students' greater risk of attrition is due to linguistic, academic, background or school characteristics, or any combination of these, remains to be determined."[84]

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[81] Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college.* Retrieved from https://www2.ed.gov/rschstat/research/pubs/toolboxrevisit/toolbox.pdf

[82] National Center of Education Statistics. (2015). *The condition of education: educational attainment.* Retrieved from http://nces.ed.gov/programs/coe/indicator_caa.asp

[83] National College Access Network. (2015). *Closing the college graduation gap: NCAN'S 2015 benchmarking report.* Retrieved from http://www.collegeaccess.org/benchmarkingreport2015

[84] Callahan, R. M. (2013). *The English learner dropout dilemma: Multiple risks and multiple resources.* Santa Barbara: California Drop out Research Project. Retrieved from http://www.cdrp.ucsb.edu/researchreport19.pdf

- The most recent four-year adjusted cohort high school graduation rates (for the senior class graduating in 2013) show a significant graduate rap gap between students of limited English proficiency and other student groups.[85]

Gender

- **Importance:** Essential
- **Calculation Notes:** Categorical (multiple selections)
- **Data Sources:** Student self-report, parents, school/district information system
- **Notes/Errata for Tracking:** Although in many cases, recording this variable will be fairly clear, programs should be sensitive to recording the gender with which a student identifies.
- **What Does Research Say?**
  - "Among first-time students seeking bachelor's degrees who started full time at a 4-year college in 2004, a higher percentage of females than males completed bachelor's degrees within 6 years (61 vs. 56 percent)—a pattern that held across all racial/ethnic groups."[86]
  - In a study of students who enrolled in a four-year public institution in Florida in 2002-03, the year immediately following their high school graduation, the authors found that male students earned 0.43 fewer credits in their first semester than female students and that this disparity continues as time progresses; by the end of the sixth semester, male students had on average earned 6.66 credits less than female students. Male students also had a GPA gap of approximately 0.20 points. In the same study, the authors followed students at five Texas universities for six years and found that male students were less likely to graduate.[87]
  - The most recent Condition of Education from the U.S. Department of Education shows both bachelor's and master's or higher attainment gaps between male and female students.[88]

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[85] U.S. Department of Education. (2015, March 16). Achievement gap narrows as high school graduation rates for minority students improve faster than rest of nation. [Blog post]. Retrieved from http://www.ed.gov/news/press-releases/achievement-gap-narrows-high-school-graduation-rates-minority-students-improve-faster-rest-nation

[86] Ross, T., Kena, G., Rathbun, A., KewalRamani, A., Zhang, J., Kristapovich, P., & Manning, E. (2012). *Higher education: Gaps in access and persistence study.* Retrieved from https://nces.ed.gov/pubs2012/2012046.pdf

[87] Conger, D., & Long, M. C. (2010). Why are men falling behind? Gender gaps in college performance and persistence. *The Annals of the American Academy of Political and Social Science*, *627*(1), 184-214. doi: 10.1177/0002716209348751

[88] National Center of Education Statistics. (2015). *The condition of education: educational attainment.* Retrieved from http://nces.ed.gov/programs/coe/indicator_caa.asp

Success Indicators

Pre-Enrollment Indicators

Student participated in a college orientation program

- **Importance:** If available
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** Student self-reporting, college and universities (may be difficult to obtain)
- **Notes/Errata for Tracking:** What qualifies as a "college orientation program" could vary from school to school. Some institutions may bring students on-campus for an overnight visit before application/admission, while others use the term "orientation" to refer to programs for admitted students who will matriculate the following semester. Regardless, if a student attends something referred to as an "orientation," for the purposes of this metric the student should be counted as a yes. Some reviewers reported including participation in college orientation and summer bridge programs in the same variable, but because summer bridge (according to research in that area) tend to include academic coursework and college orientation programs do not, this handbook leaves the two variables separate at this time. In the future, after more research or discussion with NCAN members, it is possible that these variables could merge, or they could remain separate. The research support for this metric is thinner than for other metrics, but in the initial development of the Common Measures, members felt strongly about including this metric here, and it is included as an "if available" indicator rather than an "essential" one.
- **What Does Research Say?** After a research review, no rigorous research on the effects of participation in college orientation programs was identified. Research will continue, and this section may be updated in a future version of this handbook.

Student participated in summer bridge program(s)

- **Importance:** If available
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** Student self-reporting, colleges and universities (may be difficult to obtain)
- **Notes/Errata for Tracking:** Some reviewers reported including participation in college orientation and summer bridge programs in the same variable, but because summer bridge (according to research in that area) tend to include academic coursework and college orientation programs do not, this handbook leaves the two variables separate at this time. Although summer bridge programs come in all shapes and sizes, in general, this handbook considers "summer bridge" programs to be multi-day to multi-week experiences for students that take place on a college campus and incorporate academic development and support, and/or social or behavioral skill development. The research support for this metric is thinner than for other metrics, but in the initial development of the Common Measures, members

felt strongly about including this metric here, and it is included as an "if available" indicator rather than an "essential" one.

- **What Does Research Say?**
    - An experimental study considered summer bridge programs across eight colleges and universities in 2009. The program included four common features: "accelerated instruction in developmental math, reading, and/or writing; academic support; a "college knowledge" component; and the opportunity to earn a $400 stipend."[89] The study found no effect on the average number of credits attempted or earned, no impact on persistence during a two-year follow-up period, and a limited impact on first college-level course completion in math and writing that disappeared by the end of the second academic year.[90]
    - A study considered the outcomes of a sample of over 2,200 underrepresented minority students who matriculated to Georgia Tech between 1990 and 2000 and who participated in a summer bridge program. The five-week program included "short courses in calculus, chemistry, computer science, and English composition" as well as guidance from upperclassmen mentors. The program also included discussions designed to familiarize parents with college-going topics. Students who completed the Challenge program were more likely than their peers to graduate than their peers who did not participate, academic characteristics and socioeconomic/racial/ethnic demographics held equal. The authors attribute this to the "comprehensive" nature of the summer bridge program, which addressed academic, social, and parental factors.[91]
    - In a study of 55 entering first-year students at a large, highly selective, predominantly white research institution in the southeast United States, a five-week precollege summer bridge program consisting of enrolling in two courses for credit, an academic skills/career planning seminar, English Composition I, and optional weekly math supplemental instruction sessions was found to positively impact students' academic self-efficacy and academic skills. The program was not found to have any effect on students' sense of belonging or social skills. Care should be taken with extrapolating these data because of the low level of external validity due to sample composition and size.[92]

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[89] Barnett, E. A., Bork, R. H., Mayer, A. K., Pretlow, J., Wathington, H. D., & Weiss, M. J. (2012). *Bridging the gap: An impact study of eight developmental summer bridge programs in Texas*. Retrieved from http://www.postsecondaryresearch.org/i/a/document/NCPR-BridgingtheGapBrief.pdf

[90] *Ibid.*

[91] Murphy, T. E., Gaughan, M., Hume, R., & Moore, S. G. (2010). College graduation rates for minority students in a selective technical university: Will participation in a summer bridge program contribute to success? *Educational Evaluation and Policy Analysis*, *32*(1), 70-83. doi:10.3102/0162373709360064

[92] Strayhorn, T. L. (2011). Bridging the pipeline: Increasing underrepresented students' preparation for college through a summer bridge program. *American Behavioral Scientist*, *55*(2), 142-159. doi:10.1177/0002764210381871

Enrollment Indicators

Student enrolled in postsecondary institution within 6 months of high school graduation

- **Importance:** Essential
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** National Student Clearinghouse, college/university registrar (requires relationship with the institution and/or FERPA waiver), student self-reporting (potentially unreliable)
- **Notes/Errata for Tracking:** This is a fairly straightforward indicator to collect. Assuming most students graduate high school in May or June, by late November of the same year students' enrollment statuses should be showing up in the National Student Clearinghouse. For students who are not matched (for a variety of reasons: incorrect name/birth date, institution not participating in the NSC), follow-up for student self-report or, even better, ask for a copy of a student's current schedule of class from a postsecondary institution.
- **What Does Research Say?**
    - Using a representative sample of Texas high school students from 2002, one study finds that "students who postponed college enrollment were less likely to expect a bachelor's or higher degree and much less likely to attend a postsecondary institution four years post-high school graduation." Students who delayed enrollment for one semester (roughly six months) were about 11 percentage points less likely to be enrolled in a bachelor's-granting institution four years after graduating high school than their peers who did not delay. This "attendance penalty… largely reflected their lower college readiness, socioeconomic status, and higher likelihood of initial enrollment at a two-year college."[93]
    - Using data from a nationally representative longitudinal survey that followed over 24,000 eighth graders in 1988 for 12 years, the authors find that even holding constant factors like socioeconomic status, academic background, and demographic factors (e.g., race/ethnicity, gender), "students who postpone enrolling in college a year after finishing high school are about 64 percent less likely to complete a bachelor's degree than those who enroll immediately after high school."[94]

Student enrollment by institution type and status

- **Importance:** Essential
- **Calculation Notes:** Ordinal (select from a few choices per variable)

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[93] Niu, S., & Tienda, M. (2013). Delayed enrollment and college plans: Is there a postponement penalty? *The Journal of Higher Education*, *84*(1), 1-26. doi:10.1353/jhe.2013.0007

[94] Bozick, R., & DeLuca, S. (2005). Better late than never? Delayed enrollment in the high school to college transition. *Social Forces*, *84*(1), 531-554. doi:10.1353/sof.2005.0089

- **Data Sources:** National Student Clearinghouse, college/university registrar (requires relationship with the institution and/or FERPA waiver), college transcripts, student self-reporting (potentially unreliable), College Navigator (to determine 2-/4-year and institution sector)
- **Notes/Errata for Tracking:** This is best captured with a few separate variables, which may vary according to the program's desired level of detail. For example:
    - One variable with choices: 2-year institution, 4-year institution
    - One variable with choices: private, non-profit; public; private for-profit
    - One variable with choices: full-time, part-time, less than part-time, not currently enrolled
    - If a program's data platform will allow it, one variable with a drop-down menu of combinations between 2-year or 4-year and different sector options
    - A memo/text field could be used to describe the various institutional characteristics, but this will make it difficult if not impossible to conduct searches of the database using this variable.

  Once the variables are decided upon and constructed, use multiple variables in a given query to find outcomes or enrollment status for a given combination of type and sector.

  Worth noting is that not all institutions of higher education report all of the information a program may want for its students (e.g., institutions may not report their institution type).

- **What Does Research Say?**
    - Using data from a nationally representative longitudinal survey that followed over 24,000 eighth graders in 1988 for 12 years (NELS:88), the authors find that "those who attended a less than four-year school began enrollment on average a little more than one full year after high school completion while those who attended a four-year college or university began enrollment about five months after high school completion." The authors find that "students whose first postsecondary enrollment was at a four-year college or university are over three times more likely than their counterparts, whose first postsecondary enrollment was at a less than four-year school, to complete a bachelor's degree." Additionally, for every month between high school graduation and postsecondary enrollment, the odds of degree completion decrease by 6.5 percent.[95]
    - After analyzing the same NELS:88 data, Adelman found that having ever been enrolled part-time had a significant negative effect, between a 30 and 35 percent decrease, on bachelor degree attainment by age 26 or 27.[96]

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[95] Bozick, R., & DeLuca, S. (2005). Better late than never? Delayed enrollment in the high school to college transition. *Social Forces*, *84*(1), 531-554. doi:10.1353/sof.2005.0089

[96] Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college.* Retrieved from https://www2.ed.gov/rschstat/research/pubs/toolboxrevisit/toolbox.pdf

- Finally, Kuh's analysis of data from the National Survey of Student Engagement (NSSE) 2006 showed that full-time students are more engaged in college (as measured by contact with faculty, participation in active and collaborative learning activities, and engaging in "enriching educational experiences") than their part-time counterparts.[97]

Student enrolled in postsecondary institution within 12 months of high school graduation

- **Importance:** Essential
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** National Student Clearinghouse, college/university registrar (requires relationship with the institution and/or FERPA waiver), student self-reporting (potentially unreliable)
- **Notes/Errata for Tracking:** Assuming most students graduate high school in May or June, by early April of the follow year students' enrollment statuses for the fall and spring semesters should be showing up in the National Student Clearinghouse. For students who are not matched (for a variety of reasons: incorrect name/birth date, institution not participating in the NSC), follow-up for student self-report or, even better, ask for a copy of a student's current schedule of class from a postsecondary institution.
- **What Does Research Say?**
  - Using a representative sample of Texas high school students from 2002, one study finds that "students who postponed college enrollment were less likely to expect a bachelor's or higher degree and much less likely to attend a postsecondary institution four years post-high school graduation." Students who delayed enrollment for one semester (roughly six months) were about 11 percentage points less likely to be enrolled in a bachelor's-granting institution four years after graduating high school than their peers who did not delay. This "attendance penalty… largely reflected their lower college readiness, socioeconomic status, and higher likelihood of initial enrollment at a two-year college." Students who delayed enrollment for a year or more were associated with a significantly lower likelihood (13 percentage points) of attending a four-year institution that is not explained by "socioeconomic and academic factors."[98]
  - Using data from a nationally representative longitudinal survey that followed over 24,000 eighth graders in 1988 for 12 years, the authors find that even holding constant factors like socioeconomic status, academic background, and demographic factors (e.g., race/ethnicity, gender), "students who postpone enrolling in college a

[97] Kuh, G. D. (2006). Engaged learning: Fostering success for all students - annual report 2006. Retrieved from http://nsse.indiana.edu/nsse_2006_annual_report/docs/nsse_2006_annual_report.pdf

[98] Niu, S., & Tienda, M. (2013). Delayed enrollment and college plans: Is there a postponement penalty? *The Journal of Higher Education*, *84*(1), 1-26. doi:10.1353/jhe.2013.0007

year after finishing high school are about 64 percent less likely to complete a bachelor's degree than those who enroll immediately after high school."[99]

Academic Indicators

Student placed into remedial courses (math/English)

- **Importance:** Essential
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** College/university registrar (requires relationship with the institution and/or FERPA waiver), college transcripts, student self-reporting (potentially unreliable), student web portal or information system (grades website)
- **Notes/Errata for Tracking:**
    - Programs may want to track this indicator as three separate variables: "placed into math remediation," "placed into English remediation," and "total number of remedial courses required."
    - Remedial programs may be identified in at least two ways: sub-100 level course numbers and whether or not they are credit-bearing toward a certificate or degree
- **What Does Research Say?**
    - An analysis of students from an anonymous large, urban community college system found little to no evidence of assignment to remedial math or reading *and* writing impacting (or improving) initial postsecondary enrollment, degree completion, transfer, persistence, or number of semesters enrolled or credits obtained. However, "those assigned to math remediation were 5 percentage points less likely to pass college-level math, 4 percentage points less likely to ever earn a C or better, and 2 percentage points less likely to ever earn a B or better in college-level math." Additionally, students assigned to solely to remedial reading experienced "large and significant negative effects… on the likelihood of ever taking, passing, or doing relatively well in college-level English courses." Students assigned to remedial reading were five percentage points less likely to earn an associate's degree and eight percentage points more likely to drop out, although the authors note that the data in this subsample are "noisy." The authors find "little support" for remedial coursework developing students academically or actively discouraging their further academic progress.[100]
    - A study of nearly 400,000 Texas students in the 1990s finds "little evidence that remediation improves student outcomes." The study finds "a small negative effect on the number of academic credits attempted and the likelihood of completing at

[99] Bozick, R., & DeLuca, S. (2005). Better late than never? Delayed enrollment in the high school to college transition. *Social Forces*, *84*(1), 531-554. doi:10.1353/sof.2005.0089

[100] Scott-Clayton, J., & Rodriguez, O. (2012). *Development, discouragement, or diversion? New evidence on the effects of college remediation (No. w18328)*. Retrieved from http://www.nber.org/papers/w18328

least one year of college." Effects on other postsecondary and labor outcomes were small and statistically insignificant.[101]

- In a study of almost 9,000 Ohio students, remedial coursework was found to have differing effects based on whether or not a student completed the coursework. Students placed into remedial courses were much more likely to transfer or dropout than similar students not placed in remediation. Students who complete their remedial coursework experienced lower dropout rates but at the cost of a longer time to degree completion and a higher chance of transferring to a lower-level postsecondary institution.[102]
- A study of 28,000 students across Ohio finds that students who are required to complete remedial coursework are more likely to both transfer to a more selective institution and to earn a college degree. Additionally, the authors find that math and English remediation reduce the probability of dropping out of college after five years.[103]
- A study of almost 100,000 first-time community colleges enrolled in Florida in the late 1990s found that, among students in approximately the same need of remediation, students who received math remediation were slightly more likely (2.0.-3.8 percentage points) to persist into their second year. Students remediated in math and reading also received 7.2 and 2.8 more credits than their non-remediated peers, but remediation had no effect on total college-level credits completed, completion of a certificate or associate's degree, or transfer to a public four-year college.[104]

Student completed remedial coursework within one academic year

- **Importance:** If Available
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** College/university registrar (requires relationship with the institution and/or FERPA waiver), college transcripts, student self-reporting (potentially unreliable), student web portal or information system (grades website)
- **Notes/Errata for Tracking:**
  - If a program separately tracks the subjects in which a student is taking remedial coursework, it may be helpful to also track the completion of that coursework separately. That is, if a program has a variable for student placed into English remedial coursework, they will likely want a variable for student completed English

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[101] Martorell, P., & McFarlin Jr, I. (2011). Help or hindrance? The effects of college remediation on academic and labor market outcomes. *The Review of Economics and Statistics*, *93*(2), 436-454. doi:10.1162/REST_a_00098

[102] Bettinger, E., & Long, B. T. (2004). *Shape up or ship out: The effects of remediation on students at four-year colleges (No. w10369).* Retrieved from http://www.nber.org/papers/w10369

[103] Bettinger, E. P., & Long, B. T. (2009). Addressing the needs of underprepared students in higher education: Does college remediation work?. *Journal of Human Resources*, *44*(3), 736-771. doi:10.3368/jhr.44.3.736

[104] Calcagno, J. C., & Long, B. T. (2008). *The impact of postsecondary remediation using a regression discontinuity approach: Addressing endogenous sorting and noncompliance (No. w14194).* Retrieved from http://www.nber.org/papers/w14194

remedial coursework, and the same for math. That may not be necessary and is up to the discretion of the program.
    - A different approach that is likely more streamlined is to record in one variable the number of remedial courses a student is required to take upon enrolling and in another variable to record the number of remedial courses that were completed within the first academic year.
    - The most simple way to track this metric is to say "yes" the student completed all of his or her remedial coursework within one academic year or "no" he or she did not, but this approach may not provide enough detail to be actionable.
    - When programs are scaling this metric up the program level, they should exercise caution around which students are included in the calculation. This really depends on what question is being asked. For example, the number of students enrolling in a postsecondary institution, the number of students earning credit, the number of students enrolled in remedial coursework, and the number of students completing remedial coursework are all different numbers.
- **What Does Research Say?**
    - In a study of almost 9,000 Ohio students, remedial coursework was found to have differing effects based on whether or not a student completed the coursework. Students placed into remedial courses were much more likely to transfer or dropout than similar students not placed in remediation. Students who complete their remedial coursework experienced lower dropout rates but at the cost of a longer time to degree completion and a higher chance of transferring to a lower-level postsecondary institution.[105]
    - A study of almost 100,000 first-time community colleges enrolled in Florida in the late 1990s found that, among students in approximately the same need of remediation, students who received math remediation were slightly more likely (2.0.-3.8 percentage points) to persist into their second year. Students remediated in math and reading also received 7.2 and 2.8 more credits than their non-remediated peers, but remediation had no effect on total college-level credits completed, completion of a certificate or associate's degree, or transfer to a public four-year college.[106]
    - Using a sample of 250,000 students across 57 two-year institutions in seven states (with data from the Achieving the Dream: Community Colleges Count initiative) and checked against data from the nationally representative NELS:88, analysis found that 46 percent of students referred to reading remediation and 33 percent referred to math remediation completed the entire sequence of remedial education to which they were assigned. Sequence completion decreased depending on the number of levels of remedial courses in the sequence. Of all students who enrolled in any

[105] Bettinger, E., & Long, B. T. (2004). *Shape up or ship out: The effects of remediation on students at four-year colleges (No. w10369).* Retrieved from http://www.nber.org/papers/w10369

[106] Calcagno, J. C., & Long, B. T. (2008). *The impact of postsecondary remediation using a regression discontinuity approach: Addressing endogenous sorting and noncompliance (No. w14194).* Retrieved from http://www.nber.org/papers/w14194

remediation course, 29 percent referred to math 16 percent referred to reading stopped their remedial sequences after failing or withdrawing a course, but nearly approximately 10 percent of students assigned to reading or math left their remedial sequences never having failed a course. Ultimately, only 20 percent of students referred to remedial math and 37 percent referred to remedial reading completed a "gatekeeper course" within three years of enrollment.[107]

Student completed a college-level math course within two years of enrolling

- **Importance:** If Available
- **Calculation:** Binary (yes/no)
- **Data Sources:** College/university registrar (requires relationship with the institution and/or FERPA waiver), college transcripts, student self-reporting (potentially unreliable), student web portal or information system (grades website)
- **Notes/Errata for Tracking:** A college-level math course for the purposes of this indicator is defined as any non-remedial math course for which a student received credit toward a degree upon completion. Per the research below, the timeframe for this metric is set as within the first two years of enrolling in a postsecondary institution.
- **What Does Research Say?**
    - An examination of nearly 250,000 California community college students over seven years found that students who completed a college-level math course within two years of initial enrollment were almost three times as likely (61.1% to 22.0%) to complete an associate's degree as students who did not complete college-level math in the same period. Similarly, in a sample of over 30,000 students pursuing bachelor's degree in the State University System of Florida, 80 percent of students who completed a college-level math course in their first year earned a bachelor's degree, compared to just 42 percent who did not complete a college-level math course.[108]
    - A study using the nationally representative National Educational Longitudinal Study (NELS) sample of students who started eighth grade in 1988 and followed them through 2000 found that 71 percent of students who completed a bachelor's degree by December 2000 completed a college-level mathematics course within their first two years of enrolling in college while just 38 percent of students who did not complete a bachelor's degree did so.[109]

Percentage of a student's courses successfully completed compared to the number of courses attempted

- **Importance:** If Available

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[107] Bailey, T., Jeong, D. W., & Cho, S. W. (2010). Referral, enrollment, and completion in developmental education sequences in community colleges. *Economics of Education Review*, *29*(2), 255-270. doi:10.1016/j.econedurev.2009.09.002
[108] Offenstein, J., Moore, C., & Shulock, N. (2010). *Advancing by degrees: A framework for increasing college completion.* Retrieved from http://eric.ed.gov/?id=ED511863.
[109] Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college.* Retrieved from https://www2.ed.gov/rschstat/research/pubs/toolboxrevisit/toolbox.pdf

- **Calculation:** Continuous (1-100%)
- **Data Sources:** College transcripts, student web portal or information system (grades website)
- **Notes/Errata for Tracking:** Depending on the level of detail that a program is interested in, this metric could be tracked or managed in a few different ways:
    - A percentage that updates each semester where the numerator is the number of courses for which a student received credit and the denominator is the total number of courses attempted (including those from which a student withdrew during any add/drop period and did not replace with another course). This represents the percentage of courses successfully completed over the course of a student's postsecondary career.
    - A percentage for each semester where the numerator is the number of courses for which a student received credit in the given semester and the denominator is the total number of courses attempted (including those from which a student withdrew during any add/drop period and did not replace with another course).
- **What Does Research Say?**
    - A study of nearly 250,000 California community college students over seven years found that students whose ratio of credits completed to credits attempted was 80 percent or greater in their first postsecondary year completed almost three times more often (38.7% to 14.6%) than students whose ratios were below 80 percent. In a sample of over 30,000 students pursuing bachelor's degree in the State University System of Florida, 74.5 percent of students whose credit-completion ratios were 80 percent or greater earned a bachelor's degree, compared to just 34.8 percent whose ratios were lower than 80 percent.[110]
    - Another study using a nationally representative sample found that students who dropped withdrew, or left incomplete ("the DWI ratio") more than 20 percent of courses attempted earned a bachelor's degree 6.7 percent of the time and an associate's degree 15.7 percent of the time compared to 78.4 percent and 64.0 percent, respectively, for students whose DWI ratio was less than 10 percent.[111]

Student completed more than 20 credits in first academic year

- **Importance:** If Available
- **Calculation:** Binary (yes/no)
- **Data Sources:** College transcripts, student web portal or information system (grades website)
- **Notes/Errata for Tracking:** The studies below present various credit attainment thresholds and their correlation with degree completion. In time, NCAN may suggest

[110] Offenstein, J., Moore, C., & Shulock, N. (2010). Advancing by degrees: A framework for increasing college completion. Retrieved from http://eric.ed.gov/?id=ED511863

[111] Adelman, C. (1999). *Answers in the toolbox: Academic intensity, academic patterns, and bachelor's degree attainment.* Retrieved from http://www2.ed.gov/pubs/Toolbox/index.html

adjusting this metric as more research becomes available or the research below is updated. In general, the principle that first-year credit accumulation corresponds to later successful outcomes is the important takeaway. Although this metric is likely more labor-intensive to collect, in terms of data management it takes the form of a simple yes/no binary variable.

- **What Does Research Say?**
    - Examining data from the NELS:88/2000, Adelman found that "Earning less than 20 credits in the first calendar year following postsecondary entry is a distinct drag on degree completion… falling below the 20-credit threshold lessens the probability of completing a bachelor's degree by a third!" Perhaps unsurprisingly, 40 percent of students who completed less than 20 credits in their first postsecondary calendar year were also in the bottom fifth of first year postsecondary GPA.[112]
    - A study examined nearly 250,000 California community college students over seven years and over 30,000 students pursuing bachelor's degrees in the State University System of Florida. In neither sample did the researchers find a credit accumulation threshold that was associated with a significant jump in completion rates; instead the relationship between first-year credit accumulation and postsecondary completion was mostly linear. The researchers set the community college threshold at 20 credits in the first year; 58 percent of students who met that threshold completed compared to 19 percent who did not. Among bachelor's-seeking students, the threshold set was 24 credits in the first academic year and 48 in the second. 78 and 86 percent of students who met the first and second year thresholds, respectively, completed, compared to 38 and 35 percent of students who did not meet these thresholds. [113]
    - Data from the High School and Beyond Postsecondary Education Transcript Study (PETS), a longitudinal study with a nationally representative sample of students who were high school sophomores in 1980 and periodically surveyed through 1992, also show that early credit accumulation is important for later successful outcomes. Students earning less than 20 credits in their first academic year eventually completed, on average, 86 credits; 45 percent of these students completed a bachelor's degree. Compare this to an average of 128 credits attained by those who earned 30 credits in their first year and a 91 percent degree completion rate.[114]

Student's cumulative college GPA

- **Importance:** If Available
- **Calculation:** Continuous (the value for this variable should include the full range of possible GPAs for the student's academic institution, typically 0.0 to 4.0)

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[112] *Ibid.*

[113] Offenstein, J., Moore, C., & Shulock, N. (2010). *Advancing by degrees: A framework for increasing college completion.* Retrieved from http://eric.ed.gov/?id=ED511863

[114] McCormick, A. C., & Carroll, C. D. (1999). *Credit production and progress toward the bachelor's degree: An analysis of postsecondary transcripts for beginning students at 4-year institutions (1999-179).* Retrieved from http://nces.ed.gov/pubs99/1999179.pdf

- **Data Sources:** College transcripts, student web portal or information system (grades website), student self-reporting (potentially unreliable)
- **Notes/Errata for Tracking:** Consider maintaining separate binary variable that indicates whether a student is above 2.0 or not. It may also be helpful to maintain separate fields where GPA by school year or semester can be collected; this would assist with demonstrating a student's trajectory over the course of their postsecondary career.
- **What Does Research Say?**
    - "Earning grades that place one in the top 40 percent of first-year GPA for the whole cohort is a strong—and positive—contributor to academic momentum, and remains in the account of degree completion throughout the histories of both the class of 1982 and the class of 1992." Data from the NELS:88 show a strong positive effect of first-year grades on eventual probability of attaining a bachelor's degree. This is also true for the trend of a student's GPA in their first two years of college education.[115]
    - A study of over 740,000 students in the Education Advisory Board's Student Success Collaborative National Data Set finds that 75 percent of students who enter their second postsecondary year with a GPA greater than 3.0 will graduate within six years. 52 percent of students with a GPA between 2.0 and 3.0 fail to graduate within six years, with 16 percent of these students departing within the first year and 31 percent departing between years 2 and 6.[116]

Persistence Indicators

Student's year-to-year persistence

- **Importance:** Essential
- **Calculation:** Binary (yes/no)
- **Data Sources:** National Student Clearinghouse, registrar's office (FERPA waiver needed), college transcripts, student web portal or information system (grades/registrar website)
- **Notes/Errata for Tracking:** Of all of the Common Measures, this may be the most complicated to track and/or the measure around which there is the most conversation about how to track it. One approach is to maintain a binary variable for every academic year in which they are enrolled at any institution and to mark yes in any variable in which a student was enrolled at any point during that academic year. Questions arise, however, when we ask questions like, "Does a student who is enrolled in the fall of year 1, skips spring of year 1 and fall of year 2, and re-enrolls in the spring of year 2 count as having persisted from year 1 to year 2?" The research below indicates that students who have gaps in the continuity of their enrollment are less likely to complete a postsecondary credential, and so fall-to-fall or

[115] Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college.* Retrieved from https://www2.ed.gov/rschstat/research/pubs/toolboxrevisit/toolbox.pdf
[116] Education Advisory Board. (2014). *The murky middle project.* Retrieved from https://www.eab.com/technology/student-success-collaborative/members/white-papers/the-murky-middle-project

spring-to-spring persistence (depending on a student's first semester of enrollment) is the indicator to which programs should pay the closest attention given the implications for long-term completion outcomes. Programs should strongly consider marking their variables to this approach (enrolled fall and persisted the following fall or enrolled spring and persisted the following spring) because gaps in a student's enrollment pattern will be clear and actionable using this approach.

- **What Does Research Say?**
    - "On average, 35 percent of 1989–90 first-time beginners who interrupted their enrollment for a period of more than 4 months had completed a degree 5 years after their initial enrollment, compared to 56 percent of those who had no break in continuity. Students who interrupted their enrollment were more likely to be still enrolled 5 years after initially entering postsecondary education (25 versus 8 percent)."[117]
    - An examination of students participating in the nationally representative 1980 High School & Beyond study found that, all else held constant, continuous enrollment was associate with a 23 percentage point increase in the probability of degree completion. The probability increase was even higher for students in the bottom two socioeconomic quartiles, whose completion rates on average increased 26.7 and 37.7 percentage points, respectively. Unfortunately, students from these quartiles were also the least likely to continuously enroll; just 48.4 percent of students in the lowest quartile and 58.7 percent in the next lowest enrolled continuously, compared to 59.5 and 71.3 percent respectively for the top two quartiles.[118]
    - Using data from the NELS:88/2000, Adelman found that, among 16 variables whose impact on earning a bachelor's degree was considered, continuous enrollment was found to be "overpowering" in its effect. Students who remained continuously enrolled, that is students who did not miss more than one semester or two quarters (excluding summer terms) increased their probability of earning a bachelor's degree by 43 percentage points. The research concluded that it was best to keep students continuously enrolled, even if they were enrolled part-time, because being enrolled part-time was "less damaging" than having long periods of stopping out.[119]
    - In a sample of over 30,000 students pursuing bachelor's degree in the State University System of Florida, 71 percent of students who enrolled continuously without stopping out completed a degree in the study period while just 51 percent of those who had a gap and were not continuously enrolled earned a degree.[120]

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[117] Cuccaro-Alamin, S. (1997). *Postsecondary persistence and attainment. Findings from "The Condition of Education, 1997" No. 13.* Retrieved from http://nces.ed.gov/pubs97/97984.pdf

[118] Cabrera, A. F., Burkum, K. R., & La Nasa, S. M. (2005). Pathways to a four-year degree. In A. Seidman (Ed.), *College student retention: Formula for student success*, 155-214. Retrieved from http://files.eric.ed.gov/fulltext/ED482160.pdf

[119] Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college.* Retrieved from https://www2.ed.gov/rschstat/research/pubs/toolboxrevisit/toolbox.pdf

[120] Offenstein, J., Moore, C., & Shulock, N. (2010). *Advancing by degrees: A framework for increasing college completion.* Retrieved from http://eric.ed.gov/?id=ED511863

Student's term-to-term persistence

- **Importance:** Essential
- **Calculation:** Binary (yes/no)
- **Data Sources:** National Student Clearinghouse, registrar's office (FERPA waiver needed), college transcripts, student web portal or information system (grades/registrar website)
- **Notes/Errata for Tracking:** As above, this is another complicated Common Measure to track, but it is less complicated than the year-to-year metric above. The research below indicates that students who have gaps in the continuity of their enrollment are less likely to complete a postsecondary credential. Fall-to-spring or spring-to-fall persistence (depending on a student's first semester of enrollment and optionally including summer term enrollment) is an indicator to which programs should pay the closest attention given the implications for long-term completion outcomes. Although tracking persistence term-to-term versus year-to-year is more time-intensive for staff, programs should strongly consider marking their variables to this approach (enrolled fall and persisted the following spring or enrolled spring and persisted the following fall) if possible because gaps in a student's enrollment pattern will be more clear and actionable using this approach.
- **What Does Research Say?**
    - In a study of almost 250,000 students in the California Community College students from 2000-01 through 2006-07, continuously enrolled students had a completion rate that was seven percentage points higher than students who stopped out at some point during their postsecondary career.[121]
    - In a study of over 14,000 degree- or transfer-seeking students across two cohorts enrolled at five community colleges in a single state who were followed for five to six academic years, students with more continuous enrollment patterns (with most full-time terms either front- or back-loaded) were six to eight times more likely to complete a credential than students with less continuous enrollment patterns.[122]
    - "On average, 35 percent of 1989–90 first-time beginners who interrupted their enrollment for a period of more than 4 months had completed a degree 5 years after their initial enrollment, compared to 56 percent of those who had no break in continuity. Students who interrupted their enrollment were more likely to be still enrolled 5 years after initially entering postsecondary education (25 versus 8 percent)."[123]
    - An examination of students participating in the nationally representative 1980 High School & Beyond study found that, all else held constant, continuous enrollment was associate with a 23 percentage point increase in the probability of degree completion.

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[121] *Ibid.*

[122] Crosta, P. M. (2014). Intensity and attachment: How the chaotic enrollment patterns of community college students relate to educational outcomes. *Community College Review*. Retrieved from http://ccrc.tc.columbia.edu/media/k2/attachments/intensity-and-attachment-educational-outcomes.pdf

[123] Cuccaro-Alamin, S. (1997). *Postsecondary persistence and attainment. Findings from "The Condition of Education, 1997" No. 13.* Retrieved from http://nces.ed.gov/pubs97/97984.pdf

The probability increase was even higher for students in the bottom two socioeconomic quartiles, whose completion rates on average increased 26.7 and 37.7 percentage points, respectively. Unfortunately, students from these quartiles were also the least likely to continuously enroll; just 48.4 percent of students in the lowest quartile and 58.7 percent in the next lowest enrolled continuously, compared to 59.5 and 71.3 percent respectively for the top two quartiles.[124]

Student completed a postsecondary degree within 150% of time

- **Importance:** Essential
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** National Student Clearinghouse, college/university registrar (requires relationship with the institution and/or FERPA waiver), college transcripts, student self-reporting (potentially unreliable), university alumni offices (maybe difficult to get data)
- **Notes/Errata for Tracking:** This metric was originally described as "student completed a postsecondary degree within six years of enrollment," but national comparison data often consider completion within 150% of the time, depending on the time of institution in which a student is enrolled. For associate's-granting institutions, 150% of time is three years, while for bachelor's-granting institutions it is six years. There are a few related variables/fields that should go along with the main binary indicator of completion. For example:
    - Institution awarding the degree or certificate
    - Type of institution
    - Initial enrollment data
    - Level of degree/certificate
    - Field of degree/certificate
    - Date of award
- **What Does Research Say?**
    - As this is a primary outcome to which college access and success programs are striving, research is not necessarily needed to justify this metric's inclusion. However, from a policy standpoint, the Student Right-to-Know Act (first passed in 1990) requires colleges to report the percentage of students who are "completing their program within 150 percent of the normal time to completion." This data has been collected in the Integrated Postsecondary Education Data System (IPEDS) since 1997.[125] IPEDS data on completion are often reported within the 150% window (three years for a two-year degree, six years for a four-year degree). Consequently, much of the other research around postsecondary completion also examines completion within 150% of time.

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[124] Cabrera, A. F., Burkum, K. R., & La Nasa, S. M. (2005). Pathways to a four-year degree. In A. Seidman (Ed.), *College student retention: Formula for student success*, 155-214. Retrieved from http://files.eric.ed.gov/fulltext/ED482160.pdf

[125] Glenn, D. (2010, December 7). 6-year graduation rates: a 6-minute primer. *The Chronicle of Higher Education*. Retrieved from http://chronicle.com/blogs/measuring/6-year-graduation-rates-a-6-minute-primer/27573

- There is a small amount of research examining completion rates beyond the 150% window. One study using IPEDS data and examining completion within 200% of normal time found that although the average 200% graduation rate across all institutional sectors was larger than the 150% graduation rate, the difference between these two rates was smaller than the rate between the 150% and 100% graduation rates. "For example, the average graduation rates for public 4-year colleges increased by about 4 percentage points between the 6-year and 8-year graduation rates, but by about 26 percentage points between the 4-year and 6-year graduation rates."[126]
- In the same vein, data from the Baccalaureate and Beyond: 2008-2012 study show that 26.6 percent of men and 25 percent of women had first enrolled more than six years prior to receiving their bachelor's degree.[127] While the majority of students of students graduate within the six year window, not all students do so.

Student is eligible to transfer from 2-year to 4-year program with or without Associate's Degree

- **Importance:** If Available
- **Calculation:** Binary (yes/no)
- **Data Sources:** College transcripts
- **Notes/Errata for Tracking:** This is a metric that warrants further guidance from NCAN moving forward. Requirements and policies for transfer from 2-year to 4-year institutions often vary from state to state and system to system, which makes advising how to track this metric difficult. Programs should examine the 2-year institutions most often attended by their students, consider any 4-year institutions that have transfer agreements or pipelines with these 2-year institutions, and set the criteria for this variable accordingly.

  Some of the indicators that are associated with this metric answer the following questions:

  - Does the student plan to transfer?
  - Did the student actually transfer?
  - How long was the gap between enrollment at the 2-year and 4-year institutions?
  - At the time the student transferred, had they earned an associate's degree?
  - Did a student ultimately earn a bachelor's degree?

  All of these indicators can be best documented by tracking student persistence on a term-to-term basis.
- **What Does Research Say?**
  - Using data from the National Education Longitudinal Study of 1988 (NELS:88) and the Postsecondary Education Transcript Study, the author examined 786 students

[126] Horn, L. (2010). *Tracking students to 200 Percent of normal time: Effect on institutional graduation rates*. Retrieved from http://nces.ed.gov/pubs2011/2011221.pdf

[127] National College Access Network analysis of U.S. Department of Education, National Center for Education Statistics, 2008/12 Baccalaureate and Beyond Longitudinal Study.

who enrolled in a 2-year institution soon after high school and eventually transferred to a 4-year institution. The author found that "the probability of earning a bachelor's degree among community college transfers is a function of demographic, high school, and college experience correlates." Specifically, female transfers were more likely to attain a bachelor's degree than males. Academic (rather than vocational) high school curriculum, socioeconomic status, 12th grade baccalaureate aspirations, and community college GPA also had statistically significant positive effects on the probability of completion while placement into math remediation had a significant negative effect. High school GPA and perceived internal locus of control were had statistically significant positive effects on persistence after transfer. The authors hypothesize that locus of control "may be more determined to realize their educational plans by holding themselves accountable for the process, which is partly reflected by continuing to enroll, and may be more resilient when faced with external demands and obstacles."[128]

- Adelman, in his seminal "Answers in the Toolbox" and "The Toolbox Revisited," considers transfer from 2-year to 4-year institutions. He defines transfer as purposeful migration where a transfer student starts in community college, earns more than 10 credits there, enrolls in a 4-year institution, and then earns more than 10 credits there. He finds that just 26 percent of students formally transfer to 4-year schools, but over 70 percent of these students completed bachelor's degrees. Additionally, in both studies, a student completing a transfer as defined above has a statistically significant positive impact on eventual bachelor's degree completion. This stands in contrast to "swirling" or "wandering from one school to another," which is not associated with bachelor's completion. Adelman recommends, "If we know that students who meet the transfer sequence criteria succeed as well as they do, then we should guide them into that sequence instead of allowing them to leave the community college too early."[129,130]
- Using data from the 1990 Beginning Postsecondary Students (BPS) Longitudinal Study, the authors find that "while one out of four community college transfers had received a bachelor's degree by 1994, another 44 percent were still enrolled at a 4-year institution, for an overall persistence rate of 70 percent. This is comparable to the persistence rate among students who began at 4-year institutions and among 4-year horizontal transfers. The bachelor's degree attainment rate was much higher among the minority of community college transfers who completed an associate's degree before transferring: 43 percent of associate's degree completers had received a

[128] Wang, X. (2009). Baccalaureate attainment and college persistence of community college transfer students at four-year institutions. *Research in Higher Education*, *50*(6), 570-588. doi:10.1007/s11162-009-9133-z

[129] Adelman, C. (1999). *Answers in the toolbox: Academic intensity, academic patterns, and bachelor's degree attainment.* Retrieved from http://www2.ed.gov/pubs/Toolbox/index.html

[130] Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college.* Retrieved from https://www2.ed.gov/rschstat/research/pubs/toolboxrevisit/toolbox.pdf

bachelor's degree by 1994, compared with 17 percent among those who transferred without any credential."[131]

Financial Aid Indicators

Note: Because these indicators and the research supporting their inclusion in the Common Measures are related, we include one "What the Research Says" that encompasses all four variables at the conclusion of this section.

Student completed and submitted a renewal FAFSA form

- **Importance:** Essential
- **Calculation:** Binary (yes/no)
- **Data Sources:** Local college access programs, student self-reported data, state education agency
- **Notes/Errata for Tracking:**
    - Programs should maintain two separate variables: one for when a student *submits* their FAFSA and another when the Student Aid Report (SAR) is received, which indicates that there are no problems with the submission and that the FAFSA is now "*complete*." A student who submits the FAFSA but does not correct any resulting errors is not eligible for federal student aid. Programs may also want to add additional related indicators for whether a student has set up their FSA ID or whether the student has been selected for verification, as both of these are obstacles in the financial aid process.
    - If your program examines (or would like to examine) year-over-year or month-over-month FAFSA completion progress, it will also be necessary to collect the date of submission and completion as additional variables.
- **What Does Research Say?** See "What the research says about financial aid (and indicators related to it)" at the end of this section.

Student received a financial aid award letter

- **Importance:** Essential
- **Calculation:** Binary (yes/no) or memo (see notes/errata)
- **Data Sources:** Local college access programs, student self-reported data
- **Notes/Errata for Tracking:**
    - If used in the binary format, this variable can be used to mark if and when a student receives a financial aid award letter from any postsecondary institution for a given academic year.
    - Note that a memo/text field is much more difficult than a binary variable field to incorporate into a search, query, or data set, and so it may be helpful to maintain

[131] McCormick, A. C., & Carroll, C. D. (1997). *Transfer behavior among beginning postsecondary students: 1989-94*. Retrieved from http://nces.ed.gov/pubs97/97266.pdf

both fields: a binary variable in which to record whether a student has received a financial award letter from *any* institution and a memo/text field that can be more detailed.
    - This metric was previously described as "student awarded financial aid," but note that a student may receive a financial letter that only says that he or she is eligible for unsubsidized loans. In this case, a student has not been awarded financial aid, but they have received their financial aid award letter. This caused the change of the metric to "student received a financial award letter."
- **What Does Research Say?** See "What the research says about financial aid (and indicators related to it)" at the end of this section.

Amount of financial aid awarded to student, by aid type

- **Importance:** If available
- **Calculation:** Multiple numeric columns or memo (see notes/errata)
- **Data Sources:** Local college access programs, student self-reported data (from award letters)
- **Notes/Errata for Tracking:** How this measure is recorded depends in large part on the level of detail that a program needs and which questions the program would like to be able to answer. The below are some suggestions for how to record this metric:
    - Multiple numeric indicators in which dollar amounts of financial aid can be rewarded for each of a few types: grants (which could be broken down into Pell, internal (program-awarded) scholarships, state scholarships/grants, other external scholarships, and/or other depending on which are available to a given program's students), loans (which could be broken down into federal subsidized, federal unsubsidized, and/or private), federal work study, and other. In this case, it is likely helpful to have another column for the total amount of financial aid awarded, which would be automatically calculate as a sum from all of the individual columns/fields that were created. This approach becomes much more usable after a student has selected the institution that they will attend; it is unwieldy for displaying data about multiple award packages. Note that in the future NCAN will likely issue further guidance about whether to include loans, non-grant aid, and parents loans in this financial aid award total; programs are encouraged to follow their own decision here but clearly describe what types of aid are in the "total" figure.
- **What Does Research Say?** See "What the research says about financial aid (and indicators related to it)" at the end of this section.

Student is working more than 20 hours per week

- **Importance:** If Available
- **Calculation:** Binary (yes/no) or numeric/continuous
- **Data Sources:** Student self-reported data

- **Notes/Errata for Tracking:** Research (described below) uses various cut-offs for examining the number of hours worked by students. There are at least two ways to capture this variable in a data system. The first is to record the number of hours the student reports that they are working; this method is more precise and better shows variation and could still be disaggregated into those students working more or less than 20 hours per week; this method is preferable, especially considering that the research below do not show 20 hours s a true tipping point for student outcomes. The second method is either a simple binary yes/no variable about whether the student is currently working 20 hours per week. The frequency with which programs update this metric will largely depend on data availability and staff capacity.
- **What Does Research Say?** See "What the research says about financial aid (and indicators related to it)" at the end of this section. Additionally, there is specific research about the effect working can have on postsecondary attainment:
    - In a study using data from the 1995-96 Beginning Postsecondary Students (BPS) Survey, students who were not working when first enrolled were significantly more likely (63.5%) to still be enrolled in their initial institution or have a bachelor's degree four years later than students who were working part time (61.1%) or full time (48.6%) when they first enrolled. Note that for this study the demarcation between part time and full time employment was 35 hours worked per week.[132]
    - Data from the Beginning Postsecondary Students (BPS) Longitudinal Survey showed that, "At public 2-year institutions, students who worked part time or did not work while they were enrolled were less likely than those who worked full time (33 and 43 percent, respectively, versus 59 percent) to leave college. These relationships were found even when taking into account other factors associated with departure."[133]
    - In a study of the National Postsecondary Student Aid Study (NPSAS): 1996, 40 percent of students surveyed who worked while enrolled said that their work schedule and class schedule were in conflict; 36 percent reported that their class choices were reduced as a result of working. Students were asked about four kinds of limitations: class choice restrictions, limiting the number of classes that could be taken, limiting the amount of time in which to schedule classes, and having less access to the library. Students who worked 15 hours or less while enrolled reported facing these limitations 15-22 percent of the time while students who worked full-time reported these limitations 41 percent or more of the time.[134]

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[132] Horn, L., & Kojaku, L.K. (2001). *High school academic curriculum and the persistence path through college persistence and transfer behavior of undergraduates 3 years after entering 4-year institutions.* Retrieved from http://nces.ed.gov/pubs2001/2001163.pdf

[133] Bradburn, E. M. (2002). *Short-term enrollment in postsecondary education: Student background and institutional differences in reasons for early departure, 1996-98*. Retrieved from http://nces.ed.gov/das/epubs/2003153/factors2.asp

[134] Horn, L. J. (1998). *Undergraduates who work: National Postsecondary Student Aid Study, 1996*. Retrieved from http://nces.ed.gov/pubs98/98137.pdf

- In a study of students at Berea College, Stinebrickner and Stinebrickner (as cited in Scott-Clayton, 2012) found that "an additional hour worked per week decreases the first semester grade point average (GPA) by 0.162 points on a four-point scale."[135]

What the research says about financial aid (and indicators related to it):

Each of the four indicators above is related to the process of applying for and securing financial aid. Rather than attempting to parse the research for any of the individual measures, below (and for the Financial Aid Indicators in the Success section) we describe what research says about the importance of financial aid for enrolling in, persisting through, and completing postsecondary education.

- A study using data from the Education Longitudinal Study: 2002 (ELS) found that "application for financial aid is positively associated with enrollment at any four-year college—leading to a 55 percent increase in the chances a student will enroll in any four-year college than students who did not apply for financial aid" but also notes that applying for financial aid also resulted in a 48 percent reduction to the likelihood that a student would enroll in a highly selective four-year institution, even controlling for family income.[136]
- "Estimates based on data from the 2011-12 National Postsecondary Student Aid Study (NPSAS) indicates that 30 percent of students who failed to file a FAFSA, one third would have qualified for a Pell grant."[137]
- "Faced with this unmet need, low-income students select two-year institutions rather than four-year options, reduce their attendance from full-time to part-time, live off campus rather than on campus, and work longer hours. All of these behaviors significantly reduce the probability that they will persist to completion of a four-year degree."[138]
- In a study of more than 37,000 first-time, first-year students enrolled in 2- or 4-year institutions in Oho during the 1999-00 academic year, a $1,000 increase in Pell grant receipt improved first-year persistence by 2-4 percentage points.[139]
- A similar study examined over 7,000 high school seniors in the 2000-01 academic year who were enrolled in a Florida postsecondary institution and were within $1,000 of the eligibility cut-off for the Florida Student Access Grant. This study found that grant recipients' continuous enrollment through their first spring semester increased by 4.3 percentage-points

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[135] Scott-Clayton, J. (2012). What explains trends in labor supply among US undergraduates? *National Tax Journal*, *65*(1), 181-210. doi: 10.3386/w17744

[136] Klasik, D. (2012). The college application gauntlet: A systematic analysis of the steps to four-year college enrollment. *Research in Higher Education*,*53*(5), 506-549. doi:10.1007/s11162-011-9242-3

[137] Page, L. C., & Scott-Clayton, J. (2015). *Improving college access in the United States: Barriers and policy responses (No. w21781).* Retrieved from http://www.nber.org/papers/w21781

[138] Tinto, V. (2004). *Student retention and graduation: Facing the truth, living with the consequences.* Retrieved from http://files.eric.ed.gov/fulltext/ED519709.pdf

[139] Bettinger, E. (2004). How financial aid affects persistence. In *College choices: The economics of where to go, when to go, and how to pay for it* (pp. 207-238). University of Chicago Press. Retrieved from http://www.nber.org/chapters/c10101.pdf

per $1,000 of additional grant eligibility; their likelihood of earning a bachelor's degree within six years increased by 4.6 percentage points with $1,000 of grant eligibility; and students eligible for an additional $1,000 in aid earned 2.1 more credits in their first three years than students who did not receive the additional aid.[140]

- The Opening Doors Louisiana study used random assignment in a sample of more than 500 low-income individuals aged 18-34. These individuals were eligible to receive up to $2,000 for college. Among those who were in the treatment group, there was a 3.2 percentage-point increase in retention per $1,000 of additional financial aid. Additionally, students in the treatment group earned 1.5 credits in their first year and 1.7 credits in their second year per $1,000 increase in aid. Finally, receipt of additional financial aid increased full-time enrollment in the treatment group over the control group by 9.3, 20.3, and 10.7 percentage-points in the first, second, and third semesters, respectively.[141]
- Another study used random assignment to examine nearly 15,000 students in Wisconsin who had attended a state public high school, were enrolled full time in a public state university, and who had unmet need after completing the FAFSA and qualifying for a Pell Grant. Students in the treatment group of this study were eligible for up to an additional $3,500 for up to five years through the Wisconsin Scholars Grant. Grant recipients saw their second-year retention increase by 2.5 percentage-points and were 2.4 percentage-points more likely to earn 12 or more credits by the end of their second semester. Overall, an additional $1,000 in additional total financial aid was associated with a 2.8 to 4.1 percentage-point increase in second year retention.[142]
- Two Canadian studies, both using random assignment of treatment, offer conflicting evidence about the impact of additional aid. One study of over 3,000 Canadian citizens enrolled full-time in a postsecondary institution and identified as at-risk based on placement instruments found that an additional $1,000 of financial aid increased recipients' persistence rates by 2.3 percentage points.[143] Another study of over 1,500 first-time, full-time college students with high school GPAs outside of the top quartile found that additional grant aid had little effect on credit accumulation or persistence.[144]

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[140] Castleman, B. L., & Long, B. T. (2013). *Looking beyond enrollment: The causal effect of need-based grants on college access, persistence, and graduation (No. w19306)*. Retrieved from http://gseacademic.harvard.edu/~longbr/Castleman_Long_-_Looking_Beyond_Enrollment_-_draft_Oct2012.pdf

[141] Richburg-Hayes, L., Brock, T., LeBlanc, A., Paxson, C. H., Rouse, C. E., & Barrow, L. (2009). *Rewarding persistence: Effects of a performance-based scholarship program for low-income parents.* MDRC. Retrieved from http://www.mdrc.org/sites/default/files/rewarding_persistence_fr.pdf

[142] Goldrick-Rab, S., Harris, D., Kelchen, R., & Benson, J. (2012). *Need-based financial aid and college persistence experimental evidence from Wisconsin.* Retrieved from http://www.finaidstudy.org/documents/goldrick-rab%20harris%20benson%20kelchen.pdf

[143] MacDonald, H., Malatest, R., Assels, R., Bround, R., et al. (2009). *Final impacts report: Foundations for success.* Retrieved from http://malatest.com/CMSF%20FFS%20-%20FINAL%20Impacts%20Report.pdf

[144] Angrist, J., Lang, D., & Oreopoulos, P. (2009). Incentives and services for college achievement: Evidence from a randomized trial. *American Economic Journal: Applied Economics*,*1*(1), 136-163. doi:10.1257/app.1.1.136

- For more information on research relating to the effects of financial aid on academic success, consult Welbeck et al. (2014), Table 1.[145]

Core Demographic Data

First Generation College-Going

- **Importance:** Essential
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** Student self-report
- **Notes/Errata for Tracking:** There is no universal definition of a "first generation college student," and at this time NCAN does not prescribe the use of one definition over another. Different programs use different definitions. Most of the research below defines "first generation" as a student's parents having no education beyond the high school level. However, some programs take a more expansive view and define "first generation" as neither parent having attained a bachelor's degree. In general, the student-level characteristic "first generation college student" is a proxy for whether or not a student or their family is likely to be familiar with the college enrollment, matriculation, persistence, and completion process. Until further guidance is issued, programs are encouraged to use their own definition of this characteristic while being mindful of the definitions used in the research below.
- **What Does Research Say?**
    - After analyzing NELS:88 data, Adelman found that "the probability of completing a bachelor's degree is reduced by roughly 21 percent for first generation students." This research defined "first generation" as neither parent having attended a postsecondary institution.[146]
    - Using data from the National Education Longitudinal Study examining high school graduates from the class of 1992, the authors found that 59 percent of students whose parents had no college education had enrolled in a postsecondary institution within two years. Meanwhile, 75 percent of students whose parents had some college experience and 93 percent of students whose parents had at least one bachelor's degree enrolled in the same period.[147]

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[145] Welbeck, R., Diamond, J., Mayer, A., & Richburg-Hayes, L. (2014). *Piecing together the college affordability puzzle: Student characteristics and patterns of (un) affordability. MDRC.* Retrieved from: https://www.luminafoundation.org/files/publications/ideas_summit/Piecing_Together_the_College_Affordability_Puzzle.pdf

[146] Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college.* Retrieved from https://www2.ed.gov/rschstat/research/pubs/toolboxrevisit/toolbox.pdf

[147] Chen, X., & Carroll, C. D. (2005). *First-generation students in postsecondary education: A look at their college transcripts.* Retrieved from http://nces.ed.gov/pubs2005/2005171.pdf

- For more on access issues and interventions for first-generation college students, consider Tym et al. (2004)[148] and Jenkins, Miyazaki, and Janosik (2009).[149]

Pell Grant Eligible

- **Importance:** Essential
- **Calculation Notes:** Binary (yes/no), see notes/errata below
- **Data Sources:** Student self-report, parents, campus financial aid office (if FERPA waiver)
- **Notes/Errata for Tracking:** At the least, programs should track whether or not a student was offered a Pell Grant in their financial aid award letter. Programs may additionally want to track whether the student accepted the Pell Grant and what the amount of that award was.
- **What Does Research Say?**
  - Using data from the High School & Beyond national sample of sophomores in 1980, the authors find a 24 percentage point completion gap between the students with the highest socioeconomic status and the lowest.[150]
  - Using a national (though not nationally representative) sample from the high school graduating classes of 2008, 2012, and 2014, the National Student Clearinghouse found that enrollment, persistence, and completion rates were all lower for students from low-income high schools than for students from higher-income high schools.[151]
  - A study of 1,149 four-year public and private nonprofit colleges and universities found that the average graduation rate gap between Pell Grant-receiving and non-Pell students is 5.7 percentage points. The national average was 14 percentage points. The report notes that although "leading critics of the Pell Grant program to label it a poor investment of taxpayer resources…at the average college in our sample, the low-income students who receive Pell support graduate at rates only 5.7 points below those of students who don't have the extra challenges that most low-income students have to navigate as they work their way toward a college degree."[152]

Race/Ethnicity

- **Importance:** Essential
- **Calculation Notes:** Categorical (multiple selections)
- **Data Sources:** Student self-report, parents, school/district information system

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[148] Tym, C., McMillion, R., Barone, S., & Webster, J. (2004). *First-generation college students: A literature review.* Retrieved from http://files.eric.ed.gov/fulltext/ED542505.pdf

[149] Miyazaki, Y., & Janosik, S. M. (2009). Predictors that distinguish first-generation college students from non-first generation college students. *Journal of Multicultural, Gender and Minority Studies*, *3*(1). Retrieved from http://www.scientificjournals.org/journals2009/articles/1429.pdf

[150] Cabrera, A. F., Burkum, K. R., & La Nasa, S. M. (2005). Pathways to a four-year degree. In A. Seidman (Ed.), *College student retention: Formula for student success*, 155-214. Retrieved from http://files.eric.ed.gov/fulltext/ED482160.pdf

[151] National Student Clearinghouse Research Center (2015). *High school benchmarks 2015: National college progression rates.* Retrieved from https://nscresearchcenter.org/hsbenchmarks2015/

[152] Nichols, A.H. (2015). *The Pell partnership: Ensuring a shared responsibility for low-income student success.* Retrieved from https://edtrust.org/wp-content/uploads/2014/09/ThePellPartnership_EdTrust_20152.pdf

- **Notes/Errata for Tracking:** Different programs track race and ethnicity in different ways according to their needs. For our Benchmarking Project, NCAN follows the U.S. Census and asks members to report race as one of American Indian or Alaska Native, Asian, Black, Multiracial, Pacific Islander, or White. Additionally, for ethnicity, we ask participating programs to report whether or not a student is Hispanic. If more detail is needed, programs serving large Hispanic or Asian populations, for example, may want to further categorize students by their (or their parents') country of origin.
- **What Does Research Say?**
    - After analyzing NELS:88 data, Adelman found that, "Of student demographic characteristics, only one—socioeconomic status—was significantly associated with degree completion, though in a modest manner. Gender and race/ethnicity were never significant in the logistic narrative, even though some indirect effects of these key demographic characteristics would probably be found in other statistical models. When each race/ethnicity group was treated as an independent variable, the basic story did not change."[153] With that said, postsecondary attainment gaps still exist between students of different racial and ethnic groups.[154,155]

ESL Status

- **Importance:** Essential
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** Student self-report, parents, school/district information system
- **Notes/Errata for Tracking:** Programs should keep track students' ESL status according to how the student's school or school district classifies the student. It may also be helpful for students who are ESL to maintain another field recording the student's primary language.
- **What Does Research Say?**
    - "Despite the difficulties in accurately defining a dropout rate for EL students, given the threats outlined above, researchers repeatedly show that EL students are more likely to drop out than native English speakers, or even fluent English speaking language minority students (Kim and Herman 2009; Olsen 2010; Silver, Saunders, and Zarate 2008; Watt and Roessingh 1994). Whether EL students' greater risk of attrition is due to linguistic, academic, background or school characteristics, or any combination of these, remains to be determined."[156]

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[153] Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college.* Retrieved from https://www2.ed.gov/rschstat/research/pubs/toolboxrevisit/toolbox.pdf

[154] National Center of Education Statistics (2015). *The condition of education: educational attainment.* Retrieved from http://nces.ed.gov/programs/coe/indicator_caa.asp

[155] National College Access Network. (2015). *Closing the college graduation gap: NCAN'S 2015 benchmarking report.* Retrieved from http://www.collegeaccess.org/benchmarkingreport2015

[156] Callahan, R. M. (2013). *The English learner dropout dilemma: Multiple risks and multiple resources.* Santa Barbara: California Drop out Research Project. Retrieved from http://www.cdrp.ucsb.edu/researchreport19.pdf

- The most recent four-year adjusted cohort high school graduation rates (for the senior class graduating in 2013) show a significant graduate rap gap between students of limited English proficiency and other student groups.[157]

Gender

- **Importance:** Essential
- **Calculation Notes:** Categorical (multiple selections)
- **Data Sources:** Student self-report, parents, school/district information system
- **Notes/Errata for Tracking:** Although in many cases, recording this variable will be fairly clear, programs should be sensitive to recording the gender with which a student identifies.
- **What Does Research Say?**
  - "Among first-time students seeking bachelor's degrees who started full time at a 4-year college in 2004, a higher percentage of females than males completed bachelor's degrees within 6 years (61 vs. 56 percent)—a pattern that held across all racial/ethnic groups."[158]
  - In a study of students who enrolled in a four-year public institution in Florida in 2002-03, the year immediately following their high school graduation, the authors found that male students earned 0.43 fewer credits in their first semester than female students and that this disparity continues as time progresses; by the end of the sixth semester, male students had on average earned 6.66 credits less than female students. Male students also had a GPA gap of approximately 0.20 points. In the same study, the authors followed students at five Texas universities for six years and found that male students were less likely to graduate.[159]
  - The most recent Condition of Education from the U.S. Department of Education shows both bachelor's and master's or higher attainment gaps between male and female students.[160]

Selected vs. Undecided Majors

- **Importance:** If available
- **Calculation Notes:** Binary (yes/no)
- **Data Sources:** Student self-report, registrar (if FERPA waiver), student's academic advisor (if FERPA waiver)

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[157] U.S. Department of Education. (2015, March 16). Achievement gap narrows as high school graduation rates for minority students improve faster than rest of nation. [Blog post]. Retrieved from http://www.ed.gov/news/press-releases/achievement-gap-narrows-high-school-graduation-rates-minority-students-improve-faster-rest-nation

[158] Ross, T., Kena, G., Rathbun, A., KewalRamani, A., Zhang, J., Kristapovich, P., & Manning, E. (2012). *Higher education: Gaps in access and persistence study.* Retrieved from https://nces.ed.gov/pubs2012/2012046.pdf

[159] Conger, D., & Long, M. C. (2010). Why are men falling behind? Gender gaps in college performance and persistence. *The Annals of the American Academy of Political and Social Science*, *627*(1), 184-214. doi: 10.1177/0002716209348751

[160] National Center of Education Statistics (2015). *The condition of education: educational attainment.* Retrieved from http://nces.ed.gov/programs/coe/indicator_caa.asp

- **Notes/Errata for Tracking:** This could be as simple as a yes/no for whether or not a student has selected their major or not. An accompanying field with the name of the major and additional fields with any minors or certificates being pursued may also be useful for some programs.
- **What Does Research Say?** After a research review, no rigorous research on the effects or timing of declaring a major was identified. Research will continue, and this section may be updated in a future version of this handbook. In general, this variable is worth collecting because of the implications that major selection (or change) has for a student's postsecondary course selection.