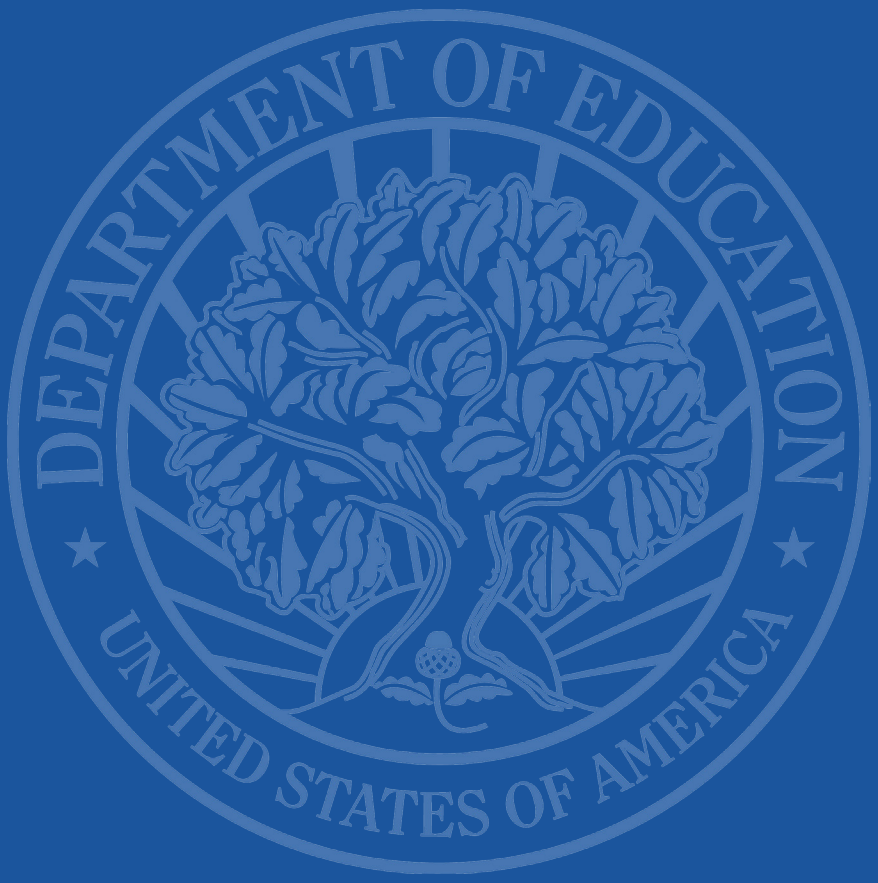

U.S. Department of Education

Secondary Career and Technical Education: Differences in Access, Participation, and Outcomes in Two National Studies

Secondary Career and Technical Education: Differences in Access, Participation, and Outcomes in Two National Studies

Prepared for the
U.S. Department of Education
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NATIONAL CENTER FOR INNOVATION IN CAREER AND TECHNICAL EDUCATION

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ABBREVIATIONS

ADD	attention deficit disorder
ADHD	attention-deficit/hyperactivity disorder
Agriculture	agriculture, food, and natural resources field of study
Architecture	architecture and construction field of study
Arts	arts, A/V technology, and communication field of study
BRR	balanced repeated replication
Business	business management and administration field of study
CSSC	Classification of Secondary School Courses
CTE	career and technical education
CTE Concentrators	students who earned three or more credits in at least one CTE field of study, based on student transcripts
CTE Explorers	students who earned three or more CTE credits but no three credits in any single CTE field, based on student transcripts
CTE Nonparticipants	students who earned less than one CTE credit, based on student transcripts
CTE Participants	students who earned at least one credit of CTE, based on student transcripts
CTE Samplers	students who earned one to two CTE credits in one or more CTE fields of study, based on student transcripts
Education	education and training CTE field of study
ELL	English language learner
ELS:2002	Education Longitudinal Study of 2002
ELS Cohort	students in the ELS:2002

CTE field of study	clusters of courses corresponding to 16 specific CTE areas or fields, coded based on student transcripts; also referred to as CTE fields
Government	government and public administration CTE field of study
Health	health science CTE field of study
Hospitality	hospitality and tourism CTE field of study
HSLS:09	High School Longitudinal Study of 2009
HSLS Cohort	students in the HSLS:09
IEP	Individualized Education Plan
IT	information technology CTE field of study
Law	law, public safety, corrections, and security CTE field of study
MLE	maximum likelihood estimation
MNL	multinomial logistic regression
NCES	National Center for Education Statistics
SCED	School Courses for the Exchange of Data
SES	socioeconomic status
STEM	science, technology, engineering, and mathematics

EXECUTIVE SUMMARY

Well-formulated career and technical education (CTE) programs provide high-quality, coherent instruction that leads to in-demand technical skills and rewarding careers for students from all backgrounds. However, participation rates and outcomes of students in CTE differ by student sociodemographic characteristics, as documented in prior research. For example, among 1992 high school graduates, 65 percent of males who earned four or more CTE credits enrolled in a postsecondary institution by 2000, compared to 78 percent of females (Levesque et al. 2008, table 2.33). Such differences in earlier high school cohorts raise the question of whether CTE provides equitable opportunities for students from different backgrounds — particularly for students who are disadvantaged or historically underserved.

To address these concerns, this study examines gaps in CTE participation rates and outcomes of CTE participants across a number of background characteristics.[1] The report identifies gaps and provides multiple measures of gaps based on student and school characteristics over time at the national level. Specifically, the study focuses on four key characteristics: sex, race/ethnicity, socioeconomic status (SES), and urbanicity of student's school locale.

The data used in this report come from the Education Longitudinal Study of 2002 (ELS:2002) and the High School Longitudinal Study of 2009 (HSLS:09), a pair of nationally representative, longitudinal studies of high school students conducted using similar methodologies and measures, allowing for comparison over time. The analytical samples used are students who were in grade 10 in 2002 (from ELS, referred to as the ELS cohort) and students in grade 9 in 2009 (from HSLS, referred to as the HSLS cohort). Most outcomes for these two samples are compared using high school transcript data for each cohort, collected in 2004 for the ELS cohort and in 2013 for the HSLS cohort. The data for the postsecondary enrollment outcome come from slightly different sources, however. For the ELS cohort, study participants were asked in 2006 (for most participants, two years after high school completion) whether they had ever attended a postsecondary institution. For the HSLS cohort, study participants were asked in 2013 (for most, the year they completed high school) if they attended or planned to attend a postsecondary institution immediately after

[1] CTE participants are high school students who earned at least one CTE credit. See the "Measures" section of Appendix A for more information on CTE participant status.

high school. Thus, the two cohorts cannot be compared directly with respect to this outcome, although similarities in the results are noted.

Three measures were used to evaluate the equitability of CTE for all students: access to CTE courses, participation in CTE courses, and CTE fields of study. Access to CTE is defined by whether the school administrator (in ELS:2002) reported that the school offers "vocational education" (the terminology used on the ELS survey) or the school counselor (in HSLS:09) reported that CTE was offered in district to students, either on-site or off-site. These questions are not fully comparable but together provide context about student access to CTE in these two cohorts.

With regard to participation in CTE, high school students are classified in one of four categories based on their earned credit in CTE courses. Courses designed for labor market preparation in a specified occupational field, such as business or computer and information sciences, are considered CTE courses for the purposes of this report.[2] Following Dalton et al. (2013), the four categories of CTE participation are [3]

1. CTE nonparticipants (less than one CTE credit);
2. CTE samplers (one to two CTE credits in one or more CTE fields of study);
3. CTE explorers (three or more CTE credits but no three credits in any single CTE field of study); and
4. CTE concentrators (three or more CTE credits in at least one CTE field of study).

CTE concentrators may be further classified by their high school CTE fields of study. Courses on respondents' high school transcripts can be classified into one (or more) of 16 CTE fields of study, such as architecture and construction, health science, human services, or manufacturing.

Both descriptive[4] and multivariate[5] statistics are used in the study. Descriptive statistics present simple means[6] or percentages for a given outcome and student group. All comparisons reported in the text between descriptive statistics have been tested for statistical significance[7] to ensure that the differences were unlikely to be due to chance. The

[2] General career exploration courses are not included.
[3] Note that these are not official designations of the U.S. Department of Education or individual States.
[4] See the "Statistical Definitions" section of Appendix A for the definition of "descriptive statistics."
[5] See the "Statistical Definitions" section of Appendix A for the definition of "multivariate models/multivariate statistics."
[6] See the "Statistical Definitions" section of Appendix A for the definition of "mean."
[7] See the "Statistical Definitions" section of Appendix A for the definition of "statistical significance."

multivariate statistics take multiple characteristics (such as race/ethnicity, sex, and family SES) into account at once in estimating the relationship between each characteristic and an outcome. Specifically, the report includes regression models: logistic regression[8] for dichotomous (0/1) outcome variables and multinomial logistic regression[9] for categorical outcome variables. For more information on the statistical methods and the definitions of all statistical terms used in this report, see the section on "Statistical Procedures and Methods" in Appendix A.

Readers are advised that the methods used in this paper cannot support rigorous causal inferences. Students who participate in CTE in high school may differ before taking their first CTE course, and differences in outcomes between CTE participants and CTE nonparticipants (or among CTE concentrators in different CTE fields) may reflect selection into CTE rather than the influence of CTE itself. The results presented here only present associations that can suggest further causal investigations about high school CTE and student outcomes.

PARTICIPATION IN CTE PROGRAMS BY STUDENT BACKGROUND CHARACTERISTICS IN 2004 AND 2013

In general, the level of participation in CTE varied by sex, race/ethnicity, SES, and urbanicity of school locale. While overall participation and concentration in CTE (particularly by CTE field of study) varied by student and school characteristics, for both the ELS and HSLS cohorts, greater differences were seen by CTE field of study. These findings are the primary focus of the report.

Access to CTE

- Accounting for all other student and school characteristics, students in urban schools were 6 percentage points[10] more likely to have access to CTE than students in suburban schools in the ELS cohort (table 7).
- In the HSLS cohort, black students were about 4 percentage points less likely to have access to CTE than white students (table 7).

[8] See the "Statistical Definitions" section of Appendix A for the definition of "logistic regression."
[9] See the "Statistical Definitions" section of Appendix A for the definition of "multinomial logistic regression."
[10] See the "Statistical Definitions" section of Appendix A for the definition of "percentage point."

- The multivariate models show few significant differences in access to CTE when accounting for student and school characteristics.

Participation in CTE

- A larger percentage of students in the HSLS cohort (21 percent) did not participate in CTE than in the ELS cohort (17 percent) (figure 1).
- In both cohorts, when accounting for all other student and school characteristics, more male students than female students participated in CTE, and fewer students from the highest SES quartile took CTE courses than from the second SES quartile (tables 8 and 9). (See Appendix A for more information on SES variable.)

CTE Participation by Field of Study

- In both cohorts, there were stark sex differences by CTE field among the students who participated and concentrated in each CTE field, with males predominating in certain CTE fields and females predominating in others. Specifically, in the ELS cohort, there was a significant difference (ranging from 8 to 80 percentage points) between the percentage of male students and female students earning a credit in all CTE fields except law and marketing (tables 10A and 10B). In the HSLS cohort, only business, finance, and information technology (IT) participation rates were not significantly different by sex (tables 11A and 11B).
- Participation rates in some CTE fields were much lower for students from the highest SES quartile than from other SES quartiles. In agriculture, human services, and transportation, smaller percentages of students from the highest SES quartile participated than students from all other SES quartiles, in both cohorts (tables 10A and 10B, and tables 11A and 11B).
- Participation across CTE fields of study differed by racial/ethnic composition within each cohort. In the multivariate models, Asian and Hispanic students in the HSLS cohort were about 4 and 3 percentage points less likely, respectively, to earn at least one credit in science, technology, engineering, and mathematics (STEM) compared to white students (table 13C).
- In both cohorts, students attending rural schools were 9–10 percentage points more likely to take at least one credit in IT compared with suburban students (tables 12B and 13B).

EDUCATIONAL OUTCOMES OF STUDENTS IN 2004, 2006, AND 2013

- Among CTE concentrators and students with CTE access, larger percentages of females than males were academic concentrators in both cohorts (tables 14 and 15). Students were defined as academic concentrators if they completed a college-oriented academic curriculum in high school, as defined by the National Center for Education Statistics (NCES) for ELS:2002 (Ingels et al. 2014).[11]

- The multivariate models show a difference in academic concentration for CTE explorers and concentrators between the ELS and HSLS cohorts. Specifically, net of all (controlling for) other student and school characteristics, CTE concentrators and explorers in the ELS cohort were about 6 percentage points less likely than CTE samplers to be academic concentrators. However, there was no significant difference in academic concentration by CTE participation level for the HSLS cohort (table 16).

- The gap in graduation rates between high- and low-SES students favored students who were CTE concentrators in both cohorts. For example, in the HSLS cohort, the gap for CTE nonparticipants was 25 percentage points between the lowest and highest SES students, and 4 percentage points between the lowest and highest SES students for CTE concentrators (table 18).

- Among some student groups, lower percentages of CTE concentrators than CTE nonparticipants ever enrolled in postsecondary education. This was the case by sex, for white students, and the highest three SES quartiles. For example, in the ELS cohort, while 95 percent of high-SES CTE nonparticipants had enrolled, 86 percent of high-SES CTE concentrators had enrolled in postsecondary education. However, this pattern did not hold for most racial/ethnic groups (table 20).

- There were wide differences between CTE fields of study in the percentage of graduates who academically concentrated. For the ELS cohort, the percentage of students who were academic concentrators ranged from almost 40 percent for arts to less than 10 percent for human services (table 24). For the HSLS cohort, the percentage of students who were academic concentrators ranged from 61 percent for STEM to 11 percent for human services (table 25).

[11] See the "Measures" section of Appendix A for more information on the definition of "academic concentrator."

IMPLICATIONS

There were few differences in CTE participation level, CTE fields of study, and outcomes between the two cohorts. These differences, mostly related to declining participation in CTE, represent small shifts in the overall patterns of CTE participation. Broadly speaking, participation in CTE generally varied by student and school characteristics, with the most pronounced differences at the CTE field of study level. Differences between the two cohorts were small and, when significant, tended towards a decrease in gaps. However, most differences between student subgroups persisted.

The most dramatic results were in the gaps in CTE participation levels, particularly in specific CTE fields of study. These gaps may have a variety of sources: individual student interest, cultural expectations, bias, or even mundane obstacles such as scheduling problems (e.g., for English language learners or academic concentrators). Addressing these gaps will require further research to understand which factors shaped them before any potentially ameliorative policies can be pursued. Also notable were the ways in which participation in certain CTE fields varied by race/ethnicity and SES. These findings highlight that selection into CTE fields of study varies greatly by student and school characteristics.

In terms of the relationship between CTE participation and student outcomes, this report provides a first examination of these relationships. More research is needed to tease out the causal relationships between CTE participation and outcomes, taking the differences in selection into different CTE fields of study into account.

INTRODUCTION

Well-formulated career and technical education (CTE) programs provide high-quality, coherent instruction that leads to in-demand technical skills and rewarding careers for students from all backgrounds. However, participation in CTE and concentration in specific CTE fields differ by student sociodemographic characteristics. For example, in 2004, 13 percent of Hispanic/Latino students completed a concentration in a CTE field of study, compared to 18 percent of black/African-American and 19 percent of white students (Dalton et al. 2013, table 8). Similarly, prior research on the outcomes of CTE participants appear to differ by student demographics. For example, among 1992 high school graduates, 65 percent of males who earned four or more CTE credits (across all CTE fields) enrolled in a postsecondary institution by 2000, compared to 78 percent of females (Levesque et al. 2008, table 2.33). These differential rates raise the question of whether CTE provides equitable opportunities for students from different backgrounds and particularly for students who are disadvantaged or historically underserved. Additionally, there is little understanding of differences in CTE participation across time.

To address these concerns, this study identifies gaps by examining CTE participation rates and the short-term educational outcomes of CTE participants from different backgrounds.[1] The study provides multiple measures of gaps based on student and school characteristics over time at the national level. This study focuses on how CTE participation rates and outcomes for students at different levels of CTE access and participation differ according to at least four key characteristics: sex, race/ethnicity, socioeconomic status (SES), and urbanicity of school locale. Where possible, English learner status disability status are also included, which is discussed in detail below.

The data used in this report come from the Education Longitudinal Study of 2002 (ELS:2002) and the High School Longitudinal Study of 2009 (HSLS:09), a pair of nationally representative, longitudinal studies of high school students using similar methodologies and measures, allowing for comparison over time.

The research questions for this study address gaps in CTE participation, access, and outcomes. These questions emphasize the association between student background and access to CTE or benefits from CTE, in order to identify possible systematic differences

[1] CTE participants are high school students who earned at least one CTE credit. See the "Measures" section of Appendix A for more information on CTE participant status.

across student groups. It is important to identify whether students' levels of CTE coursetaking vary by their key characteristics and whether CTE coursetaking leads to similar outcomes for students from different backgrounds, as this information indicates how well CTE programs and courses serve different populations. The paper compares high school outcomes for two cohorts of students, students who were in grade 10 in 2002 (the ELS cohort) and those in grade 9 in 2009 (the HSLS cohort). Specifically,

1. Do access to and participation in CTE programs vary by key student and school characteristics (sex, race/ethnicity, SES, and urbanicity of school locale) in the ELS and HSLS cohorts and between the two cohorts?
2. At the end of high school, what were the educational outcomes (on-time high school graduation and college attendance) of CTE samplers, explorers, and concentrators, and did these differ between the two cohorts?

ORGANIZATION OF THE REPORT

The following sections present the data and methods used, the results, and the conclusions and implications of these results. The data and methods section contains an overview of the two datasets used in this report, definitions for all the variables used, and a discussion of the analysis samples. It also discusses the statistical procedures and study limitations. More detailed information about data and methods are available in Appendix A.

The results section is organized around the research questions above. That section begins with an overview of the percentage of students participating in CTE overall and concentrating in given CTE fields. After the overview, the focus turns to the student and school characteristics associated with access to CTE and participation in CTE for students by demographic group for each cohort. Then the section focuses on the short-term educational outcomes of students with varying degrees of access to and participation in CTE classes, by the four key characteristics of sex, race/ethnicity, SES, and urbanicity of school locale. Supplemental tables supporting the findings are available in Appendix B.

A conclusion and implications section then summarizes the findings as well as policy and practice implications that could be drawn from them.

DATA, KEY DEFINITIONS, AND METHODS

DATA, KEY DEFINITIONS, AND ANALYSIS SAMPLES

Data. This report uses data from two nationally representative surveys of high school students: ELS:2002 and HSLS:09.

ELS:2002 began with a nationally representative survey of high school sophomores in the spring of 2002. The same students, along with additional students included to provide a representative sample of high school seniors, were surveyed again in 2004; and their high school transcripts were collected and coded. A second follow-up was conducted in 2006, when most were two years beyond high school graduation; and a final follow-up was conducted in 2012, when most study respondents were eight years beyond high school completion. The current study uses data primarily from the base-year and first follow-up data collections, which provide demographic data as well as information on students' high school educational outcomes. High school transcript data provide detailed information on students' coursetaking histories.

HSLS:09 began with a nationally representative survey of high school freshmen in the fall of 2009. These students were again surveyed in the spring of 2012, when most were juniors. Another brief survey concerning basic high school experiences and postsecondary plans was conducted in 2013, along with the collection of students' high school transcripts. Unlike ELS:2002, no additional students were added to the study to provide representative samples of juniors or seniors. These data include information on the high school attainment outcomes and coursetaking of study participants, which are the focus of the current study. HSLS:09 is the most recent national source of information about high school CTE participation and high school outcomes.

Key Definitions. In this report, three measures of CTE are used: access to CTE courses, participation in CTE courses, and CTE field of study.

Access to CTE is defined by whether the school or district reported providing access to CTE or CTE classes. In the ELS cohort, a student was defined as having access to CTE if he or she attended a school for which the school administrator indicated that "vocational education" (the terminology used on the ELS survey) courses in any CTE field of study were offered either on-site or off-site. In the HSLS cohort, access to CTE is defined by whether the school counselor reported that CTE was offered in his or her district. If CTE was

offered (on-site or off-site), the student attending the school was considered to have access to CTE.

With regard to participation in CTE, high school students are classified in one of four categories based on their earned credit in CTE courses. CTE courses refer to courses designed for labor market preparation in a specified occupational field, such as business or computer and information sciences. This report focuses only on these CTE courses, using information about credits earned from student transcripts to define the level of CTE participation.[2] Following Dalton et al. (2013), the four categories of CTE participation are [3]

1. CTE nonparticipants (less than one CTE credit);
2. CTE samplers (one to two CTE credits in one or more fields of study);
3. CTE explorers (three or more CTE credits but no three credits in any single CTE field of study); and
4. CTE concentrators (three or more CTE credits in at least one CTE field of study).

Students who were CTE samplers, CTE explorers, or CTE concentrators are all considered to be CTE participants. CTE participants (particularly CTE concentrators) may be further classified by their high school CTE field(s) of study. Each course on respondents' high school transcripts can be classified into one of the 16 CTE fields of study listed below (Bradby 2007). The shortened names and abbreviations used in this report are in parentheses:

1. Agriculture, food, and natural resources (Agriculture)
2. Architecture and construction (Architecture)
3. Arts, A/V technology, and communication (Arts)
4. Business management and administration (Business)
5. Education and training (Education)
6. Finance
7. Government and public administration (Government)
8. Health science (Health)
9. Hospitality and tourism (Hospitality)

[2] While some schools, states or fields of study may have different thresholds for levels of CTE participation (specifically in terms of defining CTE concentrators), for the purposes of this report level of CTE participation is defined based on transcript data for consistency.
[3] Note that these are not official designations of the U.S. Department of Education.

10. Human services
11. Information technology (IT)
12. Law, public safety, corrections, and security (Law)
13. Manufacturing
14. Marketing
15. Science, technology, engineering, and mathematics (STEM)
16. Transportation

For a list of definitions for each of the above 16 CTE fields, see Appendix A.

Analysis sample. Two analytical samples are used in this report, one from ELS:2002 and one from HSLS:09. ELS:2002 enables projections to the nationally representative population of students who were in grade 10 in 2002 or grade 12 in 2004. The grade 10 sample is used to best identify the ways in which CTE is related to student background characteristics, coursetaking, and completion. In addition, to align with public policy interests, the analysis only includes students who attended a public school. Specifically, the ELS:2002 sample includes public school students who were in grade 10 in 2002, who responded to the first-follow-up in 2004, and who had complete high school transcript data.

HSLS:09 enables projections to the nationally representative population of students who were in grade 9 in 2009. The base-year survey, asked of students in grade 9, and first follow-up, asked of students in grade 11, occurred one year earlier in students' high school careers than did the equivalent ELS surveys, so the HSLS cohort does not align perfectly with the ELS cohort. The HSLS:09 2013 update includes high school outcomes that are similar to those in the ELS first follow-up. The HSLS:09 analysis sample consists of public school students who were in grade 9 in 2009, who responded to both the base-year survey in 2009 and the 2013 update, and who had complete high school transcript data in the HSLS:09 database.

HOW TO INTERPRET RESULTS

This report examines CTE participation rates and educational outcomes of CTE participants from different backgrounds. The statistics shown in the figures and tables and discussed in the report are considered estimates because they are drawn from samples of students. Statistics reported include averages or means (e.g., the mean credits earned in specific CTE fields) and percentages or proportions of a group (e.g., the percentage of students who had earned at least one CTE credit in high school).

The report compares means or percentages for some groups with means or percentages for other groups. The Student's *t*-test[4] was used to detect differences between estimates that were larger than would be expected due to sampling variation, and therefore likely represent real differences in the population. In some cases, independent, mutually exclusive groups were compared, such as when CTE concentrators were compared with CTE explorers. Other comparisons, however, were part-to-whole comparisons — for example, CTE concentrators who were employed full time compared to all students who were employed full time — in which case CTE concentrators were a part of the larger group with which they were compared. Throughout the report, wherever differences between students or a subset of students (e.g., agriculture and natural resource CTE concentrators) and a larger, over-arching category are discussed, the reader should note that the estimates for the larger group include the dependent group.[5]

Unless noted otherwise, all differences reported in the text are statistically significant[6] at an alpha level[7] of 0.05. This means that the chance that differences between findings cited in the text are due to random variation among the sample is no greater than 5 percent. Readers should note that the text points out some instances when no statistically significant difference was measured.

The multivariate[8] techniques take multiple characteristics (such as race/ethnicity, sex, and family SES) into account at once to estimate the relationship between each characteristic and a single outcome. This clarifies whether bivariate[9] relationships observed in descriptive statistics are independent of other characteristics or depend on another characteristic. Specifically, the report includes logistic regression[10] models with appropriate adjustments for the survey design of ELS:2002 and HSLS:09. Logistic (for dichotomous variables) and multinomial logistic regression[11] (for categorical variables) are the two dominant types of models used by researchers for noncontinuous outcomes.

[4] See the "Statistical Definitions" section of Appendix A for the definition of "*t*-test."
[5] See the "Establishing Statistical Significance" section of Appendix A for discussion of how statistical tests were adjusted for part-to-whole comparisons.
[6] See the "Statistical Definitions" section of Appendix A for the definition of "statistical significance."
[7] See the "Statistical Definitions" section of Appendix A for the definition of "alpha level."
[8] See the "Statistical Definitions" section of Appendix A for the definition of "multivariate models."
[9] See the "Statistical Definitions" section of Appendix A for the definition of "bivariate statistics."
[10] See the "Statistical Definitions" section of Appendix A for the definition of "logistic regression."
[11] See the "Statistical Definitions" section of Appendix A for the definition of "multinomial logistic regression."

For ease of interpretation, the results of the logistic and multinomial logistic regression models are presented as marginal effects. A marginal effect[12] shows the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for (net of) the other variables in the model.[13] The other variables are held at their average to calculate the marginal effects.

While both the bivariate and multivariate methods used in this study provide important perspectives on the relationships between characteristics and outcomes, readers should note that estimates of the association between these characteristics and outcomes do not support causal inferences. Observational data, such as those obtained through cross-sectional surveys, cannot be used to determine the underlying cause of the findings presented.

For more detailed information on statistical procedures and definitions of statistical terms, see Appendix A.

STUDY LIMITATIONS

This report presents results by CTE participation level and high school CTE field of study for CTE concentrators. CTE concentration, defined as having earned three or more credits in one or more CTE fields of study, does not necessarily correspond to defined curricula or programs as experienced by students or designed by schools. For example, students may have completed programs that involved taking courses across two or more CTE fields of study. The current study mitigates against this possibility by presenting results for CTE explorers, who earn at least three CTE credits but not in one particular CTE field of study. These students may have completed a concentration in a CTE field of study as defined by the school or perceived by employers.

The transcripts for the ELS and HSLS cohorts were coded according to two different high school course taxonomies. In order to compare between the two data sources, the ELS:2002 transcript data were recoded to match the HSLS:09 transcript data. Thus, the number of students concentrating in CTE, the CTE fields of study, and the academic concentration

[12] See the "Statistical Definitions" section of Appendix A for the definition of "marginal effect."
[13] The phrases "net of," "controlling for," and "net of controls" are used to describe point estimates where the other variables in the model are held constant. See the "Statistical Procedures and Methods" section of Appendix A for more information.

indicator reported here will not match previously published reports or figures for ELS:2002.[14] For more information, see Appendix A.

In the ELS and HSLS cohorts, the definitions of CTE access vary. As described above, for the ELS cohort, CTE access was based on whether the *school* offered CTE courses, whereas for the HSLS cohort, CTE access was based on whether the *district* offered CTE courses. CTE access in the two cohorts is not directly compared for this reason. Additionally, the information on access to CTE courses in ELS:2002 and HSLS:09 was derived from questions asked of school counselors and administrators. The administrators and counselors' responses to questions of CTE access may rely on their understanding of what courses or fields of study count as CTE courses, or the way their schools or districts categorize CTE courses. It may be the case that the courses that administrators and counselors consider "CTE courses" do not fully align with the definitions of the CTE fields of study used in this report.

Results presented by CTE field of study (for CTE concentrators) are limited by small sample sizes. When outcomes for students who concentrated in a CTE field of study are broken down further (e.g., by demographic background characteristics), results often must be suppressed due to small sample sizes or flagged as unstable, as defined earlier (see Appendix A for a discussion of suppression procedures). Where suppressed data hindered the discussion of findings for CTE concentrators, some CTE participant findings were presented instead, particularly when they were similar to the suppressed results.

Readers are advised that the methods used in this paper cannot support rigorous causal inferences. Students who participate in CTE in high school may differ before taking their first CTE course, and differences in outcomes between CTE participants and CTE nonparticipants (or among CTE concentrators in different CTE fields) may reflect selection into CTE rather than the influence of CTE itself. Selection into CTE may include the school characteristics, demographic, and/or academic characteristics of students. Although care is taken in this report to show the observable associations between high school CTE participation and outcomes, no statistical adjustments have been made to estimate the extent to which outcomes derive from selection into CTE. The results presented here provide the associations needed to pursue further causal investigation about high school CTE and student outcomes.

[14] An academic concentration was defined as a college-oriented academic curriculum in high school, as defined by the National Center for Education Statistics (NCES) for ELS:2002 (Ingels et al. 2014). See the "Measures" section of Appendix A for additional information on the definition of "academic concentration."

RESULTS

This section contains the findings of the research questions:

1. Do access to and participation in CTE programs vary by key student and school characteristics (sex, race/ethnicity, SES, English learner status, disability status, and urbanicity of school locale) in the ELS and HSLS cohorts and between the two cohorts?
2. At the end of high school, what were the educational outcomes (on-time high school graduation and college attendance) of CTE samplers, explorers, and concentrators, and did these differ between the two cohorts?

Results are discussed for the ELS cohort, then the HSLS cohort, followed by a comparison of the two datasets. Full results for the ELS and HSLS cohorts are presented in the tables; figures include selected comparisons.

The analyses discussed above and the findings discussed below include English learner status and student disability status. Because these are relatively (and numerically) small groups, in the descriptive tables many of these lines are suppressed for confidentiality. Similarly, the small group sizes lead to higher levels of uncertainty in the multivariate models. As a result, although results for these groups are presented, there is little discussion of these results in the following sections.

DOES ACCESS TO AND PARTICIPATION IN CTE PROGRAMS VARY BY STUDENT AND SCHOOL CHARACTERISTICS?

In general, the level of participation in CTE varied by sex, race/ethnicity, SES, and urbanicity of school locale. While overall participation and field of study in CTE varied by student and school characteristics, for both the ELS and HSLS cohorts, greater differences were seen by CTE field of study. These differences indicate that, for both cohorts, engagement in CTE content varied by student and school characteristics.

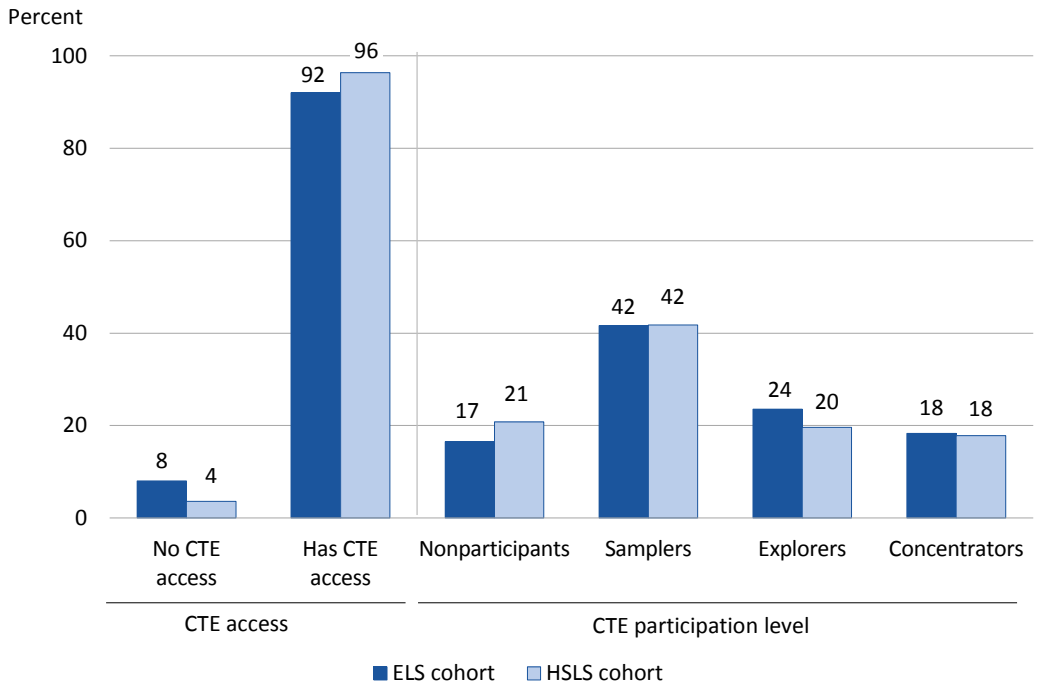
Before examining participation by student background, it is important to understand rates of CTE participation and CTE concentration both overall and by CTE field for both cohorts.

CTE Access and Participation Levels

Overall, access to CTE is widespread. The majority of students in both the ELS and HSLS cohorts attended schools or districts that reported offering access to CTE courses, with over 90 percent of students in both cohorts having access: 92 percent of students in the ELS cohort attended schools with access to CTE, and 96 percent of students in the HSLS cohort attended schools with CTE offerings in the district (figure 1). While ELS focuses on access to CTE within schools and HSLS on access within districts, the responses in both surveys indicate most students in both cohorts had access to CTE.

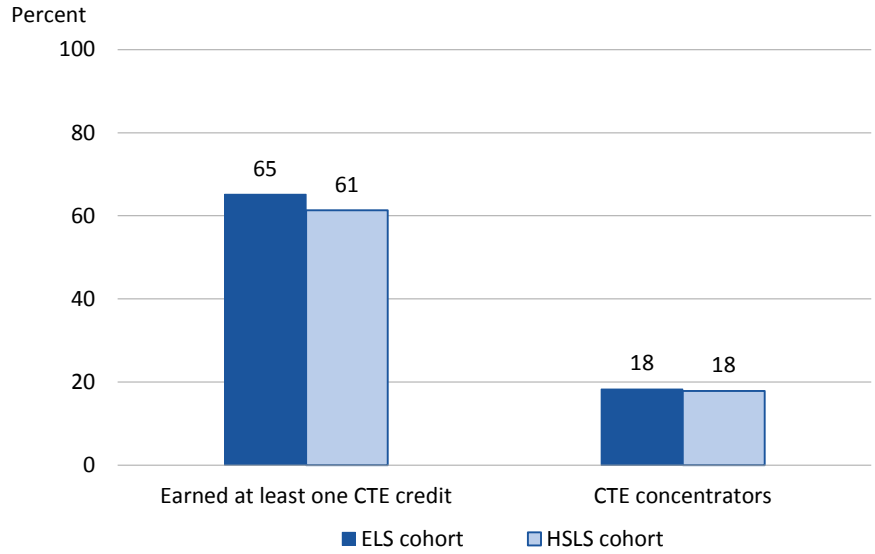
While most students had access to CTE through their school or district, the percentage of students taking more than one credit in CTE decreased: 65 percent of students in the ELS cohort, compared to 61 percent of students in the HSLS cohort who took at least one credit of CTE (figure 2). This decrease is reflected mostly in the decrease in the percentage of students who are CTE explorers (took three or more CTE credits but no three credits in any single CTE field of study). While the proportion of students who were CTE samplers and concentrators were similar across cohorts (42 and 18 percent, respectively), the percentage of CTE explorers fell from 24 to 20 percent between the ELS and HSLS cohorts (figure 1).

Figure 1. Percentage of students in the ELS and HSLS cohorts, by level of access to and participation in CTE



NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. For the ELS cohort, respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site. For the HSLS cohort, respondents are defined as having access to CTE if the school counselor reported that CTE was offered in their district or if students were allowed to take Career Clusters, Pathways, or Programs of Study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program. Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE Explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status. Figure bars with the same displayed estimate differ in height because bar height is based on underlying unrounded estimates while the displayed estimates are rounded.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Figure 2. Percentage of students in the ELS and HSLS cohorts who had earned at least one CTE credit and were CTE concentrators



NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status. Figure bars with the same displayed estimate differ in height because bar height is based on underlying unrounded estimates while the displayed estimates are rounded.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Among CTE explorers and concentrators, students' participation in CTE can be examined in greater detail. For both the ELS and HSLS cohorts, the majority of CTE concentrators took more than three CTE credits (94 and 93 percent, respectively) (table 1). While relatively small percentages of CTE concentrators had more than one CTE concentration (7 percent for both cohorts), about half of CTE concentrators in the ELS cohort and about 40 percent in the HSLS cohort had enough CTE credits to meet the definition of being CTE explorers in addition to being CTE concentrators, meaning that in addition to having a CTE concentration (at least three credits in one CTE field of study), they took another three or more CTE credits, although not in any one CTE field of study. The percentage of CTE concentrators who met both definitions decreased from the ELS cohort to the HSLS cohort. Among CTE explorers, about two-thirds from both cohorts took more than three CTE credits, and similar proportions of CTE explorers approached the "CTE concentrator"

definition by taking two or more credits in at least one CTE field (64 percent[15] in the ELS cohort and 69 percent in the HSLS cohort).

Table 1. Percentage of CTE concentrators and explorers in the ELS and HSLS cohorts, by number of CTE credits and field of study

CTE concentrators/explorers[a]	ELS cohort	HSLS cohort
CTE concentrators		
All CTE concentrators	100.0	100.0
Percentage of CTE concentrators with more than 3 CTE credits	94.0	93.1
Percentage of CTE concentrators with a single CTE concentration	92.6	92.9
Percentage of CTE concentrators with multiple CTE concentrations	7.4	7.1
Percentage of CTE concentrators who are also CTE explorers	47.2	41.2
CTE explorers		
All CTE explorers	100.0	100.0
Percentage of CTE explorers with more than 3 CTE credits	67.5	64.9
Percentage of CTE explorers with 2 or more credits in a single CTE field	52.0	52.7
Percentage of CTE explorers with 2 or more credits in multiple CTE fields	12.4	15.8
Percentage of CTE explorers with 2 or more credits in any CTE field	64.5	68.6

[a] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.

NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

CTE Coursetaking Status by CTE Field of Study

The percentage of students who earned at least one CTE credit or concentrated in CTE, as well as the number of CTE credits students took, varied by CTE field of study and between the two surveys. Some CTE fields of study drew a larger percentage of students taking at least one credit than the percentage concentrating in the CTE field, such as business management and administration, where about 20 percent of students in the ELS and HSLS cohorts took at least one credit, and 2 percent of students were CTE concentrators (table 2 and table 3).

[15] The value of 64 percent appears in Table 1 as 64.5. See Rule 3 under the subsection "Rounding" in Appendix A.

Table 2. Percentage distribution and mean credits of students in the ELS cohort who had earned at least one CTE credit and were CTE concentrators, by CTE participation level and CTE field of study

	Earned at least one CTE credit		CTE concentrators		
CTE participation level[a] and CTE field of study	Percent	Mean credits	Percent	Mean credits	No courses in CTE or CTE field of study
All students	**65.2**	**3.1**	**18.3**	**6.7**	**16.5**
CTE field of study[b]					
Agriculture, food, and natural resources	6.8	1.4	2.5	4.3	90.7
Architecture and construction	12.3	1.4	3.1	4.7	84.6
Arts, A/V technology, and communication	18.2	1.3	2.4	3.8	79.4
Business management and administration	22.3	1.3	2.1	3.6	75.6
Education and training	1.0	1.2	‡	3.0 !	99.0
Finance	7.1	1.2	0.1 !	3.6	92.8
Government and public administration	#	#	#	#	100.0
Health science	3.9	1.3	1.3	4.3	94.8
Hospitality and tourism	4.4	1.3	0.6	4.2	95.0
Human services	4.9	1.3	1.1	4.8	94.0
Information technology	34.2	1.3	2.7	3.9	63.0
Law, public safety, corrections, and security	2.3	1.1	0.1 !	4.1	97.6
Manufacturing	4.8	1.3	0.9	4.7	94.2
Marketing	5.1	1.3	1.2	3.6	93.7
Science, technology, engineering, and mathematics	1.6	1.2	‡	3.8	98.3
Transportation	4.3	1.4	1.6	4.6	94.2

Rounds to zero.
! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[b] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields. Therefore, these numbers will not sum to the "All students" row.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

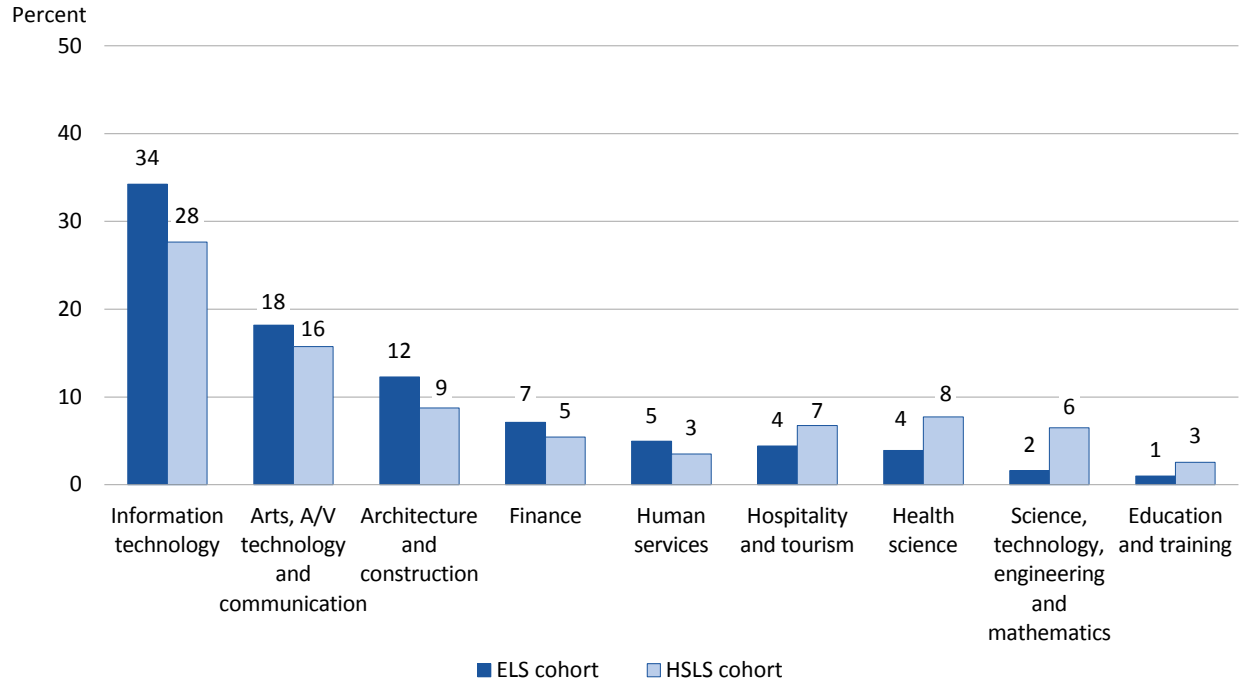
Table 3. Percentage distribution and mean credits of students in the HSLS cohort who had earned at least one CTE credit and were CTE concentrators, by CTE participation level and CTE field of study

	Earned at least one CTE credit		CTE concentrators		
CTE participation level[a] and CTE field of study	Percent	Mean credits	Percent	Mean credits	No courses in CTE or CTE field of study
All students	**61.4**	**2.9**	**17.8**	**6.3**	**20.8**
CTE field of study[b]					
Agriculture, food, and natural resources	7.8	1.4	2.4	4.3	89.8
Architecture and construction	8.8	1.4	2.0	4.4	89.2
Arts, A/V technology, and communication	15.7	1.3	1.9	3.8	82.4
Business management and administration	19.9	1.3	1.8	3.7	78.3
Education and training	2.6	1.3	0.5 !	4.2	97.0
Finance	5.4	1.2	0.2 !	3.7	94.4
Government and public administration	‡	1.4	†	†	99.9
Health science	7.7	1.3	2.9	4.3	89.3
Hospitality and tourism	6.7	1.3	1.1	4.4	92.2
Human services	3.5	1.2	0.8	4.8	95.7
Information technology	27.7	1.3	1.7	3.8	70.6
Law, public safety, corrections, and security	2.6	1.2	0.3	4.4	97.1
Manufacturing	3.8	1.3	0.6	4.5	95.7
Marketing	5.1	1.2	0.6	3.6	94.3
Science, technology, engineering, and mathematics	6.5	1.3	1.0	3.7	92.5
Transportation	3.4	1.3	1.3	4.5	95.2

† Not applicable.
! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[b] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields. Therefore, these numbers will not sum to the "All students" row.
NOTE: CTE = career and technical education; HSLS = High School Longitudinal Study of 2009. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Between the ELS cohort and the HSLS cohort, there were differences in the CTE fields of study in which students engaged. About one-third of students in the ELS cohort took at least one credit of IT, whereas about one-quarter of HSLS students took at least one credit in that field of study (figure 3). Some small CTE fields saw increases in the percentage of students taking courses between ELS and HSLS. For example, 2 percent of students in the ELS cohort took at least one credit in STEM, compared with 6 percent[16] of students in the HSLS cohort. Health science also grew in popularity, as 4 percent of students in the ELS cohort took at least one health science credit, compared with 8 percent of students in the HSLS cohort.

Figure 3. Percentage of students in the ELS and HSLS cohorts who had earned at least one CTE credit, by selected CTE field of study



NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields. Figure bars with the same displayed estimate differ in height because bar height is based on underlying unrounded estimates while the displayed estimates are rounded.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

[16] The value of 6 percent appears in table 2 as 6.5. See Rule 3 under the subsection "Rounding" in Appendix A.

The largest CTE concentrations shifted between the ELS cohort and the HSLS cohort. In the ELS cohort, 3 percent of students concentrated in architecture and construction, but in the HSLS cohort, the percentage of CTE concentrators in architecture and construction declined to 2 percent (table 2 and table 3). In the HSLS cohort, health science was the largest CTE concentration, with 3 percent of students, an increase from the 1 percent of students concentrating in health science in the ELS cohort. Thus the students in the two cohorts engaged with CTE concentrations differently.

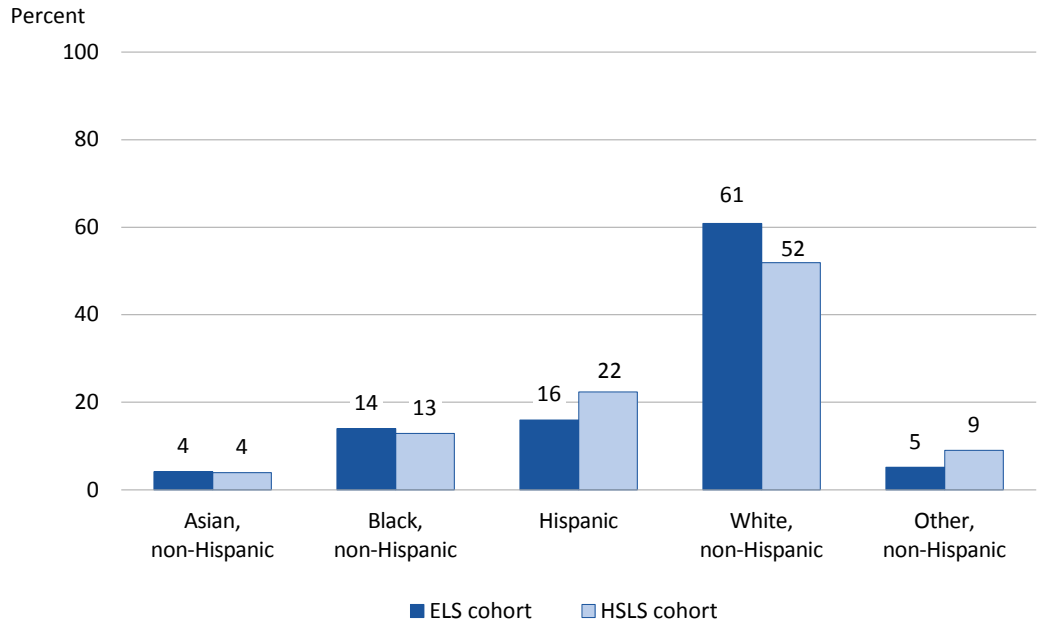
DEMOGRAPHIC DIFFERENCES BETWEEN THE ELS AND HSLS COHORTS

In the seven years between the ELS base-year survey in 2002 and the HSLS base-year survey in 2009, the demographic profile of the high school student cohorts shifted, particularly with regard to students' race and ethnicity. White students made up 61 percent of the ELS cohort but 52 percent of the HSLS cohort, a drop of 9 percentage points (figure 4). Meanwhile, whereas Hispanic students comprised 16 percent of the ELS cohort, their share of the sample increased 6 percentage points to 22 percent of the HSLS cohort; the percentage of students of other races increased between the two cohorts as well. The percentage of Asian and black students remained stable. These changes reflect larger demographic trends in the population of American kindergarten through grade 12 students as well as of the United States as a whole (Aud, Fox, and KewalRamani 2010; Kena et al. 2016).

The HSLS cohort also saw slightly larger percentages than the ELS cohort of students who were considered disabled or English language learners. In addition, there were shifts in the urbanicity of students' school locales between the two cohorts. The percentage of students attending schools in suburban locales declined from 52 to 46 percent from the ELS cohort to the HSLS cohort, while the percentage of students attending schools in urban and rural locales increased by 4 and 2 percentage points (respectively) between the two cohorts (table 4).

The demographic shifts in the baseline populations of each cohort are important to consider while interpreting the results of this report. As the composition of the student population changes over time, the context of access to and participation in career and technical education may shift alongside demographic trends.

Figure 4. Percentage distribution of the race/ethnicity of students in the ELS and HSLS cohorts



NOTE: ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. Figure bars with the same displayed estimate differ in height because bar height is based on underlying unrounded estimates while the displayed estimates are rounded.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table 4. Percentage distribution of students in the ELS and HSLS cohorts by selected student and school characteristic

Student and school characteristics	ELS cohort Total	Student and school characteristics	HSLS cohort Total
Sex		Sex	
Female	**50.9**	Female	**50.2**
Male	**49.1**	Male	**49.8**
Race/ethnicity[a]		Race/ethnicity[a]	
Asian, non-Hispanic	**4.1**	Asian, non-Hispanic	**3.9**
Black, non-Hispanic	**14.0**	Black, non-Hispanic	**12.9**
Hispanic	**15.9**	Hispanic	**22.4**
White, non-Hispanic	**60.9**	White, non-Hispanic	**51.9**
Other, non-Hispanic	**5.2**	Other, non-Hispanic	**9.0**
Socioeconomic status (SES) quartile[b]		Socioeconomic status (SES) quartile[b]	
Lowest quartile	**24.0**	Lowest quartile	**24.0**
Second quartile	**26.3**	Second quartile	**26.0**
Third quartile	**25.7**	Third quartile	**25.9**
Highest quartile	**24.0**	Highest quartile	**24.2**
Disability status[c]		Disability status[c]	
No disability	**92.5**	No disability	**90.0**
Has disability	**7.6**	Has disability	**10.0**
English learner status[d]		English learner status[d]	
Not fluent	**1.7**	Currently ELL	**3.1**
Fluent	**96.6**	Not currently ELL	**95.3**
Don't know	**1.7**	Don't know	**1.6**
School urbanicity[e]		School urbanicity[e]	
Urban	**25.7**	Urban	**29.6**
Suburban	**52.3**	Suburban	**46.3**
Rural	**22.0**	Rural	**24.1**

See notes at end of table.

Table 4. Percentage distribution of students in the ELS and HSLS cohorts by selected student and school characteristic—continued

[a] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[b] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in both ELS:2002 and HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[c] For the ELS cohort, respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities. For the HSLS cohort, respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[d] For the ELS cohort, respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent. For the HSLS cohort, respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.
[e] For the HSLS cohort, respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs.
NOTES: ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Demographics of CTE Access

Based on school administrator and counselor reports about access to CTE, table 5 through table 7 show the reported access[17] to CTE for each cohort by student and school characteristics. When thinking about students' participation in CTE, it is important to know which students attend schools or districts where administrators report offering CTE courses because this information provides context as to which students were more likely to earn CTE credits. Meanwhile, some students who earned CTE credits did so at a school or in a district that did not report that students had access to CTE. Overall, most students in the ELS and HSLS cohorts had access to CTE courses in their school or district (92 percent in the ELS cohort and 96 percent in the HSLS cohort) (table 5 and table 6).

[17] The reported access to CTE varies from CTE coursetaking for several reasons. First, the use of the later School Courses for the Exchange of Data (SCED) codes for ELS results in some courses that were not considered CTE at the time the ELS data collection were classified as CTE in this analysis. Second, schools may offer CTE courses that they do not consider to be CTE, although at a national level those courses cover material that is considered CTE. This section is concerned with students attending schools with known access to CTE.

Table 5. Percentage distribution of ELS cohort students' access to CTE and CTE participation level, by selected student and school characteristics

	CTE access[a]		CTE participation level[b]			
Student and school characteristics	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Total	**8.0**	**92.0**	**16.5**	**41.6**	**23.5**	**18.3**
Sex						
Female	8.5	91.5	20.1	44.5	20.9	14.6
Male	7.6	92.4	12.8	38.7	26.3	22.2
Race/ethnicity[c]						
Asian, non-Hispanic	11.1 !	88.9	21.4	52.7	15.7	10.2
Black, non-Hispanic	8.1 !	91.9	13.7	45.3	23.0	18.0
Hispanic	3.1 !	96.9	19.0	45.5	22.5	13.0
White, non-Hispanic	8.9	91.1	16.6	38.6	24.7	20.1
Other, non-Hispanic	8.6	91.4	11.8	46.9	20.6	20.8
Socioeconomic status (SES) quartile[d]						
Lowest quartile	5.2	94.8	13.3	41.1	24.6	21.0
Second quartile	7.5	92.5	13.2	39.9	26.1	20.8
Third quartile	8.9	91.1	15.8	41.9	23.8	18.5
Highest quartile	10.3	89.7	24.1	43.8	19.4	12.8
Disability status[e]						
No disability	8.1	91.9	16.6	42.0	23.8	17.6
Has disability	7.3	92.7	15.3	37.8	19.8	27.1
English learner status[f]						
Not fluent	5.1 !	94.9	25.2	43.8	20.2	10.8
Fluent	8.1	91.9	16.3	41.6	23.6	18.5
Don't know	‡	97.0	21.6	42.4	20.6	15.4
School urbanicity						
Urban	4.1 !	95.9	19.7	45.9	19.0	15.4
Suburban	11.3	88.7	15.9	42.4	24.0	17.6
Rural	4.6 !	95.4	14.1	34.8	27.7	23.5

See notes at end of table.

Table 5. Percentage distribution of ELS cohort students' access to CTE and CTE participation level, by selected student and school characteristics—continued

! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] Respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site.
[b] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in both ELS:2002 and HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[f] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table 6. Percentage distribution of HSLS cohort students' access to CTE and CTE participation level, by selected student and school characteristics

	CTE access[a]		CTE participation level[b]			
Student and school characteristics	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Total	**3.6**	**96.4**	**20.8**	**41.8**	**19.6**	**17.9**
Sex						
Female	4.0 !	96.0	23.7	42.3	17.8	16.2
Male	3.3	96.8	17.9	41.2	21.4	19.5
Race/ethnicity[c]						
Asian, non-Hispanic	‡	91.4	30.6	43.1	12.1	14.2
Black, non-Hispanic	6.2 !	93.8	18.3	47.0	19.2	15.5
Hispanic	5.0 !	95.0	24.9	42.0	18.3	14.9
White, non-Hispanic	2.3 !	97.7	18.8	39.9	20.7	20.6
Other, non-Hispanic	‡	97.9	21.2	44.0	20.6	14.2
Socioeconomic status (SES) quartile[d]						
Lowest quartile	4.3 !	95.7	22.6	40.2	18.4	18.8
Second quartile	3.1 !	96.9	18.1	42.1	21.7	18.2
Third quartile	3.3 !	96.7	19.6	40.9	20.4	19.1
Highest quartile	3.9 !	96.1	23.1	43.9	17.8	15.2
Disability status[e]						
No disability	3.7	96.3	20.9	41.8	19.8	17.5
Has disability	2.7 !	97.3	19.7	41.5	17.5	21.3
English learner status[f]						
Currently ELL	‡	92.6	22.5	45.0	12.7	19.7
Not currently ELL	3.4	96.6	20.7	41.6	20.0	17.7
Don't know	7.6 !	92.4	16.7	52.1	17.5	13.7 !
School urbanicity[g]						
Urban	6.0 !	94.0	23.6	45.3	15.6	15.5
Suburban	3.5 !	96.5	21.3	40.4	20.8	17.6
Rural	‡	98.8	16.4	40.1	22.2	21.3

See notes at end of table

Table 6. Percentage distribution of HSLS cohort students' access to CTE and CTE participation level, by selected student and school characteristics—continued

! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] Respondents are defined as having access to CTE if the school counselor reported that career technical education (CTE) was offered in his or her district or if students were allowed to take Career Clusters, Pathways, or Programs of Study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program.
[b] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[f] Respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.
[g] Respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs.
NOTE: CTE = career and technical education; HSLS = High School Longitudinal Study of 2009. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

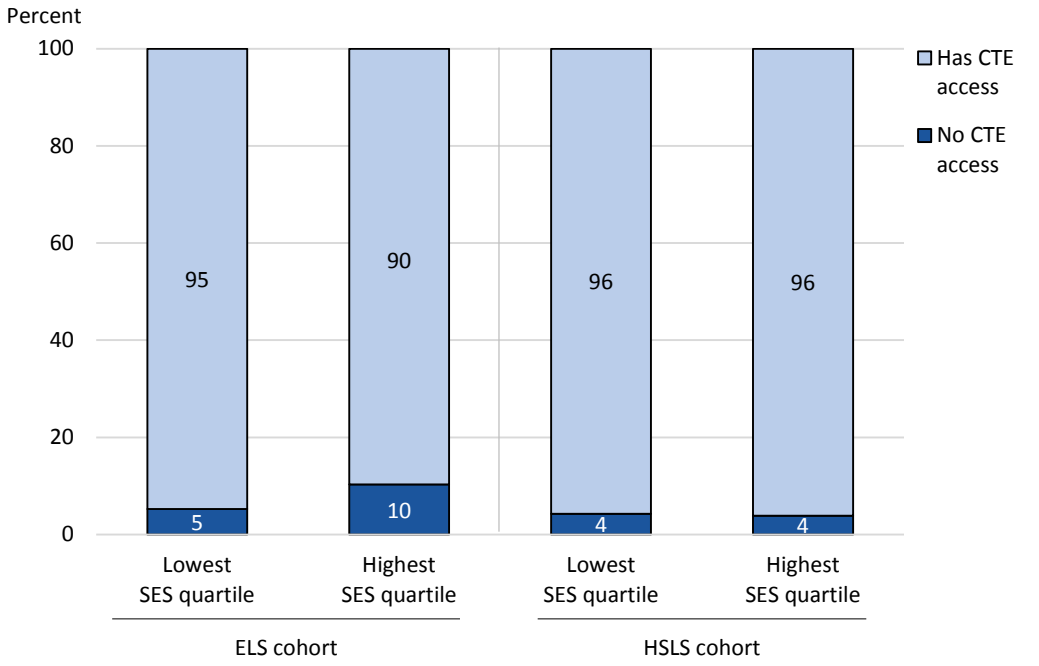
In the ELS cohort, there were significant differences in access to CTE by student and school characteristics, as 95 percent s of low-SES students from the ELS cohort had access to CTE compared to 90 percent of high-SES students (figure 5). Ninety-seven percent of Hispanic students in the ELS cohort had access to CTE courses, compared to 91 percent of white students (table 5). Finally, compared to students attending suburban schools, larger proportions of students attending urban and rural schools in the ELS cohort had access to CTE courses.

For students in the HSLS cohort, there were no significant differences by student SES in access to CTE (figure 5). Additionally, there was no significant difference in the percentage of Hispanic and white students with access to CTE (98 percent of white students and 95 percent of Hispanic students) (table 6). Finally, there was no significant difference by urbanicity for the HSLS cohort.

The multivariate models show few significant differences in access to CTE when accounting for student and school characteristics (table 7). Mainly, compared with white students, Hispanic students in the ELS cohort had a 5 percentage point higher probability of having access to CTE, while urban students were 6 percentage points more likely to have access to

CTE than suburban students, net of all other characteristics. In the HSLS cohort, the one significant comparison was that, compared with otherwise similar white students, the probability that a black student had access to CTE was about 4 percent lower.

Figure 5. Among students in the ELS and HSLS cohorts, percentage who had or did not have access to CTE, by socioeconomic quartile



NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009; SES = socioeconomic status. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. For the ELS cohort, respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site. For the HSLS cohort, respondents are defined as having access to CTE if the school counselor reported that CTE was offered in their district or if students were allowed to take Career Clusters, Pathways, or Programs of Study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program. SES is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in both ELS:2002 and HSLS:09 are divided into quartiles based on weighted distributions of the variables. Figure bars with the same displayed estimate differ in height because bar height is based on underlying unrounded estimates while the displayed estimates are rounded.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table 7. Average marginal effects of selected student and school characteristics on the probability that students in the ELS and HSLS cohorts had access to CTE courses

	ELS cohort			HSLS cohort	
Student and school characteristics	Marginal effect[a]	Standard error	Student and school characteristics	Marginal effect[a]	Standard error
Sex [female]			Sex [female]		
Male	0.010	0.010	Male	0.004	0.000
Race/ethnicity[b] [white, non-Hispanic]			Race/ethnicity[b] [white, non-Hispanic]		
Asian, non-Hispanic	-0.054	0.050	Asian, non-Hispanic	-0.050	0.030
Black, non-Hispanic	-0.011	0.030	Black, non-Hispanic	-0.038 *	0.020
Hispanic	0.046 **	0.020	Hispanic	-0.021	0.010
Other, non-Hispanic	-0.006	0.020	Other, non-Hispanic	0.004	0.010
Socioeconomic status (SES) quartile[c] [second quartile]			Socioeconomic status (SES) quartile[c] [second quartile]		
Lowest quartile	0.018	0.010	Lowest quartile	-0.005	0.010
Third quartile	-0.011	0.010	Third quartile	-0.003	0.010
Highest quartile	-0.009	0.020	Highest quartile	-0.018	0.010
Disability status[d] [no disability]			Disability status[d] [no disability]		
Has disability	-0.008	0.020	Has disability	0.003	0.010
English learner status[e] [fluent]			English learner status[e] [currently ELL]		
Not fluent	0.010	0.030	Not currently ELL	-0.021	0.020
Don't know	0.036	0.030	Don't know	-0.028	0.030
School urbanicity[f] [suburban]			School urbanicity[f] [suburban]		
Urban	0.062 *	0.030	Urban	-0.022	0.030
Rural	0.062	0.030	Rural	0.023	0.010
Academic concentrator[g] [not an academic concentrator]			Academic concentrator[g] [not an academic concentrator]		
Academic concentrator	-0.031	0.020	Academic concentrator	0.001	0.010
Sample size (N)[h]	11,538	†	Sample size (N)[h]	17,342	†

See notes at end of table.

Table 7. Average marginal effects of selected student and school characteristics on the probability that students in the ELS and HSLS cohorts had access to CTE courses—continued

† Not applicable.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.
[a] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are logistic regression models.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in both ELS:2002 and HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[d] For the ELS cohort, respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities. For the HSLS cohort, respondents are defined as having a disability if they had an IEP, if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[e] For the ELS cohort, respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent. For the HSLS cohort, respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.
[f] For the HSLS cohort, respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs.
[g] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
[h] Sample sizes differ from those of other regressions because a number of students in each sample are missing information on access to CTE. In the ELS cohort, 1,119 students are missing information on access to CTE, while 3,316 students are missing this information in the HSLS cohort.
NOTES: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. For the ELS cohort, respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site. For the HSLS cohort, respondents are defined as having access to CTE if the school counselor reported that CTE was offered in his or her district or if students were allowed to take Career Clusters, Pathways, or Programs of Study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program. The category in brackets for each characteristic is the reference category.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Taken together, table 4 through table 7 show that despite the differences between how access was defined in the two cohorts, a large majority of students in both studies had access to CTE courses in their school or districts. In the HSLS cohort, almost all students, 96 percent, had access to CTE courses in their district (table 6). Controlling for other characteristics, black students in the HSLS cohort were about 4 percentage points less likely to have access to CTE compared with white students (table 7).

Demographics of CTE Participation

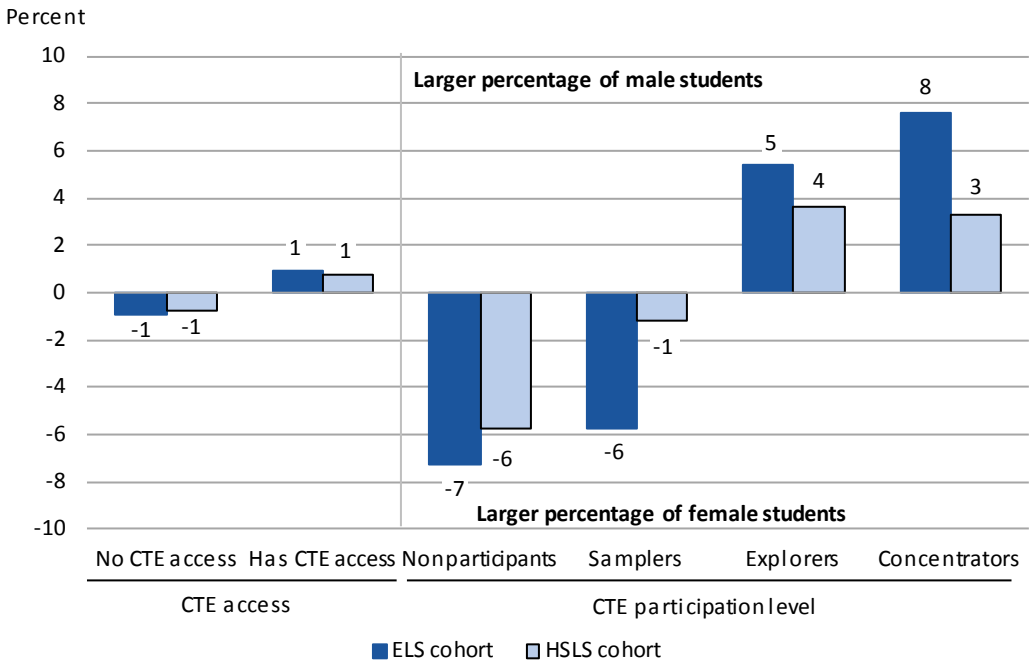
In both cohorts, students' participation in CTE courses varied by sex, SES, race/ethnicity, disability status, and school urbanicity (table 5, table 6, table 8, and table 9). Between the ELS and HSLS cohorts, there were some similarities and differences in the students who participated in CTE. While access to CTE increased between the ELS cohort and HSLS cohorts, a larger percentage of students in the HSLS cohort (21 percent) did not participate in CTE than in the ELS cohort (17 percent). In both cohorts, more male students participated in CTE than female students did. Fewer students in the ELS cohort from the highest SES quartile took CTE courses. The paragraphs below discuss CTE participation for the two cohorts in detail.

Sex

In both cohorts, larger proportions of male students participated in CTE than did female students. There was a 5 percentage point increase in the percentage of male students who were CTE nonparticipants between the ELS and HSLS cohorts (table 5 and table 6). In the ELS cohort, 13 percent of male students were CTE nonparticipants, compared to 20 percent of female students, a 7 percentage point difference, while in the HSLS cohort 24 percent of female students and 18 percent of male students did not participate in CTE, a 6 percentage point difference (figure 6). In contrast, the percentage of male students who were CTE concentrators was 8 percentage points higher than the percentage of female students who concentrated in CTE among students in the ELS cohort. These relationships hold even when controlling for school and student characteristics.

The multivariate models of any CTE participation show that the probability that males in the ELS and HSLS cohorts did not participate in CTE courses is, on average, 6 to 7 percentage points lower than for females, holding the other school and student characteristics at their averages (table 8 and table 9). In both cohorts, similar or larger proportions of male students were CTE explorers or CTE concentrators than female students. This holds in the models of levels of CTE participation, which show that in both cohorts male students are, on average, about 4 percentage points more likely to be CTE explorers than female students (net of controls). In the ELS cohort, male students were 8 percentage points more likely to be CTE concentrators than were female students; in the HSLS cohort, it was 3 percentage points.

Figure 6. Among students in the ELS and HSLS cohorts, difference in the percentage of male students and female students by level of access to and participation in CTE



NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. For the ELS cohort, respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site. For the HSLS cohort, respondents are defined as having access to CTE if the school counselor reported that CTE was offered in his or her district or if students were allowed to take Career Clusters, Pathways, or Programs of Study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program. Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status. Figure bars with the same displayed estimate differ in height because bar height is based on underlying unrounded estimates while the displayed estimates are rounded.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table 8. Average marginal effects of selected student and school characteristics on the probability that students in the ELS cohort participated at each level of CTE participation

	Level of CTE participation[a]							
	Nonparticipants		Samplers		Explorers		Concentrators	
Student and school characteristics	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error
Sex [female]								
Male	-0.071 ***	0.01	-0.049 ***	0.01	0.04 ***	0.01	0.08 ***	0.01
Race/ethnicity[c] [white, non-Hispanic]								
Asian, non-Hispanic	0.029	0.02	0.118 ***	0.03	-0.063 **	0.02	-0.085 ***	0.02
Black, non-Hispanic	-0.028	0.02	0.058 *	0.02	-0.005	0.02	-0.024	0.02
Hispanic	0.035	0.02	0.067 **	0.02	-0.038 *	0.02	-0.064 ***	0.02
Other, non-Hispanic	-0.032	0.02	0.091 **	0.03	-0.038	0.02	-0.021	0.03
Socioeconomic status (SES) quartile[d] [second quartile]								
Lowest quartile	-0.017	0.01	-0.014	0.02	0.013	0.02	0.018	0.01
Third quartile	0.035 *	0.01	-0.006	0.02	-0.004	0.02	-0.026	0.01
Highest quartile	0.102 ***	0.02	0.007	0.02	-0.036 *	0.02	-0.073 ***	0.01
Disability status[e] [no disability]								
Has disability	0.026	0.02	-0.029	0.03	-0.037	0.02	0.04 *	0.02
English learner status[f] [fluent]								
Not fluent	0.098	0.05	-0.03	0.05	0.001	0.04	-0.069 *	0.03
Don't know	0.042	0.04	-0.03	0.05	-0.019	0.04	0.006	0.04
School urbanicity [suburban]								
Urban	0.05 *	0.02	0.021	0.02	-0.059 **	0.02	-0.012	0.02
Rural	-0.003	0.02	-0.055 *	0.02	0.026	0.02	0.032	0.02
Academic concentrator[g] [not an academic concentrator]								
Academic concentrator	0.05 ***	0.01	0.047 *	0.02	-0.055 ***	0.01	-0.043 **	0.01
Sample size (N)	12,657	†	12,657	†	12,657	†	12,657	†

See notes at end of table.

Table 8. Average marginal effects of selected student and school characteristics on the probability that students in the ELS cohort participated at each level of CTE participation—continued

† Not applicable.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.
[a] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[b] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are multinomial logistic regression models.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[f] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
[g] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
NOTES: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. The category in brackets for each characteristic is the reference category.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table 9. Average marginal effects of selected student and school characteristics on the probability that students in the HSLS cohort participated at each level of CTE participation

	Level of CTE participation[a]							
	Nonparticipants		Samplers		Explorers		Concentrators	
Student and school characteristics	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error
Sex [female]								
Male	-0.059 ***	0.01	-0.008	0.01	0.038 **	0.01	0.029 **	0.01
Race/ethnicity[c] [white, non-Hispanic]								
Asian, non-Hispanic	0.102 *	0.04	0.019	0.04	-0.069 **	0.02	-0.053	0.04
Black, non-Hispanic	-0.009	0.02	0.071 *	0.03	-0.006	0.02	-0.056 **	0.02
Hispanic	0.056 **	0.02	0.022	0.02	-0.01	0.02	-0.068 ***	0.02
Other, non-Hispanic	0.02	0.02	0.04	0.03	0.007	0.03	-0.066 ***	0.02
Socioeconomic status (SES) quartile[d] [second quartile]								
Lowest quartile	0.028	0.02	-0.026	0.02	-0.022	0.02	0.02	0.02
Third quartile	0.019	0.01	-0.003	0.02	-0.018	0.02	0.002	0.01
Highest quartile	0.055 ***	0.02	0.027	0.02	-0.046 **	0.01	-0.036 **	0.01
Disability status[e] [no disability]								
Has disability	0.008	0.02	0.011	0.02	-0.034 *	0.02	0.016	0.03
English learner status[f] [not currently ELL]								
Currently ELL	-0.009	0.05	0.04	0.05	-0.066 *	0.03	0.035	0.04
Don't know	0.001	0.01	0.005	0.02	-0.009	0.01	0.003	0.01
School urbanicity[g] [suburban]								
Urban	0.011	0.02	0.042	0.03	-0.049 **	0.02	-0.004	0.03
Rural	-0.044 *	0.02	0	0.02	0.012	0.02	0.032	0.02
Academic concentrator[h] [not an academic concentrator]								
Academic concentrator	-0.006	0.01	0.015	0.02	0.011	0.02	-0.02	0.01
Sample size (N)	20,658	†	20,658	†	20,658	†	20,658	†

See notes at end of table.

Table 9. Average marginal effects of selected student and school characteristics on the probability that students in the HSLS cohort participated at each level of CTE participation—continued

† Not applicable.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.
[a] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[b] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are multinomial logistic regression models.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[f] Respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.
[g] Respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs.
[h] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
NOTES: CTE = career and technical education; HSLS = High School Longitudinal Study of 2009. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. The category in brackets for each characteristic is the reference category.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

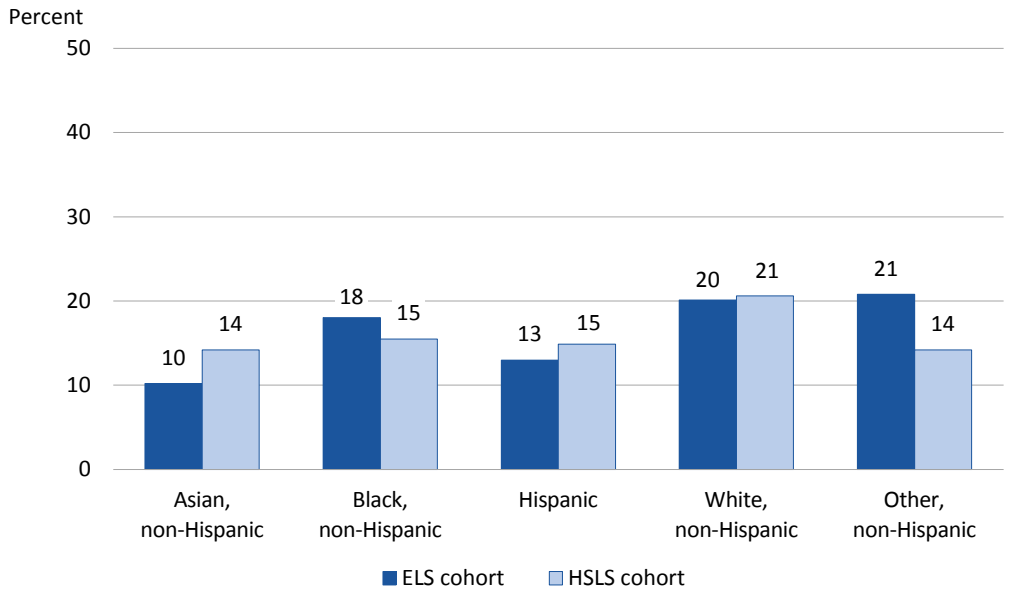
Race/Ethnicity

In both cohorts, there were racial/ethnic differences in CTE participation level, particularly among CTE concentrators and CTE nonparticipants (table 8 and table 9). Between the ELS and HSLS cohorts, there were significant differences in the composition of CTE participation by student subgroup. Significantly more Hispanic students in the HSLS cohort were CTE nonparticipants compared to the ELS cohort (25 percent vs. 19 percent). In the ELS cohort, there were no multivariate racial/ethnic differences in overall CTE nonparticipation (table 8), whereas in the HSLS cohort, Asian and Hispanic students were more likely to not participate in CTE than white students (by 10 and 6 percentage points, respectively) (table 9).

In both cohorts, there were racial/ethnic differences in CTE participation level, particularly among CTE concentrators and CTE nonparticipants. There were no statistically significant differences in the race/ethnicity of CTE samplers and CTE concentrators in CTE when comparing the ELS cohort to the HSLS cohort, except for "other race" which was different for CTE concentrators in the two cohorts (figure 7). In the ELS cohort, larger proportions of white students (20 percent) were CTE concentrators compared with Asian and Hispanic students (10 and 13 percent, respectively) (table 5), which is also reflected in the multivariate model. Compared with white students, nonwhite students had a predicted probability of being CTE samplers that was 6 to 12 percentage points higher than that of white students (table 8). In the HSLS cohort, descriptively, a larger proportion of CTE concentrators were white (21 percent) than the proportion from any other racial/ethnic group (14–15 percent[18]) (table 6). In the multivariate models, controlling for other student and school characteristics, Hispanic, black, and other race students were significantly less likely than white students to be CTE concentrators (table 9).

[18] The value of 15 percent appears in table 4 as 15.5. See Rule 3 under the subsection "Rounding" in Appendix A.

Figure 7. Among students in the ELS and HSLS cohorts, percentage who were CTE concentrators, by race/ethnicity



NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status. Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race. Figure bars with the same displayed estimate differ in height because bar height is based on underlying unrounded estimates while the displayed estimates are rounded.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Socioeconomic Status (SES)

Although there was no statistically significant difference in overall CTE participation rates between the students in the ELS and HSLS cohorts by SES, in the ELS cohort, a larger percentage of students from the second quartile participated in CTE than from the lowest or highest quartile. Yet in the HSLS cohort, there was no statistically significant difference in CTE participation between the SES quartiles (tables 10A and 10B and tables 11A and 11B).

Table 10A. Percentage of the ELS cohort who had participated in CTE, by CTE field of study and selected student and school characteristics

		CTE fields of study[a]						
Student and school characteristics	**Total**	Agriculture, food, and natural resources	Architecture and construction	Arts, A/V technology, and communication	Business management and administration	Education and training	Finance	Health science
Sex								
Female	**50.9**	37.1	15.4	57.2	53.9	65.6	56.3	74.1
Male	**49.1**	62.9	84.6	42.8	46.1	34.4	43.7	25.9
Race/ethnicity[b]								
Asian, non-Hispanic	**4.1**	1.2	3.3	3.4	2.9	5.7 !	3.9	3.3
Black, non-Hispanic	**14.0**	8.1	10.6	13.6	16.9	9.5 !	11.6	22.2
Hispanic	**15.9**	12.7	13.3	13.3	13.2	26.2	8.9	14.2
White, non-Hispanic	**60.9**	72.5	66.9	64.4	62.6	55.6	72.1	55.5
Other, non-Hispanic	**5.2**	5.6	5.9	5.4	4.4	3.0 !	3.5	4.8
Socioeconomic status (SES) quartile[c]								
Lowest quartile	**24.0**	33.3	25.2	21.0	24.4	29.5	20.2	25.8
Second quartile	**26.3**	31.1	31.2	26.0	28.9	28.4	29.2	29.2
Third quartile	**25.7**	22.6	27.4	27.6	27.0	19.8	27.7	25.6
Highest quartile	**24.0**	13.0	16.3	25.4	19.7	22.3	22.9	19.4
Disability status[d]								
No disability	**92.5**	88.1	90.0	93.8	94.9	91.3	97.0	94.3
Has disability	**7.6**	12.0	10.0	6.2	5.1	8.7 !	3.0	5.8
English learner status[e]								
Not fluent	**1.7**	1.3	1.7	0.7	0.9	‡	0.7 !	‡
Fluent	**96.6**	97.0	96.3	98.4	97.6	94.6	98.4	98.6
Don't know	**1.7**	1.7	2.0	0.9	1.4	‡	‡	0.9 !
School urbanicity								
Urban	**25.7**	8.6	18.6	23.2	22.1	21.3	15.4	26.0
Suburban	**52.3**	45.4	54.6	54.9	51.5	72.3	56.2	50.8
Rural	**22.0**	45.9	26.9	21.9	26.4	‡	28.4	23.2

See notes at end of table.

Table 10A. Percentage of the ELS cohort who had participated in CTE, by CTE field of study and selected student and school characteristics—continued

		CTE fields of study[a]						
Student and school characteristics	**Total**	Agriculture, food, and natural resources	Architecture and construction	Arts, A/V technology, and communication	Business management and administration	Education and training	Finance	Health science
CTE participation level[f]								
Samplers	**41.6**	19.3	24.0	36.1	34.5	43.8	33.3	25.1
Explorers	**23.5**	40.5	41.5	39.3	42.3	40.0	42.6	42.2
Concentrators	**18.3**	40.2	34.5	24.7	23.2	16.2	24.2	32.7

! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[d] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[e] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
[f] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the SCED taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table 10B. Percentage of the ELS cohort who had participated in CTE, by CTE field of study and selected student and school characteristics

	CTE fields of study[a]							
Student and school characteristics	Hospitality and tourism	Human services	Information technology	Law, public safety, corrections, and security	Manufacturing	Marketing	Science, technology, engineering, and mathematics	Transportation
Sex								
Female	**59.4**	88.2	45.8	47.7	12.4	55.0	22.8	9.8
Male	**40.6**	11.8	54.2	52.3	87.6	45.0	77.2	90.2
Race/ethnicity[b]								
Asian, non-Hispanic	**4.1**	1.4	4.2	0.7	2.0	3.5	2.3	2.6
Black, non-Hispanic	**15.3**	16.5	17.6	16.9	11.5	16.3	11.2	7.4
Hispanic	**18.7**	19.8	16.7	16.3	12.1	12.0	15.2	18.3
White, non-Hispanic	**56.4**	59.3	56.9	59.6	68.9	60.1	62.6	65.1
Other, non-Hispanic	**‡**	‡	4.6 !	‡	‡	8.1 !	‡	6.7 !
Socioeconomic status (SES) quartile[c]								
Lowest quartile	**27.4**	32.3	26.5	21.3	26.8	22.9	22.3	30.6
Second quartile	**28.5**	27.5	27.1	29.6	35.6	25.0	26.6	32.9
Third quartile	**27.0**	24.3	25.3	30.7	21.3	28.9	21.4	24.6
Highest quartile	**17.1**	15.9	21.2	18.4	16.3	23.2	29.7	11.9
Disability status[d]								
No disability	**87.3**	90.2	93.9	94.9	88.0	95.5	90.2	86.6
Has disability	**12.7**	9.8	6.1	5.1	12.0	4.5	9.8 !	13.4
English learner status[e]								
Not fluent	**2.3**	2.3	1.4	0.1	1.7	1.7	1.6	2.6
Fluent	**96.8**	95.0	96.8	97.0	97.0	96.8	96.7	94.7
Don't know	**‡**	‡	1.8	2.9 !	‡	‡	‡	2.7 !
School urbanicity								
Urban	**26.3**	23.3	26.4	20.2	21.5	27.7	21.2	17.7
Suburban	**45.4**	58.4	47.9	48.4	58.7	54.7	43.0	61.6
Rural	**28.4**	18.3	25.7	31.4	19.9	17.6	35.8	20.7

See notes at end of table.

Table 10B. Percentage of the ELS cohort who had participated in CTE, by CTE field of study and selected student and school characteristics—continued

	CTE fields of study[a]							
Student and school characteristics	Hospitality and tourism	Human services	Information technology	Law, public safety, corrections, and security	Manufacturing	Marketing	Science, technology, engineering, and mathematics	Transportation
CTE participation level[f]								
Samplers	**26.4**	32.5	40.4	33.1	17.0	26.9	21.6	18.9
Explorers	**49.7**	40.3	37.4	38.6	46.3	41.9	47.6	39.8
Concentrators	**23.9**	27.2	22.2	28.4	36.7	31.3	30.8	41.2

! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[d] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[e] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
[f] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the SCED taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table 11A. Percentage of the HSLS cohort who had participated in CTE, by CTE field of study and selected student and school characteristics

		CTE fields of study[a]						
Student and school characteristics	**Total**	Agriculture, food, and natural resources	Architecture and construction	Arts, A/V technology, and communication	Business management and administration	Education and training	Finance	Health science
Sex								
Female	**50.2**	41.0	17.7	57.9	50.7	86.4	47.7	74.8
Male	**49.8**	59.0	82.3	42.1	49.3	13.6	52.3	25.2
Race/ethnicity[b]								
Asian, non-Hispanic	**3.9**	1.1	2.1 !	3.8	3.3	‡	4.5	4.4 !
Black, non-Hispanic	**12.9**	8.2	6.2	11.2	16.6	12.0	10.5	18.6
Hispanic	**22.4**	18.8	14.8	22.5	19.9	28.7	16.3	23.3
White, non-Hispanic	**51.9**	65.2	67.8	53.8	52.2	47.8	58.6	43.6
Other, non-Hispanic	**9.0**	6.7	9.2	8.7	8.1	9.2 !	10.0 !	10.0
Socioeconomic status (SES) quartile[c]								
Lowest quartile	**24.0**	27.1	22.4	23.2	23.4	22.3	17.9	24.2
Second quartile	**26.0**	30.8	26.9	25.4	28.4	28.9	27.9	29.2
Third quartile	**25.9**	27.4	28.0	27.4	26.8	27.3	28.2	23.2
Highest quartile	**24.2**	14.7	22.7	24.0	21.5	21.6	26.0	23.4
Disability status[d]								
No disability	**90.0**	87.0	87.0	91.5	91.6	90.5	93.3	95.8
Has disability	**10.0**	13.0	13.0	8.5	8.4	9.5	6.7	4.2
English learner status[e]								
Currently ELL	**2.4**	2.3	1.6	2.1	1.7	‡	1.4 !	1.6 !
Not currently ELL	**74.1**	73.5	77.8	74.8	73.4	70.8	77.4	71.5
Don't know	**23.5**	24.1	20.7	23.1	24.9	28.3	21.2	26.9
School urbanicity[f]								
Urban	**29.6**	11.5	18.6	28.4	26.6	21.2	18.8	36.4
Suburban	**46.3**	#	52.1	46.5	45.1	60.9	60.4	37.4
Rural	**24.1**	46.2	29.4	25.1	28.3	17.9	20.8	26.2

See notes at end of table.

Table 11A. Percentage of the HSLS cohort who had participated in CTE, by CTE field of study and selected student and school characteristics—continued

Student and school characteristics	Total	CTE fields of study[a]						
		Agriculture, food, and natural resources	Architecture and construction	Arts, A/V technology, and communication	Business management and administration	Education and training	Finance	Health science
CTE participation level[g]								
Samplers	**41.8**	27.2	24.7	41.2	38.6	29.5	30.5	36.8
Explorers	**19.6**	36.1	42.2	36.0	36.4	38.3	43.0	28.3
Concentrators	**17.9**	36.7	33.1	22.8	25.0	32.3	26.5	35.0

Rounds to zero.
! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[d] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[e] Respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.
[f] Respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs.
[g] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the SCED taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
NOTE: CTE = career and technical education; HSLS = High School Longitudinal Study of 2009. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table 11B. Percentage of the HSLS cohort who had participated in CTE, by CTE field of study and selected student and school characteristics

	CTE fields of study[a]							
Student and school characteristics	Hospitality and tourism	Human services	Information technology	Law, public safety, corrections, and security	Manufacturing	Marketing	Science, technology, engineering, and mathematics	Transportation
Sex								
Female	**61.3**	90.1	49.7	36.6	11.4	44.3	23.1	10.2
Male	**38.7**	9.9	50.3	63.4	88.6	55.7	76.9	89.8
Race/ethnicity[b]								
Asian, non-Hispanic	**3.4**	1.2 !	3.2	‡	‡	4.3	2.8	3.5 !
Black, non-Hispanic	**15.7**	19.9	16.9	22.6	4.0 !	13.9	9.0	8.1 !
Hispanic	**26.6**	22.9	21.5	22.9	14.5	15.1	14.2	20.7
White, non-Hispanic	**47.3**	49.2	49.9	44.4	70.9	54.3	64.7	56.2
Other, non-Hispanic	**7.0**	6.8	8.5	9.1	7.3	12.5 !	9.3	11.5
Socioeconomic status (SES) quartile[c]								
Lowest quartile	**27.7**	29.9	23.7	23.2	20.1	20.1	16.2	29.1
Second quartile	**30.6**	33.5	27.0	30.3	31.6	22.9	26.0	33.0
Third quartile	**23.3**	22.5	26.3	23.2	28.3	32.0	25.3	23.7
Highest quartile	**18.4**	14.2	23.1	23.3	20.0	25.0	32.5	14.2
Disability status[d]								
No disability	**88.5**	90.9	91.9	91.7	87.3	94.0	88.1	84.5
Has disability	**11.5**	9.2	8.1	8.3	12.7	6.0	11.9	15.5
English learner status[e]								
Currently ELL	**2.0** !	4.2 !	2.0	4.0 !	1.2 !	‡	1.5 !	1.7 !
Not currently ELL	**73.9**	70.3	72.6	74.6	79.1	73.3	79.7	74.2
Don't know	**24.2**	25.5	25.4	21.4	19.7	24.8	18.8	24.2
School urbanicity[f]								
Urban	**29.0**	27.0	32.4	33.4	19.4	23.4	23.7	26.8
Suburban	**46.6**	50.2	39.4	46.6	50.4	53.4	57.0	53.2
Rural	**24.3**	22.8	28.2	19.9	30.3	23.2	19.3	20.0

See notes at end of table.

Table 11B. Percentage of the HSLS cohort who had participated in CTE, by CTE field of study and selected student and school characteristics—continued

	CTE fields of study[a]							
Student and school characteristics	Hospitality and tourism	Human services	Information technology	Law, public safety, corrections, and security	Manufacturing	Marketing	Science, technology, engineering, and mathematics	Transportation
CTE participation level[g]								
Samplers	**33.0**	25.1	44.2	28.1	20.5	23.4	29.6	23.8
Explorers	**41.4**	43.1	32.7	34.1	41.8	51.1	38.7	38.0
Concentrators	**25.7**	31.8	23.1	37.8	37.8	25.5	31.7	38.2

! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[d] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[e] Respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.
[f] Respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs.
[g] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the SCED taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
NOTE: CTE = career and technical education; HSLS = High School Longitudinal Study of 2009. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Students from the highest SES families had higher predicted probabilities of not participating in CTE (10 percentage points in the ELS cohort and 6 percentage points in the HSLS cohort) than students from the second SES quartile (taking the selected school and student characteristics into account) (table 8 and table 9). Similarly, compared with students from the second SES quartile, students from the highest quartile were less likely to be CTE concentrators (7 percentage points in the ELS cohort and 4 percentage points in the HSLS cohort, net of controls).

Urbanicity of School Locale

Finally, looking at the urbanicity of the school attended, larger proportions of students attending urban schools (20 percent in the ELS cohort and 24 percent in HSLS) than rural schools (14 percent and 16 percent, respectively) were CTE nonparticipants (table 5 and table 6). The multivariate models compare students in urban and rural schools with those in suburban schools, with slightly different results. Students attending urban schools in the ELS cohort were 5 percentage points more likely to not participate in CTE than suburban students, whereas, in the HSLS cohort, rural students were 4 percentage points less likely to be CTE nonparticipants than suburban students (table 8 and table 9). In both cohorts, fewer urban students were CTE explorers than rural (based on percentages) or suburban students (based on descriptive and multivariate results).

Summary of Demographic Patterns in CTE Access and Participation

In sum, the ELS and HSLS cohorts had different patterns of CTE access and participation. Overall participation in CTE coursetaking declined. Male students were more likely to be CTE concentrators or CTE explorers than their female counterparts in both cohorts. CTE participation by race/ethnicity and SES varied between the two cohorts, but white students tended to be more likely than other racial groups to be CTE concentrators, while students from the highest SES quartile were less likely than those from the second quartile to be CTE participants, explorers, or concentrators.

Demographics of CTE Participants and Concentrators by CTE Field of Study

CTE participation in and concentration by CTE field of study varied greatly by student and school characteristics. Of all the outcomes examined, the largest differences — and thus largest inequalities — were in participation and concentration in individual CTE fields. Because the findings were similar for all CTE participants (regardless of level of participation) and CTE concentrators, the majority of the discussion below focuses on CTE participants (due to sample size). Because under 1 percent of students in either cohort earned at least one credit in government, the results for this CTE field are not discussed below.

Sex

In both cohorts, there are stark differences in who participates and concentrates in each CTE field by sex. Specifically, in the ELS cohort, there was a significant difference between the percentage of male students and female students participating in CTE for all CTE fields except law. In the HSLS cohort, only three of the CTE fields were not significantly different — business, finance, and IT. At the extremes, 82–90 percent of architecture, transportation, and manufacturing CTE participants were male in the ELS and HSLS cohorts, while 74–90 percent of human services and health science CTE participants were female in both cohorts (tables 10A and 10B and tables 11A and 11B). Of the four CTE fields that did not have statistically similar percentages of female students in both the ELS and HSLS cohorts, two switched and no longer had a statistically dominant sex (finance and IT), one became more sex segregated (education went from 66 to 86 percent female), and one CTE field switched which sex was dominant (marketing went from 55 percent female to 44 percent female).

The multivariate models support these findings. In the ELS cohort, only law and marketing did not have a statistically significant difference by sex, net of the controls, while in the HSLS cohort, business, finance, and IT were not significantly different. Controlling for race/ethnicity, SES, disability status, English learner status, academic concentrator status, and school urbanicity, sex is associated with a 1 to 21 percentage point difference in the probability of taking at least one class in a CTE field by sex for students in the ELS and HSLS cohorts (tables 12A–12C and tables 13A–13C).

Table 12A. Average marginal effects of selected student and school characteristics on the probability that students in the ELS cohort participated in a CTE field, by CTE field of study

	CTE fields of study[a]									
	Agriculture, food, and natural resources		Architecture and construction		Arts, A/V technology, and communication		Business management and administration		Education and training[b]	
Student and school characteristics	Marginal effect[c]	Standard error	Marginal effect[c]	Standard error	Marginal effect[c]	Standard error	Marginal effect[c]	Standard error	Marginal effect[c]	Standard error
Sex [female]										
Male	0.039 ***	0.01	0.21 ***	0.01	-0.046 ***	0.01	-0.034 **	0.01	-0.011 **	0.00
Race/ethnicity[d] [white, non-Hispanic]										
Asian, non-Hispanic	-0.067 ***	0.01	-0.022	0.02	-0.028	0.02	-0.048 *	0.02	0.002	0.01
Black, non-Hispanic	-0.047 ***	0.01	-0.055 ***	0.02	0.001	0.02	0.068 **	0.02	-0.001	0.00
Hispanic	-0.029 *	0.01	-0.037 *	0.02	-0.015	0.02	-0.036	0.02	0.007	0.00
Other, non-Hispanic	-0.028	0.02	-0.017	0.02	0.006	0.03	-0.056 *	0.02	-0.007 *	0.00
Socioeconomic status (SES) quartile[e] [second quartile]										
Lowest quartile	0.037 **	0.01	-0.007	0.02	-0.016	0.02	-0.007	0.02	-0.001	0.00
Third quartile	-0.018	0.01	-0.029	0.01	0.007	0.01	-0.013	0.02	-0.008	0.00
Highest quartile	-0.039 ***	0.01	-0.077 ***	0.01	0.008	0.02	-0.061 ***	0.02	-0.001	0.00
Disability status[f] [no disability]										
Has disability	0.024	0.01	0.023	0.02	-0.033	0.02	-0.07 ***	0.02	0.001	0.00
English learner status[g] [fluent]										
Not fluent	-0.019	0.02	-0.015	0.03	-0.1 **	0.03	-0.053	0.05	0.014	0.01
Don't know	0.005	0.03	0.012	0.04	-0.061	0.04	0.015	0.05	-0.005	0.01
School urbanicity [suburban]										
Urban	-0.049 ***	0.01	-0.046 **	0.02	-0.023	0.02	-0.033	0.02	-0.005	0.00
Rural	0.077 ***	0.02	0.018	0.02	-0.009	0.02	0.052	0.03	-0.011 **	0.00

See notes at end of table.

Table 12A. Average marginal effects of selected student and school characteristics on the probability that students in the ELS cohort participated in a CTE field, by CTE field of study—continued

	CTE fields of study[a]									
	Agriculture, food, and natural resources		Architecture and construction		Arts, A/V technology, and communication		Business management and administration		Education and training[b]	
Student and school characteristics	Marginal effect[c]	Standard error	Marginal effect[c]	Standard error	Marginal effect[c]	Standard error	Marginal effect[c]	Standard error	Marginal effect[c]	Standard error
Academic concentrator[h]										
[not an academic concentrator)										
Academic concentrator	-0.046 ***	0.01	-0.013	0.01	0.005	0.01	-0.031 *	0.02	-0.001	0.00
CTE access[i] [has CTE access]										
No CTE access	-0.063 ***	0.02	-0.022	0.02	0.002	0.03	-0.032	0.04	--	--
Access unknown	-0.032	0.02	-0.012	0.02	0.023	0.03	-0.027	0.03	-0.004	0.00
Sample size (N)	12,657	†	12,657	†	12,657	†	12,657	†	11,941	†

† Not applicable.
* p < 0.05; ** p < 0.01; *** p < 0.001.
[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
[b] The education and training model contains 11,941 members rather than 12,657 because 716 students without access to CTE were dropped from the regression. The "no CTE access" category was dropped because it perfectly predicted the outcome of not participating in the field of education and training, and a marginal effect could not be estimated for that category.
[c] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are logistic regression models.
[d] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[e] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[f] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[g] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
[h] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
[i] Respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site.
NOTES: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. The ELS sample included no government and public administration participants. The category in brackets for each characteristic is the reference category.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table 12B. Average marginal effects of selected student and school characteristics on the probability that students in the ELS cohort participated in a CTE field, by CTE field of study

	CTE fields of study[a]									
	Finance		Health science		Hospitality and tourism		Human services		Information technology	
Student and school characteristics	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error
Sex [female]										
Male	-0.017 **	0.01	-0.047 ***	0.01	-0.016 *	0.01	-0.088 ***	0.01	0.08 ***	0.01
Race/ethnicity[c] [white, non-Hispanic]										
Asian, non-Hispanic	-0.003	0.01	-0.007	0.01	0.011	0.02	-0.039 ***	0.01	0.056 *	0.03
Black, non-Hispanic	-0.008	0.01	0.032 **	0.01	0.013	0.01	0.003	0.01	0.153 ***	0.03
Hispanic	-0.034 **	0.01	-0.007	0.01	0.011	0.01	-0.003	0.01	0.059	0.03
Other, non-Hispanic	-0.024	0.01	0.008	0.02	-0.001	0.01	-0.028 **	0.01	0.005	0.03
Socioeconomic status (SES) quartile[d] [second quartile]										
Lowest quartile	-0.019	0.01	0.003	0.01	-0.002	0.01	0.005	0.01	0.029	0.02
Third quartile	-0.007	0.01	-0.004	0.01	0.0	0.01	-0.01	0.01	-0.011	0.02
Highest quartile	-0.021	0.01	-0.013	0.01	-0.013	0.01	-0.014	0.01	-0.038 *	0.02
Disability status[e] [no disability]										
Has disability	-0.043 ***	0.01	0.0	0.01	0.025	0.01	0.031 *	0.01	-0.067 **	0.03
English learner status[f] [fluent]										
Not fluent	-0.045 **	0.01	-0.027	0.02	0.017	0.03	0.031	0.03	-0.123 **	0.04
Don't know	-0.025	0.03	-0.029 *	0.01	-0.032 **	0.01	0.048	0.04	-0.034	0.04
School urbanicity [suburban]										
Urban	-0.03 **	0.01	-0.008	0.01	0.003	0.01	-0.014	0.01	0.0	0.03
Rural	0.008	0.01	-0.006	0.01	0.012	0.01	-0.021	0.01	0.101 **	0.03

See notes at end of table.

Table 12B. Average marginal effects of selected student and school characteristics on the probability that students in the ELS cohort participated in a CTE field, by CTE field of study—continued

	CTE fields of study[a]									
	Finance		Health science		Hospitality and tourism		Human services		Information technology	
Student and school characteristics	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error
Academic concentrator[g]										
[not an academic concentrator)										
Academic concentrator	0.011	0.01	-0.002	0.01	-0.014 *	0.01	-0.036 ***	0.01	0.058 **	0.02
CTE access[h] [has CTE access]										
No CTE access	0.003	0.02	-0.049 ***	0.01	-0.034 ***	0.01	-0.019	0.02	-0.003	0.05
Access unknown	0.005	0.02	-0.003	0.01	-0.028 **	0.01	-0.002	0.01	-0.042	0.04
Sample size (N)	12,657	†	12,657	†	12,657	†	12,657	†	12,657	†

† Not applicable.
* p < 0.05; ** p < 0.01; *** p < 0.001.
[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
[b] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are logistic regression models.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[f] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
[g] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
[h] Respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site.
NOTES: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. The category in brackets for each characteristic is the reference category.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table 12C. Average marginal effects of selected student and school characteristics on the probability that students in the ELS cohort participated in a CTE field, by CTE field of study

	CTE fields of study[a]									
	Law, public safety, corrections, and security		Manufacturing		Marketing		Science, technology, engineering, and mathematics		Transportation	
Student and school characteristics	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error
Sex [female]										
Male	0.002	0.00	0.083 ***	0.01	-0.008	0.01	0.017 ***	0.00	0.091 ***	0.01
Race/ethnicity[c] [white, non-Hispanic]										
Asian, non-Hispanic	-0.015 ***	0.00	-0.047 ***	0.01	-0.011	0.01	-0.008	0.00	-0.022	0.01
Black, non-Hispanic	0.01	0.01	-0.026 **	0.01	0.014	0.01	-0.003	0.01	-0.036 ***	0.01
Hispanic	0.009	0.01	-0.027 **	0.01	-0.023 *	0.01	0.002	0.01	-0.015	0.01
Other, non-Hispanic	0.002	0.01	-0.019	0.01	0.033	0.02	0.013	0.01	-0.008	0.01
Socioeconomic status (SES) quartile[d] [second quartile]										
Lowest quartile	-0.009	0.00	-0.002	0.01	0.004	0.01	0.001	0.00	0.016	0.01
Third quartile	0	0.01	-0.028 **	0.01	0.007	0.01	0	0.00	-0.007	0.01
Highest quartile	-0.008	0.01	-0.031 **	0.01	0.002	0.01	0.008	0.01	-0.035 ***	0.01
Disability status[e] [no disability]										
Has disability	-0.008	0.01	0.022	0.01	-0.031 **	0.01	-0.007	0.00	0.009	0.01
English learner status[f] [fluent]										
Not fluent	-0.022 ***	0.00	0.009	0.03	0.006	0.03	0.008	0.02	-0.007	0.02
Don't know	0.035	0.02	-0.002	0.02	0.006	0.03	0.006	0.01	0.025	0.03
School urbanicity [suburban]										
Urban	-0.004	0.01	-0.013	0.01	-0.003	0.01	0.002	0.00	-0.03 ***	0.01
Rural	0.023 *	0.01	-0.022 *	0.01	-0.021	0.01	0.011	0.01	-0.027 *	0.01

See notes at end of table.

Table 12C. Average marginal effects of selected student and school characteristics on the probability that students in the ELS cohort participated in a CTE field, by CTE field of study—continued

	CTE fields of study[a]									
	Law, public safety, corrections, and security		Manufacturing		Marketing		Science, technology, engineering, and mathematics		Transportation	
Student and school characteristics	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error
Academic concentrator[g]										
[not an academic concentrator)										
Academic concentrator	-0.008	0.00	-0.024 **	0.01	-0.004	0.01	-0.003	0.00	-0.047 ***	0.01
CTE access[h] [has CTE access]										
No CTE access	-0.014 *	0.01	-0.028 **	0.01	-0.041 ***	0.01	-0.004	0.01	-0.035 ***	0.01
Access unknown	0.004	0.01	-0.018	0.01	0.006	0.02	0.003	0.01	-0.009	0.01
Sample size (N)	12,657	†	12,657	†	12,657	†	12,657	†	12,657	†

† Not applicable.
* p < 0.05; ** p < 0.01; *** p < 0.001.
[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
[b] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are logistic regression models.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[f] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
[g] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
[h] Respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site.
NOTES: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. The category in brackets for each characteristic is the reference category.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table 13A. Average marginal effects of selected student and school characteristics on the probability that students in the HSLS cohort participated in a CTE field, by CTE field of study

	CTE fields of study[a]									
	Agriculture, food, and natural resources		Architecture and construction		Arts, A/V technology, and communication		Business management and administration		Education and training	
Student and school characteristics	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error
Sex [female]										
Male	0.032 ***	0.01	0.136 ***	0.01	-0.052 ***	0.01	0.003	0.01	-0.045 ***	0.01
Race/ethnicity[c] [white, non-Hispanic]										
Asian, non-Hispanic	-0.076 ***	0.01	-0.067 ***	0.02	-0.015	0.02	-0.03	0.03	-0.006	0.01
Black, non-Hispanic	-0.054 ***	0.02	-0.078 ***	0.01	-0.034	0.02	0.063 *	0.03	0	0.01
Hispanic	-0.032 *	0.02	-0.063 ***	0.01	-0.002	0.02	-0.017	0.02	0.018	0.01
Other, non-Hispanic	-0.042 **	0.02	-0.024	0.01	-0.008	0.02	-0.015	0.03	0.004	0.01
Socioeconomic status (SES) quartile[d] [second quartile]										
Lowest quartile	0.004	0.01	0.009	0.01	0.001	0.02	-0.008	0.02	-0.008	0.01
Third quartile	-0.017	0.01	-0.002	0.01	0.008	0.01	-0.014	0.02	-0.001	0.01
Highest quartile	-0.054 ***	0.01	-0.021	0.01	-0.01	0.01	-0.051 **	0.02	-0.003	0.01
Disability status[e] [no disability]										
Has disability	0	0.01	-0.004	0.01	-0.017	0.02	-0.034 *	0.02	0.009	0.01
English learner status[f] [not currently ELL]										
Currently ELL	0.006	0.03	-0.024	0.02	-0.022	0.04	-0.052	0.03	-0.02 ***	0.01
Don't know	0	0.01	-0.013	0.01	-0.003	0.01	0.012	0.01	0.006	0.01
School urbanicity[g] [suburban]										
Urban	-0.046 ***	0.01	-0.035 **	0.01	-0.009	0.02	-0.02	0.02	-0.02 *	0.01
Rural	0.098 ***	0.02	0.005 *	0.01	0.006	0.02	0.038	0.02	-0.017 *	0.01

See notes at end of table.

Table 13A. Average marginal effects of selected student and school characteristics on the probability that students in the HSLS cohort participated in a CTE field, by CTE field of study—continued

	CTE fields of study[a]									
	Agriculture, food, and natural resources		Architecture and construction		Arts, A/V technology, and communication		Business management and administration		Education and training	
Student and school characteristics	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error
Academic concentrator[h]										
[not an academic concentrator)										
Academic concentrator	-0.054 ***	0.01	-0.02	0.01	0.029*	0.01	0.055 **	0.02	-0.003	0.01
CTE access[i] [has CTE access]										
No CTE access	0.072	0.07	0.018	0.06	0.105	0.06	-0.063	0.06	0.014	0.02
Access unknown	-0.017	0.03	-0.019	0.02	-0.021	0.03	-0.008	0.04	-0.003	0.01
Sample size (N)	20,658	†	20,658	†	20,658	†	20,658	†	20,658	†

† Not applicable.

* p < 0.05; ** p < 0.01; *** p < 0.001.

[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.

[b] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are logistic regression models.

[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.

[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in HSLS:09 are divided into quartiles based on weighted distributions of the variables.

[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).

[f] Respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.

[g] Respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs.

[h] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.

[i] Respondents are defined as having access to CTE if the school counselor reported that CTE was offered in his or her district or if students were allowed to take Career Clusters, Pathways, or Programs of Study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program.

NOTES: CTE = career and technical education; HSLS = High School Longitudinal Study of 2009. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. The category in brackets for each characteristic is the reference category.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table 13B. Average marginal effects of selected student and school characteristics on the probability that students in the HSLS cohort participated in a CTE field, by CTE field of study

	CTE fields of study[a]									
	Finance		Health science		Hospitality and tourism		Human services		Information technology	
Student and school characteristics	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error
Sex [female]										
Male	0.007	0.01	-0.097 ***	0.01	-0.037 ***	0.01	-0.069 ***	0.01	0.019	0.01
Race/ethnicity[c] [white, non-Hispanic]										
Asian, non-Hispanic	0.007	0.01	0.019	0.03	0.009	0.02	-0.027 ***	0.01	-0.061 **	0.02
Black, non-Hispanic	-0.01	0.01	0.044 *	0.02	0.017	0.01	0.013	0.01	0.096 ***	0.02
Hispanic	-0.013	0.01	0.016	0.02	0.019	0.02	-0.005	0.01	-0.005	0.02
Other, non-Hispanic	0.003	0.02	0.029 *	0.01	-0.013	0.01	-0.013	0.01	-0.002	0.02
Socioeconomic status (SES) quartile[d] [second quartile]										
Lowest quartile	-0.012	0.01	-0.011	0.01	-0.008	0.01	-0.005	0.01	-0.003	0.02
Third quartile	-0.003	0.01	-0.022	0.02	-0.018	0.01	-0.016 *	0.01	-0.004	0.02
Highest quartile	-0.009	0.01	-0.016	0.01	-0.024 *	0.01	-0.026 ***	0.01	-0.027	0.02
Disability status[e] [no disability]										
Has disability	-0.02 **	0.01	-0.052 ***	0.01	0.014	0.01	0.005	0.01	-0.052 *	0.02
English learner status[f] [not currently ELL]										
Currently ELL	-0.018	0.02	-0.034	0.02	-0.025	0.02	0.032	0.03	-0.036	0.06
Don't know	-0.007	0.01	0.017	0.02	-0.004	0.01	0.001	0.01	0.03 *	0.01
School urbanicity[g] [suburban]										
Urban	-0.036 *	0.02	0.034	0.03	-0.006	0.01	-0.01	0.01	0.063 *	0.03
Rural	-0.026 *	0.01	0.03	0.02	0.001	0.01	-0.006	0.01	0.09 ***	0.03

See notes at end of table.

Table 13B. Average marginal effects of selected student and school characteristics on the probability that students in the HSLS cohort participated in a CTE field, by CTE field of study—continued

	CTE fields of study[a]									
	Finance		Health science		Hospitality and tourism		Human services		Information technology	
Student and school characteristics	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error
Academic concentrator[h]										
[not an academic concentrator)										
Academic concentrator	0.013	0.01	0.035 ***	0.01	-0.024 **	0.01	-0.017 **	0.01	0.08 ***	0.02
CTE access[i] [has CTE access]										
No CTE access	-0.023	0.02	-0.001	0.05	0.012	0.05	-0.009	0.02	-0.016	0.06
Access unknown	0.006	0.02	-0.052 **	0.02	-0.018	0.02	0.02	0.02	-0.023	0.04
Sample size (N)	20,658	†	20,658	†	20,658	†	20,658	†	20,658	†

† Not applicable.
* p < 0.05; ** p < 0.01; *** p < 0.001.
[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
[b] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are logistic regression models.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[f] Respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.
[g] Respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs.
[h] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
[i] Respondents are defined as having access to CTE if the school counselor reported that CTE was offered in his or her district or if students were allowed to take Career Clusters, Pathways, or Programs of Study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program.
NOTES: CTE = career and technical education; HSLS = High School Longitudinal Study of 2009. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. The category in brackets for each characteristic is the reference category. The HSLS sample included very few government and public administration participants.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table 13C. Average marginal effects of selected student and school characteristics on the probability that students in the HSLS cohort participated in a CTE field, by CTE field of study

	CTE fields of study[a]									
	Law, public safety, corrections, and security		Manufacturing		Marketing		Science, technology, engineering, and mathematics		Transportation	
Student and school characteristics	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error
Sex [female]										
Male	0.018 ***	0.00	0.065 ***	0.01	0.016 *	0.01	0.081 ***	0.01	0.074 ***	0.01
Race/ethnicity[c] [white, non-Hispanic]										
Asian, non-Hispanic	-0.019 ***	0.00	-0.009	0.02	0.004	0.01	-0.037 ***	0.01	-0.003	0.02
Black, non-Hispanic	0.027 *	0.01	-0.042 ***	0.01	0.01	0.01	-0.026	0.01	-0.025 **	0.01
Hispanic	0.003	0.01	-0.029 ***	0.01	-0.015	0.01	-0.033 ***	0.01	-0.017	0.01
Other, non-Hispanic	0.004	0.01	-0.023 **	0.01	0.022	0.03	-0.01	0.01	0.005	0.01
Socioeconomic status (SES) quartile[d] [second quartile]										
Lowest quartile	-0.007	0.01	-0.009	0.01	0.005	0.01	-0.015	0.01	0.003	0.01
Third quartile	-0.005	0.01	-0.008	0.01	0.018	0.01	-0.007	0.01	-0.016 *	0.01
Highest quartile	-0.002	0.01	-0.02 *	0.01	0.005	0.01	0.01	0.01	-0.03 ***	0.01
Disability status[e] [no disability]										
Has disability	-0.008	0.01	-0.007	0.01	-0.026 ***	0.01	0.005	0.01	0.003	0.01
English learner status[f] [not currently ELL]										
Currently ELL	0.02	0.02	-0.02	0.01	0	0.02	-0.012	0.02	-0.02	0.01
Don't know	-0.004	0.00	-0.01	0.01	0.004	0.01	-0.012	0.01	-0.002	0.01
School urbanicity[g] [suburban]										
Urban	0.001	0.01	-0.011	0.01	-0.018	0.02	-0.021	0.01	-0.005	0.01
Rural	-0.004	0.01	0.005	0.01	-0.012	0.01	-0.034 **	0.01	-0.015 *	0.01

See notes at end of table.

Table 13C. Average marginal effects of selected student and school characteristics on the probability that students in the HSLS cohort participated in a CTE field, by CTE field of study—continued

	CTE fields of study[a]									
	Law, public safety, corrections, and security		Manufacturing		Marketing		Science, technology, engineering, and mathematics		Transportation	
Student and school characteristics	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error
Academic concentrator[h]										
[not an academic concentrator)										
Academic concentrator	0	0.01	-0.023 ***	0.01	0.009	0.01	0.023*	0.01	-0.024 ***	0.01
CTE access[i] [has CTE access]										
No CTE access	0.037	0.03	-0.029 ***	0.01	-0.033 **	0.01	-0.037	0.02	-0.007	0.02
Access unknown	0.009	0.01	0.023	0.02	-0.013	0.01	-0.006	0.01	-0.002	0.01
Sample size (N)	20,658	†	20,658	†	20,658	†	20,658	†	20,658	†

† Not applicable.

* p < 0.05; ** p < 0.01; *** p < 0.001.

[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.

[b] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are logistic regression models.

[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.

[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in HSLS:09 are divided into quartiles based on weighted distributions of the variables.

[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).

[f] Respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.

[g] Respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs.

[h] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.

[i] Respondents are defined as having access to CTE if the school counselor reported that CTE was offered in his or her district or if students were allowed to take Career Clusters, Pathways, or Programs of Study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program.

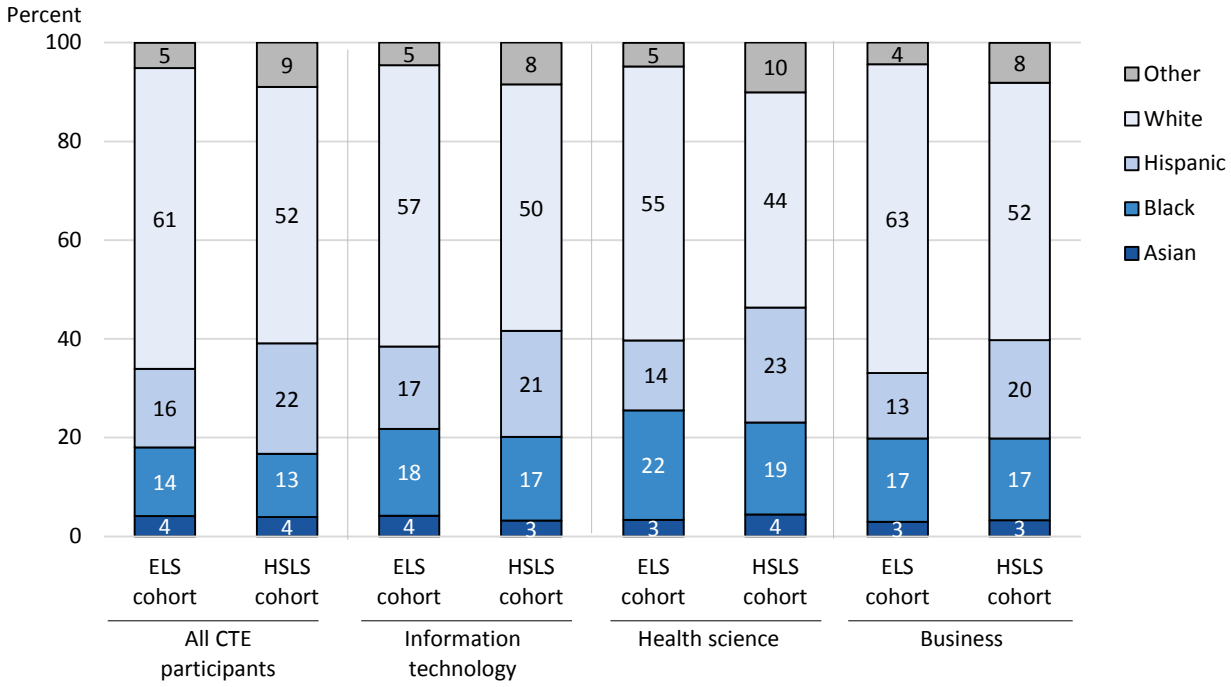
NOTES: CTE = career and technical education; HSLS = High School Longitudinal Study of 2009. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. The category in brackets for each characteristic is the reference category.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Race/Ethnicity

Just as participation in CTE fields of study varied by sex, CTE participation across fields also differed by racial/ethnic composition within each cohort. For the most part, the racial/ethnic composition of CTE participation by field of study was not significantly different between the two cohorts. However, architecture and manufacturing had significantly smaller percentages of black CTE participants in the HSLS cohort than in the ELS cohort. Seven CTE fields had significantly smaller percentages of white CTE participants (arts, business, finance, health, hospitality, IT, and law), consistent with overall demographic trends; and five CTE fields (arts, business, finance, health, and IT) had larger percentages of Hispanic CTE participants in HSLS than ELS (tables 10A and 10B and tables 11A and 11B). Figure 8 displays the differences in racial/ethnic composition between the ELS cohort and the HSLS cohort for the IT, health science, and business fields.

Figure 8. Percentage distribution of the racial/ethnic composition of ELS and HSLS cohort students who participated in CTE, by selected CTE fields of study



NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE participants earned at least one CTE credit. See Appendix A for more information on the definition of CTE participant status. CTE fields of study are coded based on categories in the SCED taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields. Figure bars with the same displayed estimate differ in height because bar height is based on underlying unrounded estimates while the displayed estimates are rounded.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

The logistic regression models of participation in CTE fields of study (tables 12A–12C and tables 13A–13C), which show the marginal effects of participating in a CTE field net of sex, SES, disability status, English learner status, school urbanicity, academic concentration, and CTE participation level, show the percentage point difference of a student compared with an otherwise similar white student. In both cohorts, Asian, black, and Hispanic students were less likely to earn at least one agriculture credit than white students. Net of controls, Asian and Hispanic students in the HSLS cohort were less likely to earn at least one credit in STEM compared to white students. In both cohorts, net of controls, black students were 6 to 7 percentage points more likely than white students to earn at least one credit in business,

3–4 percentage points more likely to earn a credit in health, and 10–15 percentage points more likely to participate in the IT field of study. Net of controls and compared to white students, Hispanic and black students in both cohorts were less likely to participate in the architecture or manufacturing fields of study.

Socioeconomic Status (SES)

Participation by student SES also varied for some CTE fields. As with the prior subgroups examined, there were very few significant differences in the composition of students taking at least one credit in each CTE field between the ELS cohort and the HSLS cohort (tables 10A and 10B and tables 11A and 11B). Specifically, compared with the students in the ELS cohort, a smaller percentage of low-SES students in the HSLS cohort participated in the agriculture field and a larger percentage of high-SES students earned at least one credit in architecture.

Participation rates in some CTE fields were lower for students from the highest SES quartile than from other SES quartiles. In agriculture, human services, and transportation, smaller percentages of students from the most advantaged SES quartile participated than students from all other SES quartiles, in both cohorts. In the ELS cohort only, smaller percentages of students from the highest SES quartile took at least one CTE credit than students from other SES quartiles in the following CTE fields: business, health, and hospitality. Conversely, in the HSLS cohort, smaller percentages of students from the lowest SES quartile took at least one credit in STEM compared with all other SES quartiles.

The multivariate models show similar significant differences between the second SES quartile (the reference category), after controlling for student sex, race/ethnicity, disability status, English learner status, school urbanicity, academic concentration, and CTE participation level (tables 12A–12C and tables 13A–13C). In both cohorts, students from the highest SES quartile had a lower probability of having taken at least one credit in agriculture, business, manufacturing, and transportation than students in the reference category, net of the student and school controls.

Urbanicity of School Locale

The urbanicity of students' high schools was also associated with student CTE coursetaking. Students from urban, rural, and suburban high schools earned credit in CTE fields of study at different rates. For example, controlling for all other student and school characteristics, students who attended rural schools were 8–10 percentage points more likely to have taken at least one credit in agriculture than students who attended suburban schools, and students attending urban schools were 5 percentage points (in both cohorts) less likely to take

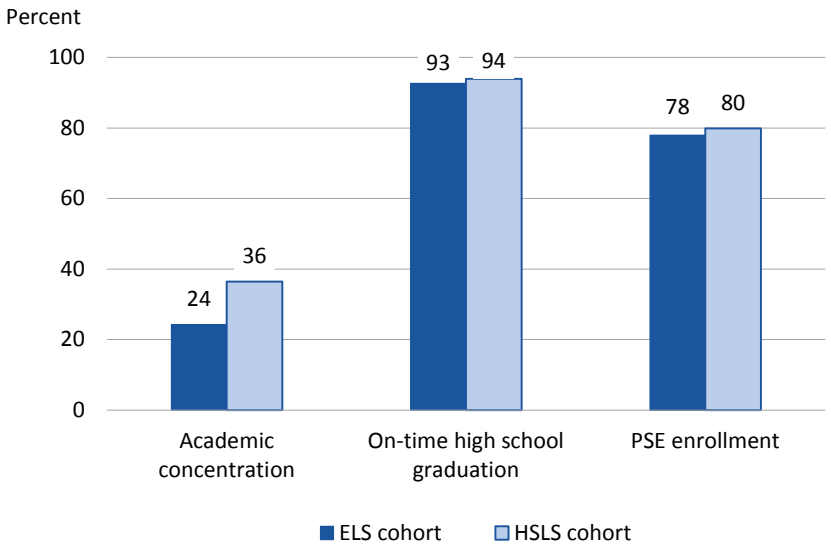
agriculture than suburban students (table 12A and table 13A).[19] Similarly, in both cohorts, students attending rural schools were 9–10 percentage points more likely to take at least one credit in IT compared with suburban students (table 12B and table 13B).

WHAT WERE THE EDUCATIONAL OUTCOMES OF CTE PARTICIPANTS, EXPLORERS, AND CONCENTRATORS?

Among students at different levels of CTE access and participation, distinct trends emerged for each of the educational outcomes examined in this study: academic concentration in high school, on-time high school graduation, and enrollment in postsecondary education after high school. Among students overall, only the percentage of students with academic concentrations shifted significantly between the ELS cohort and the HSLS cohort: the percentage of academic concentrators rose from 24 percent in the ELS cohort to 36 percent in the HSLS cohort (figure 9). In contrast, overall rates of on-time graduation and postsecondary enrollment remained stable across the two cohorts. However, rates of on-time graduation and postsecondary enrollment varied according to students' levels of CTE access and participation. Compared with CTE nonparticipants, CTE concentrators were more likely to graduate on time but slightly less likely to enroll in postsecondary education (table 17, table 18, table 20, and table 22). The differences were less pronounced for students in the HSLS cohort than those in the ELS cohort. Educational outcomes also varied widely for students in different CTE fields of study.

[19] The data themselves do not provide reasons for these differences, although differences in agricultural CTE coursetaking may be related to local labor markets.

Figure 9. Among ELS and HSLS cohort students who had earned at least one CTE credit, percentage who were academic concentrators, had graduated on time, and had enrolled in postsecondary education

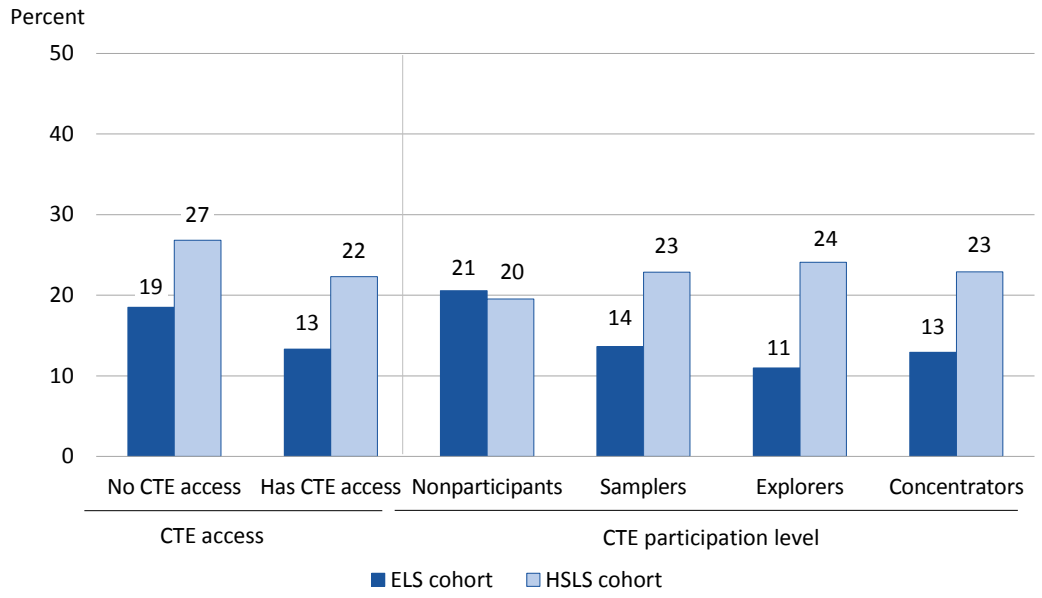


NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009; PSE = postsecondary education. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language. ELS cohort respondents are counted as having graduated on time if they received a high school diploma between fall 2003 and summer 2004, and HSLS cohort respondents are counted as having graduated on time if they received a high school diploma between fall 2012 and summer 2013.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Academic Concentration

For most student subgroups, the percentage of CTE samplers, explorers, and concentrators who were academic concentrators was higher for students in the HSLS cohort than in the ELS cohort. Even where the percentage of academic concentrators was not higher for the HSLS cohort, it was not statistically different from the percentage of academic concentrators in the ELS cohort. For example, while similar percentages of CTE nonparticipants from the lowest SES quartile of both cohorts were academic concentrators, the percentage of CTE participants who were academic concentrators was 9–13 percentage points higher for students in the HSLS cohort than the ELS cohort (figure 10).

Figure 10. Among students in the ELS and HSLS cohorts who were from the lowest socioeconomic quartile, percentage who were academic concentrators, by access to CTE and CTE participation level



NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in both ELS:2002 and HSLS:09 are divided into quartiles based on weighted distributions of the variables. A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language. For the ELS cohort, respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site. For the HSLS cohort, respondents are defined as having access to CTE if the school counselor reported that CTE was offered in his or her district or if students were allowed to take Career Clusters, Pathways, or Programs of Study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program. Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status. Figure bars with the same displayed estimate differ in height because bar height is based on underlying unrounded estimates while the displayed estimates are rounded.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Based on descriptive results, academic concentration varied by access to CTE, particularly for the ELS cohort, although access to CTE was not significant in the multivariate models for either cohort. In the ELS cohort, higher or statistically similar percentages of students without access to CTE were academic concentrators than students with access to CTE. This was not the case for the HSLS cohort, where most student subgroups were not statistically different.

Among CTE concentrators and students with CTE access, larger percentages of female students than male students were academic concentrators in ELS (table 14 and table 15). In the ELS cohort, among those with CTE access, 4 percent more female students than male students were academic concentrators, and among CTE concentrators, 6 percent more female students were academic concentrators. In the HSLS cohort, among those with CTE access, 6 percent more female students than male students were academic concentrators.

For both male students and female students in the ELS cohort, a significantly smaller proportion of CTE concentrators were academic concentrators than CTE samplers and CTE nonparticipants. The largest difference is between CTE concentrators and CTE nonparticipants; among female students, 36 percent of CTE nonparticipants were academic concentrators, compared to 23 percent of CTE concentrators. For the most part, similar or smaller (depending on the student characteristic) percentages of students who were CTE samplers, explorers, or concentrators were academic concentrators than CTE nonparticipants. In the ELS cohort, for most groups, similar or larger proportions of students without access to CTE were academic concentrators (Hispanic students are one exception).

Table 14. Percentage of ELS cohort students who were academic concentrators, by access to CTE, CTE participation level, and selected student and school characteristics

		CTE access[a]		CTE participation level[b]			
Student and school characteristics	**Total**	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Sex							
Female	**27.8**	36.7	27.7	35.9	29.2	20.8	22.7
Male	**24.2**	37.7	23.4	33.4	27.6	20.8	17.0
Race/ethnicity[c]							
Asian, non-Hispanic	**43.5**	66.8	41.5	49.4	45.9	35.5	30.8
Black, non-Hispanic	**20.6**	14.0	20.8	21.0	19.8	20.8	22.0
Hispanic	**14.2**	18.6 !	14.9	13.5	15.3	12.3	14.7
White, non-Hispanic	**29.6**	41.3	28.7	43.2	33.7	22.3	19.6
Other, non-Hispanic	**21.1**	28.2 !	19.5	28.5	23.4	19.2	13.6 !
Socioeconomic status (SES) quartile[d]							
Lowest quartile	**13.7**	18.5 !	13.3	20.6	13.6	11.0	12.9
Second quartile	**19.4**	23.1	19.5	25.6	22.9	16.7	12.4
Third quartile	**29.4**	38.9	28.5	35.0	32.1	25.8	23.2
Highest quartile	**42.0**	55.7	41.4	48.5	44.2	32.8	36.1
Disability status[e]							
No disability	**27.7**	39.7	27.2	36.7	30.3	21.9	21.1
Has disability	**5.2**	‡	5.6	11.3 !	3.4 !	4.8 !	4.7 !
English learner status[f]							
Not fluent	**12.9**	‡	12.6	17.7 !	15.1 !	‡	‡
Fluent	**26.5**	37.4	25.9	35.9	28.8	21.3	19.6
Don't know	**14.2**	‡	15.3	15.7 !	20.7	‡	‡
School urbanicity							
Urban	**26.1**	28.3	27.1	28.4	27.4	22.9	23.2
Suburban	**27.2**	41.4	25.9	38.0	29.5	21.8	19.0
Rural	**23.3**	22.2 !	23.3	37.4	27.0	17.0	16.9

See notes at end of table.

Table 14. Percentage of ELS cohort students who were academic concentrators, by access to CTE, CTE participation level, and selected student and school characteristics—continued

! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] Respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site.
[b] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[f] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File..

Table 15. Percentage of HSLS cohort students who were academic concentrators, by access to CTE, CTE participation level, and selected student and school characteristics

		CTE access[a]		CTE participation level[b]			
Student and school characteristics	**Total**	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Sex							
Female	**39.7**	39.6	39.5	41.2	40.4	40.6	34.7
Male	**33.5**	36.3	33.0	31.9	35.3	33.8	31.0
Race/ethnicity[c]							
Asian, non-Hispanic	**60.4**	72.7	56.5	63.2	59.1	57.0	61.1
Black, non-Hispanic	**35.1**	38.8 !	35.5	31.6	32.0	46.8	34.4 !
Hispanic	**30.6**	27.0 !	31.1	21.9	32.0	36.0	34.2
White, non-Hispanic	**38.9**	39.5	38.3	44.0	42.3	35.9	30.5
Other, non-Hispanic	**30.8**	32.6	29.9	38.0	28.9	26.2	32.3
Socioeconomic status (SES) quartile[d]							
Lowest quartile	**22.3**	26.8	22.3	19.5	22.9	24.1	22.9
Second quartile	**31.0**	41.5	30.5	30.0	30.8	36.0	26.4
Third quartile	**37.7**	27.2	37.0	41.6	39.8	33.7	33.7
Highest quartile	**55.7**	57.9	55.6	56.5	57.0	55.2	51.3
Disability status[e]							
No disability	**38.8**	39.4	38.5	39.0	39.9	39.1	35.5
Has disability	**17.3**	23.6	16.8	20.2	19.8	14.7	11.8
English learner status[f]							
Currently ELL	**27.3**	47.4	21.7	24.1	27.7	32.1	27.0
Not currently ELL	**39.2**	‡	38.7	41.9	40.8	37.5	34.4 !
Don't know	**30.6**	24.3 !	30.2	20.8	27.8	55.6	21.4
School urbanicity[g]							
Urban	**40.3**	45.4	40.2	36.1	41.3	43.2	40.7
Suburban	**34.1**	34.7 !	33.3	37.0	35.1	34.3	28.1
Rural	**37.0**	15.9	37.4	39.7	38.6	36.3	32.8

See notes at end of table.

Table 15. Percentage of HSLS cohort students who were academic concentrators, by access to CTE, CTE participation level, and selected student and school characteristics—continued

! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] Respondents are defined as having access to CTE if the school counselor reported that CTE was offered in his or her district or if students were allowed to take Career Clusters, Pathways, or Programs of Study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program.
[b] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in both ELS:2002 and HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[f] Respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.
[g] Respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs.
NOTE: CTE = career and technical education; HSLS = High School Longitudinal Study of 2009. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

The multivariate models show differences in academic concentration for CTE explorers and concentrators between the ELS and HSLS cohorts. Specifically, net of all other student and school characteristics, CTE concentrators and explorers in the ELS cohort were about 6 percentage points less likely than CTE samplers to be academic concentrators (table 16). There was no significant difference in academic concentration by CTE participation level for the HSLS cohort.

Table 16. Average marginal effects of selected student and school characteristics on the probability that students in the ELS and HSLS cohorts were academic concentrators, including level of CTE participation

	ELS cohort				HSLS cohort		
Student and school characteristics	Marginal effect[a]		Standard error	Student and school characteristics	Marginal effect[a]		Standard error
Sex [female]				Sex [female]			
Male	-0.025		0.01	Male	-0.05	***	0.01
Race/ethnicity[b] [white, non-Hispanic]				Race/ethnicity[b] [white, non-Hispanic]			
Asian, non-Hispanic	0.144	***	0.02	Asian, non-Hispanic	0.183	***	0.04
Black, non-Hispanic	-0.047	*	0.02	Black, non-Hispanic	0.016		0.02
Hispanic	-0.102	***	0.02	Hispanic	-0.003		0.02
Other, non-Hispanic	-0.061	*	0.03	Other, non-Hispanic	-0.063	**	0.02
Socioeconomic status (SES) quartile[c] [second quartile]				Socioeconomic status (SES) quartile[c] [second quartile]			
Lowest quartile	-0.035	*	0.01	Lowest quartile	-0.09	***	0.02
Third quartile	0.095	***	0.02	Third quartile	0.066	***	0.02
Highest quartile	0.187	***	0.02	Highest quartile	0.221	***	0.02
Disability status[d] [no disability]				Disability status[d] [no disability]			
Has disability	-0.21	***	0.02	Has disability	-0.185	***	0.02
English learner status[e] [fluent]				English learner status[e] [not currently ELL]			
Not fluent	-0.072		0.04	Currently ELL	-0.05		0.05
Don't know	-0.025		0.05	Don't know	-0.076	***	0.02
School urbanicity[f] [suburban]				School urbanicity[f] [suburban]			
Urban	0.012		0.02	Urban	0.073	**	0.02
Rural	-0.016		0.02	Rural	0.03		0.02
CTE access[g] [has CTE access]				CTE access[g] [has CTE access]			
No CTE access	0.062		0.03	No CTE access	-0.003		0.04
Access unknown	-0.019		0.03	Access unknown	0.013		0.03
CTE participation level[h] [samplers]				CTE participation level[h] [samplers]			
Nonparticipants	0.033		0.02	Nonparticipants	-0.013		0.02
Explorers	-0.064	***	0.02	Explorers	0.006		0.02
Concentrators	-0.063	**	0.02	Concentrators	-0.031		0.02
Sample size (N)	12,657		†	Sample Size (N)	20,658		†

See notes at end of table.

Table 16. Average marginal effects of selected student and school characteristics on the probability that students in the ELS and HSLS cohorts were academic concentrators, including level of CTE participation—continued

† Not applicable.
* p < 0.05; ** p < 0.01; *** p < 0.001.
[a] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are logistic regression models.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in both ELS:2002 and HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[d] For the ELS cohort, respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities. For the HSLS cohort, respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[e] For the ELS cohort, respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent. For the HSLS cohort, respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.
[f] For the HSLS cohort, respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs.
[g] For the ELS cohort, respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site. For the HSLS cohort, respondents are defined as having access to CTE if the school counselor reported that CTE was offered in his or her district or if students were allowed to take Career Clusters, Pathways, or Programs of Study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program.
[h] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
NOTES: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language. The category in brackets for each characteristic is the reference category.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

On-Time High School Graduation

Compared to CTE nonparticipants, descriptively, the percentages of CTE concentrators who graduated from high school on time were higher or not significantly different for all student groups in both the ELS and HSLS cohorts (table 17 and table 18). In the multivariate models, there were statistically significant gaps in the average predicted probability of graduating on time for students in the ELS and HSLS cohorts with and without accounting for CTE participation — although there was some difference in demographic characteristics between the two cohorts (see table 19).

Descriptively, the gaps in the graduation rates between student groups did not increase — they were either lower or similar — among the CTE concentrators than among the CTE nonparticipants, depending on the demographic characteristic being examined. For example, in the ELS cohort, 79 percent[20] of CTE nonparticipants from the lowest SES group graduated on time, compared to 98 percent of students from the highest SES group, an 18 percentage point difference (table 17). Among CTE concentrators, 91 percent of students from the lowest SES quartile and 96 percent of students from the highest graduated high school on time, a 5 percentage point difference. Similarly, in the HSLS cohort, the gap for CTE nonparticipants was 25 percentage points between the lowest and highest SES students, and 4 percentage points between the lowest and highest SES students for CTE concentrators (table 18).

[20] The value of 79 percent appears in table 4 as 79.5. See Rule 3 under the subsection "Rounding" in Appendix A.

Table 17. Percentage of ELS cohort students who had graduated on time, by access to CTE, CTE participation level, and selected student and school characteristics

		CTE access[a]		CTE participation level[b]			
Student and school characteristics	**Total**	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Sex							
Female	**94.2**	94.8	94.5	93.4	93.4	95.1	96.1
Male	**90.4**	95.2	90.5	85.9	89.1	91.8	93.7
Race/ethnicity[c]							
Asian, non-Hispanic	**94.8**	95.9	95.4	91.1	94.6	97.6	98.6
Black, non-Hispanic	**87.3**	92.6	87.0	80.0	86.4	91.5	89.7
Hispanic	**85.7**	95.2	86.7	81.8	85.8	86.6	89.2
White, non-Hispanic	**95.4**	95.4	95.3	95.3	94.8	95.7	96.4
Other, non-Hispanic	**88.2**	93.6	87.0	87.3	86.2	85.7	95.5
Socioeconomic status (SES) quartile[d]							
Lowest quartile	**87.2**	86.9	88.0	79.5	85.2	91.2	91.3
Second quartile	**91.5**	93.1	92.1	87.9	90.5	91.9	95.3
Third quartile	**94.2**	98.0	93.7	91.6	94.0	94.5	96.6
Highest quartile	**96.4**	97.6	96.1	97.5	95.7	96.5	96.2
Disability status[e]							
No disability	**92.9**	95.9	93.0	91.7	92.1	93.5	95.2
Has disability	**85.4**	83.1	86.1	76.0	82.8	91.0	90.2
English learner status[f]							
Not fluent	**80.3**	98.9	77.7	69.7	80.7	83.1	98.5
Fluent	**92.7**	95.2	92.9	91.5	91.8	93.7	94.7
Don't know	**81.1**	57.1 !	83.2	74.8	82.4	78.7	89.4
School urbanicity							
Urban	**88.7**	92.8	89.9	85.1	87.8	90.3	93.9
Suburban	**93.2**	95.9	92.8	92.0	92.5	93.9	95.1
Rural	**94.5**	91.8	94.6	95.7	94.0	94.5	94.5

See notes at end of table.

Table 17. Percentage of ELS cohort students who had graduated on time, by access to CTE, CTE participation level, and selected student and school characteristics—continued

! Interpret data with caution. Standard error is 5 percentage points or greater.
[a] Respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site.
[b] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[f] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. Respondents are counted as having graduated on time if they received a high school diploma between fall 2003 and summer 2004.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table 18. Percentage of HSLS cohort students who had graduated on time, by access to CTE, CTE participation level, and selected student and school characteristics

		CTE access[a]		CTE participation level[b]			
Student and school characteristics	**Total**	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Sex							
Female	**93.9**	94.0	94.0	89.9	94.9	94.3	96.7
Male	**90.9**	94.0	90.9	82.1	90.8	94.0	95.8
Race/ethnicity[c]							
Asian, non-Hispanic	**93.4**	100.0	92.9	93.7	93.1	93.2	93.6
Black, non-Hispanic	**89.3**	91.1	89.1	77.7	90.1	92.4	96.7
Hispanic	**90.0**	89.8	89.8	80.1	92.3	92.5	96.8
White, non-Hispanic	**94.6**	98.1	94.6	91.6	94.6	95.8	96.3
Other, non-Hispanic	**89.7**	92.7	90.3	85.9	89.7	90.4	94.1
Socioeconomic status (SES) quartile[d]							
Lowest quartile	**85.0**	88.5	84.9	71.0	87.0	89.1	93.6
Second quartile	**92.7**	98.0	93.1	87.9	91.6	95.7	96.6
Third quartile	**94.1**	94.8	93.8	91.5	94.1	93.8	97.4
Highest quartile	**97.6**	95.7	97.7	96.1	98.4	97.7	97.4
Disability status[e]							
No disability	**93.0**	94.8	93.1	87.4	93.6	94.3	96.7
Has disability	**87.2**	84.1	87.0	78.7	86.2	92.6	92.4
English learner status[f]							
Currently ELL	**89.9**	97.4	89.6	70.6	95.6	98.1	93.9
Not currently ELL	**93.6**	93.9	93.5	90.1	93.9	94.1	96.6
Don't know	**86.6**	93.8	85.4	81.3	82.9	96.6	94.3
School urbanicity[g]							
Urban	**91.5**	92.8	91.8	84.8	92.9	92.6	96.3
Suburban	**91.8**	94.5	91.4	85.7	92.3	94.0	95.3
Rural	**94.8**	98.2 !	95.0	92.0	94.1	95.6	97.6

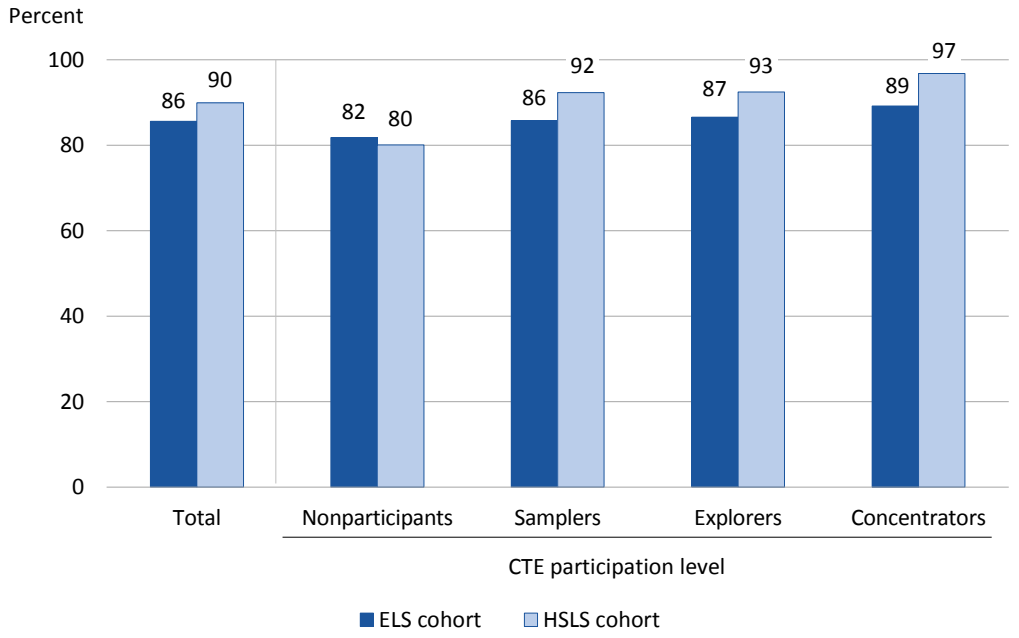
See notes at end of table.

Table 18. Percentage of HSLS cohort students who had graduated on time, by access to CTE, CTE participation level, and selected student and school characteristics—continued

! Interpret data with caution. Standard error is 5 percentage points or greater.
[a] Respondents are defined as having access to CTE if the school counselor reported that CTE was offered in his or her district or if students were allowed to take Career Clusters, Pathways, or Programs of Study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program.
[b] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[f] Respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.
[g] Respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs.
NOTE: CTE = career and technical education; HSLS = High School Longitudinal Study of 2009. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. Respondents are counted as having graduated on time if they received a high school diploma between fall 2012 and summer 2013.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

For most student groups, the proportion of students graduating from high school on time was similar for the two cohorts. However, this was not true for Hispanic CTE samplers, explorers, and concentrators in the HSLS cohort, who had higher on-time graduation rates than those in the ELS cohort (Figure 11).

Figure 11. Among Hispanic students in the ELS and HSLS cohorts, percentage who had graduated from high school on time, by CTE participation level



NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. Hispanic includes Latino. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. ELS cohort respondents are counted as having graduated on time if they received a high school diploma between fall 2003 and summer 2004, and HSLS cohort respondents are counted as having graduated on time if they received a high school diploma between fall 2012 and summer 2013. Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status. Figure bars with the same displayed estimate differ in height because bar height is based on underlying unrounded estimates while the displayed estimates are rounded.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

In the multivariate models, the difference between the two cohorts remains; additionally, significant differences in graduation rates among student subgroups remain after accounting for student and school characteristics. For both the ELS and HSLS cohorts, adding CTE participation to the model does not reduce the predicted differences in on-time graduation for the average student (table 19). For CTE participants in the ELS cohort, there are no significant differences by disability status, English learner status, and urbanicity in on-time high school graduation. Differences by race/ethnicity: compared to white students, Black and Hispanic students were 5 percent less likely to graduate on time. CTE participants from the highest SES quartile are 3 percent more likely than CTE participants from the second quartile to graduate on time. This is not the case for CTE participants in the HSLS cohort, where compared with white students, there is no significant difference in on-time high school graduation for Asian, black, and Hispanic students (controlling for other student and school characteristics); and CTE participants from the lowest and highest SES quartiles have 4 percent lower and 3 percent higher probabilities, respectively, of graduating on time than CTE participants from the second quartile.

Table 19. Average marginal effects of selected student and school characteristics on the probability that students in the ELS and HSLS cohorts graduated on time, including level of CTE participation

	ELS cohort						HSLS cohort					
	CTE participants		All students		All students		CTE participants		All students		All students	
Student and school characteristics	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error
Sex [female]												
Male	-0.030 ***	0.01	-0.03 ***	0.01	-0.034 ***	0.01	-0.021 **	0.01	-0.025 ***	0.01	-0.028 ***	0.01
Race/ethnicity[b] [white, non-Hispanic]												
Asian, non-Hispanic	0.008	0.02	-0.006	0.02	0	0.01	-0.037	0.03	-0.032	0.02	-0.023	0.02
Black, non-Hispanic	-0.049 ***	0.01	-0.047 ***	0.01	-0.045 ***	0.01	-0.018	0.01	-0.032 **	0.01	-0.027 *	0.01
Hispanic	-0.045 **	0.01	-0.045 ***	0.01	-0.038 **	0.01	0.003	0.01	-0.008	0.01	0.001	0.01
Other, non-Hispanic	-0.061 **	0.02	-0.061 **	0.02	-0.057 **	0.02	-0.031	0.02	-0.035 *	0.02	-0.031 *	0.02
Socioeconomic status (SES) quartile[c] [second quartile]												
Lowest quartile	-0.02	0.01	-0.026 *	0.01	-0.027 *	0.01	-0.04 **	0.01	-0.058 ***	0.01	-0.057 ***	0.01
Third quartile	0.013	0.01	0.01	0.01	0.012	0.01	0.005	0.01	0.006	0.01	0.007	0.01
Highest quartile	0.025 *	0.01	0.032 ***	0.01	0.036 ***	0.01	0.032 ***	0.01	0.03 ***	0.01	0.033 ***	0.01
Disability status[d] [no disability]												
Has disability	-0.019	0.01	-0.025	0.01	-0.025	0.01	-0.025 *	0.01	-0.026 *	0.01	-0.027 *	0.01
English learner status[e] [fluent]												
Not fluent	-0.007	0.03	-0.031	0.02	-0.025	0.02	0.029 *	0.01	0.004	0.02	0.002	0.02
Don't know	-0.021	0.03	-0.024	0.03	-0.025	0.03	-0.014	0.01	-0.029 **	0.01	-0.026 **	0.01
School urbanicity[f] [suburban]												
Urban	-0.018	0.01	-0.022	0.01	-0.017	0.01	-0.001	0.01	0	0.01	0.002	0.01
Rural	0.003	0.01	0.011	0.01	0.008	0.01	0.017	0.01	0.027 **	0.01	0.023 *	0.01

See notes at end of table.

Table 19. Average marginal effects of selected student and school characteristics on the probability that students in the ELS and HSLS cohorts graduated on time, including level of CTE participation—continued

	ELS cohort						HSLS cohort					
	CTE participants		All students		All students		CTE participants		All students		All students	
Student and school characteristics	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error
Academic concentrator[g]												
[not an academic concentrator]												
Academic concentrator	0.077 ***	0.01	0.082 ***	0.01	0.083 ***	0.01	0.064 ***	0.01	0.086 ***	0.01	0.086 ***	0.01
CTE access[h]												
[has CTE access]												
No CTE access	-0.011	0.03	-0.008	0.02	-0.003	0.02	0.009	0.02	0.019	0.02	0.018	0.02
Access unknown	0.004	0.01	-0.003	0.01	0	0.01	-0.002	0.02	-0.005	0.02	-0.002	0.02
CTE participation level[i]												
[samplers]												
Nonparticipants	†	†	†	†	-0.015	0.01	†	†	†	†	-0.061 ***	0.01
Explorers	0.034 ***	0.01	†	†	0.033 ***	0.01	0.012	0.01	†	†	0.011	0.01
Concentrators	0.039 ***	0.01	†	†	0.039 ***	0.01	0.036 ***	0.01	†	†	0.035 ***	0.01
Sample size (N)	8,125	†	12,657	†	12,657	†	9,061	†	20,658	†	20,658	†

† Not applicable.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

[a] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are logistic regression models.

[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.

[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in both ELS:2002 and HSLS:09 are divided into quartiles based on weighted distributions of the variables.

[d] For the ELS cohort, respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities. For the HSLS cohort, respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).

[e] For the ELS cohort, respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent. For the HSLS cohort, respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.

[f] For the HSLS cohort, respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs. [g] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.

Table 19. Average marginal effects of selected student and school characteristics on the probability that students in the ELS and HSLS cohorts graduated on time, including level of CTE participation—continued

[h] For the ELS cohort, respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site. For the HSLS cohort, respondents are defined as having access to CTE if the school counselor reported that CTE was offered in his or her district or if students were allowed to take Career Clusters, Pathways, or Programs of Study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program.

[i] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.

NOTES: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. ELS cohort respondents are counted as having graduated on time if they received a high school diploma between fall 2003 and summer 2004, and HSLS cohort respondents are counted as having graduated on time if they received a high school diploma between fall 2012 and summer 2013. The category in brackets for each characteristic is the reference category.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Enrollment in Postsecondary Education

With regard to the ELS cohort, in contrast to the patterns seen in the descriptive results for on-time graduation, in which generally larger percentages of CTE concentrators graduated on time than did CTE nonparticipants, the pattern in the descriptive results for ever enrolling[21] in postsecondary education reflects a different pattern among some student groups. For some groups, lower percentages of CTE concentrators ever enrolled, compared with CTE nonparticipants. This was the case across the sexes and the highest three SES quartiles: while 95 percent of high-SES CTE nonparticipants had enrolled, 86 percent of high-SES CTE concentrators had, a difference of about 10 percentage points (table 20). However, this pattern of higher enrollment among CTE nonparticipants did not hold for most racial/ethnic groups, with the exception of white students, among whom 72 percent of CTE concentrators, but 92 percent of CTE nonparticipants, ever enrolled in postsecondary education.

The multivariate models reflect the pattern seen among male students, female students, white students, and the three highest SES quartiles in the descriptive statistics: even controlling for all other student and school characteristics, CTE concentrators are less likely than CTE samplers to ever enroll. Among both the CTE participant sample and the sample of all students, having a CTE concentration is associated with a 4 percent lower predicted probability of ever enrolling in postsecondary education (table 21).

[21] The term "ever enrolled" refers to ELS cohort members who reported having ever been enrolled in a postsecondary institution at any point between 2002 and 2006.

Table 20. Percentage of the ELS cohort who had ever enrolled in postsecondary education, by access to CTE, CTE participation level, and selected student and school characteristics

		CTE access[a]		CTE participation level[b]			
Student and school characteristics	**Total**	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Sex							
Female	**82.2**	86.7	81.6	88.2	82.0	80.0	78.0
Male	**75.6**	84.0	75.4	78.9	78.6	77.9	66.3
Race/ethnicity[c]							
Asian, non-Hispanic	**89.5**	93.7	89.3	86.3	91.1	91.7	84.5
Black, non-Hispanic	**76.5**	92.1	74.4	77.6	75.9	80.1	72.7
Hispanic	**69.5**	82.8	69.6	64.0	72.9	68.7	67.7
White, non-Hispanic	**82.1**	84.4	82.0	91.7	83.9	81.3	71.7
Other, non-Hispanic	**66.6**	77.8	63.8	80.3	67.0	61.6	61.9
Socioeconomic status (SES) quartile[d]							
Lowest quartile	**64.5**	66.4	64.0	63.4	68.3	65.8	56.4
Second quartile	**73.2**	76.7	72.4	80.0	73.1	75.2	67.3
Third quartile	**83.8**	87.7	83.6	87.4	84.3	83.0	80.4
Highest quartile	**93.3**	97.7	93.2	95.4	94.1	93.7	85.8
Disability status[e]							
No disability	**80.9**	86.6	80.6	87.0	81.7	80.4	74.0
Has disability	**54.7**	70.2	51.6	52.5	62.2	55.2	45.1
English learner status[f]							
Not fluent	**52.8**	70.3 !	53.7	43.6	60.6	51.8	39.6 !
Fluent	**79.9**	85.6	79.3	86.7	81.1	79.5	71.6
Don't know	**61.7**	100.0 !	61.1	42.0	66.8	68.0	67.1
School urbanicity							
Urban	**77.9**	88.1	78.1	77.7	77.1	80.4	77.4
Suburban	**79.6**	86.5	78.6	88.8	81.4	78.8	68.6
Rural	**79.3**	77.7	79.4	86.0	82.6	78.0	71.1

See notes at end of table.

Table 20. Percentage of the ELS cohort who had ever enrolled in postsecondary education, by access to CTE, CTE participation level, and selected student and school characteristics—continued

! Interpret data with caution. Standard error is 5 percentage points or greater.
[a] Respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site.
[b] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in both ELS:2002 and HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[f] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table 21. Average marginal effects of selected student and school characteristics on the probability that students in the ELS cohort ever attended a postsecondary institution

	CTE participants				All students					
	Without CTE concentration		With CTE concentration		Without CTE concentration		With CTE concentration		With CTE concentration	
Student and school characteristics	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error
Sex [female]										
Male	-0.059	0.01	-0.05 ***	0.01	-0.063 ***	0.01	-0.06 ***	0.01	-0.053 ***	0.01
Race/ethnicity[b] [white, non-Hispanic]										
Asian, non-Hispanic	0.114 ***	0.02	0.109 ***	0.02	0.094 ***	0.02	0.091 ***	0.02	0.087 ***	0.02
Black, non-Hispanic	0.004	0.02	0.002	0.02	-0.001	0.02	-0.003	0.02	-0.005	0.02
Hispanic	0.007	0.02	0.002	0.02	-0.005	0.02	-0.008	0.02	-0.013	0.02
Other, non-Hispanic	-0.125 ***	0.03	-0.133 ***	0.03	-0.105 ***	0.03	-0.107 ***	0.03	-0.113 ***	0.03
Socioeconomic status (SES) quartile[c] [second quartile]										
Lowest quartile	-0.055 **	0.02	-0.056 **	0.02	-0.066 ***	0.02	-0.065 ***	0.02	-0.066 ***	0.02
Third quartile	0.103 ***	0.02	0.101 ***	0.02	0.097 ***	0.01	0.095 ***	0.02	0.093 ***	0.02
Highest quartile	0.183 ***	0.02	0.179 ***	0.02	0.179 ***	0.01	0.176 ***	0.02	0.173 ***	0.02
Disability status[d] [no disability]										
Has disability	-0.122 ***	0.02	-0.113 ***	0.02	-0.134 ***	0.02	-0.131 ***	0.02	-0.123 ***	0.02
English learner status[e] [fluent]										
Not fluent	-0.099 *	0.05	-0.094	0.05	-0.099 *	0.04	-0.102 *	0.04	-0.098 *	0.04
Don't know	-0.031	0.04	-0.034	0.04	-0.053	0.04	-0.051	0.04	-0.053	0.04
School urbanicity [suburban]										
Urban	0.006	0.02	0.005	0.02	0	0.02	0	0.02	0	0.02
Rural	0.023	0.02	0.017	0.02	0.015	0.02	0.015	0.01	0.01	0.01
Academic concentrator[f] [not an academic concentrator]										
Academic concentrator	0.205 ***	0.01	0.2 ***	0.01	0.202 ***	0.01	0.201 ***	0.01	0.197 ***	0.01

See notes at end of table.

Table 21. Average marginal effects of selected student and school characteristics on the probability that students in the ELS cohort ever attended a postsecondary institution—continued

	CTE participants				All students					
	Without CTE concentration		With CTE concentration		Without CTE concentration		With CTE concentration		With CTE concentration	
Student and school characteristics	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error
CTE participation level[g] [samplers]										
Nonparticipants	†	†	†	†	†	†	0.002	0.02	†	†
Explorers	0.016	0.02	†	†	†	†	0.014	0.01	†	†
Concentrators	-0.037 *	0.02	†	†	†	†	-0.037 *	0.01	†	†
CTE access[h] [has CTE access]										
No CTE access	0.03	0.02	†	†	0.021	0.02	0.02	0.02	†	†
Access unknown	0.04	0.02	†	†	0.028	0.02	0.026	0.02	†	†
CTE field[i] [did not concentrate in the field]										
Agriculture, food, and natural resources	†	†	0.002	0.04	†	†	†	†	0.004	0.04
Architecture and construction	†	†	-0.057	0.03	†	†	†	†	-0.053	0.03
Arts, A/V technology, and communication	†	†	-0.011	0.05	†	†	†	†	-0.014	0.05
Business management and administration	†	†	-0.013	0.03	†	†	†	†	-0.014	0.03
Education and training	†	†	—	—	†	†	†	†	—	—
Finance	†	†	—	—	†	†	†	†	—	—
Health science	†	†	0.029	0.05	†	†	†	†	0.027	0.04
Hospitality and tourism	†	†	-0.048	0.08	†	†	†	†	-0.045	0.08
Human services	†	†	-0.099 *	0.05	†	†	†	†	-0.096 *	0.05
Information technology	†	†	-0.01	0.03	†	†	†	†	-0.01	0.03
Law, public safety, corrections, and security	†	†	—	—	†	†	†	†	—	—
Manufacturing	†	†	-0.307 ***	0.05	†	†	†	†	-0.298 ***	0.05
Marketing	†	†	0	0.05	†	†	†	†	-0.002	0.05
Science, technology, engineering, and mathematics	†	†	—	—	†	†	†	†	—	—
Transportation	†	†	-0.13 *	0.05	†	†	†	†	-0.124 *	0.05
Small concentrations[j]	†	†	0.102	0.09	†	†	†	†	0.099	0.09

See notes at end of table.

Table 21. Average marginal effects of selected student and school characteristics on the probability that students in the ELS cohort ever attended a postsecondary institution—continued

	CTE participants				All students					
	Without CTE concentration		With CTE concentration		Without CTE concentration		With CTE concentration		With CTE concentration	
Student and school characteristics	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error
Sample size (N)[k]	7,645	†	7,645	†	12,090	†	12,090	†	12,090	†

† Not applicable.
* p < 0.05; ** p < 0.01; *** p < 0.001.
[a] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are logistic regression models.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[d] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[e] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
[f] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
[g] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[h] Respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site.
[i] Unlike the categories listed for other variables, the categories for CTE field are not mutually exclusive with each other, as a student may concentrate in more than one CTE field. The reference category, "did not concentrate in the field," applies to each CTE field individually.
[j] Small concentrations includes education and training; finance; science, technology, engineering, and mathematics; and law, public safety, corrections, and security. A CTE field of study was defined as "small" if its number of concentrators made up less than 3.1 percent of all CTE concentrators; this was the threshold at which the models were able to support marginal effects estimation. The ELS sample included no government and public administration concentrators.
[k] Sample sizes differ from those of other regressions because a number of students in the sample are missing information on postsecondary attendance. Among CTE participants, 480 students are missing postsecondary attendance data, and among all students, 567 students are missing this information.
NOTES: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. The category in brackets for each characteristic is the reference category.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

The ELS cohort multivariate models show that patterns of postsecondary enrollment among CTE participants reflect the patterns of postsecondary enrollment among all students in the ELS cohort. Including controls for CTE access, participation level, and field of study had little effect on the significance of the other variables in the models. For example, across all models, differences between SES quartiles in postsecondary enrollment were significant and consistent, with students from the lowest quartile 6 to 7 percentage points less likely, students from the third quartile 9 to 10 percentage points more likely, and students from the highest quartile 17 or 18 percentage points more likely than students from the second SES quartile to ever enroll, controlling for all other student and school characteristics as well as CTE access, participation level, and field of study (table 21).

Unlike in ELS:2002, information on postsecondary enrollment in HSLS:09 was only available for the fall immediately after an on-time graduation date, rather than two years afterward. As a result, the two cohorts cannot be compared directly with respect to this outcome, although similarities in the results are noted. As with the ELS cohort, the percentages of HSLS students enrolling in postsecondary education do not reflect the cohort's patterns for graduating on time. Instead, the percentages of students enrolling in postsecondary education immediately after high school remained relatively similar for each student and school characteristic across levels of CTE participation and access (table 22).

Table 22. Percentage of the HSLS cohort who had ever enrolled in postsecondary education immediately after high school, by access to CTE, CTE participation level, and selected student and school characteristics

		CTE access[a]		CTE participation level[b]			
Student and school characteristics	**Total**	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Sex							
Female	**83.8**	86.0	83.9	84.2	85.4	81.3	82.2
Male	**75.4**	80.8	74.9	71.7	78.4	77.8	69.7
Race/ethnicity[c]							
Asian, non-Hispanic	**92.8**	90.5	92.6	97.4	92.1	90.8	86.5
Black, non-Hispanic	**77.4**	78.5	76.9	66.5	80.9	79.3	76.6
Hispanic	**78.8**	87.4	78.7	74.4	82.5	76.4	78.5
White, non-Hispanic	**80.0**	81.8	79.8	82.2	82.4	79.5	74.0
Other, non-Hispanic	**76.9**	88.6	77.2	76.6	75.7	82.8	72.4
Socioeconomic status (SES) quartile[d]							
Lowest quartile	**69.7**	70.5	70.1	66.7	73.1	71.5	64.5
Second quartile	**73.7**	78.1	73.4	71.4	76.6	71.9	71.6
Third quartile	**81.4**	88.8	81.0	81.7	82.6	82.3	77.3
Highest quartile	**92.2**	97.2	91.9	92.0	93.1	92.3	89.9
Disability status[e]							
No disability	**81.1**	83.9	81.0	80.3	83.7	80.5	76.9
Has disability	**65.9**	82.3	65.4	66.6	66.0	67.2	64.4
English learner status[f]							
Currently ELL	**79.5**	77.1	79.6	73.4	87.1	83.6	66.2
Not currently ELL	**82.8**	86.2	82.4	84.6	83.9	82.2	78.7
Don't know	**67.2**	‡	69.8	55.7 !	65.1	92.9	54.9
School urbanicity[g]							
Urban	**81.2**	87.5	81.9	77.0	85.4	75.9	80.7
Suburban	**79.9**	81.3	79.3	80.5	81.8	80.4	74.6
Rural	**77.5**	76.3 !	77.2	79.1	77.9	80.6	72.0

See notes at end of table.

Table 22. Percentage of the HSLS cohort who had ever enrolled in postsecondary education immediately after high school, by access to CTE, CTE participation level, and selected student and school characteristics—continued

! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] Respondents are defined as having access to CTE if the school counselor reported that CTE was offered in his or her district or if students were allowed to take Career Clusters, Pathways, or Programs of Study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program.
[b] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in both ELS:2002 and HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[f] Respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.
[g] Respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs.
NOTE: CTE = career and technical education; HSLS = High School Longitudinal Study of 2009. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Overall, accounting for CTE access, participation, and field of study did not affect the association between student and school characteristics and CTE attendance, except in one case. Specifically, while there was not a significant difference between students in the first and second SES quartiles for most of the models, in the model examining all students by access to CTE only students from the lowest SES quartile were less likely to attend postsecondary education than students from the second SES quartile. Generally, the significance and magnitude of difference were fairly stable across models, even when adding controls for CTE access, participation type, and field of study, or when separating out CTE participants. There were some significant differences by CTE field of study: specifically, compared with students who did not concentrate in each respective CTE field, CTE concentrators in architecture (9–10 percentage points), human services (13–14 percentage points), manufacturing (22–23 percentage points), and transportation (8–10 percentage points) were less likely to attend a postsecondary institution immediately after graduating from high school, net of controls. After controlling for school and student characteristics, only business CTE concentrators were more likely than students who did not concentrate in business to attend postsecondary education (by 9 percentage points).

Table 23. Average marginal effects of selected student and school characteristics on the probability that students in the HSLS cohort attended a postsecondary institution immediately following high school

	CTE participants				All students					
	Without CTE concentration		With CTE concentration		Without CTE concentration		Without CTE concentration		With CTE concentration	
Student and school characteristics	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error
Sex [female]										
Male	-0.065 ***	0.01	-0.058 ***	0.01	-0.072 ***	0.01	-0.073 ***	0.01	-0.066 ***	0.01
Race/ethnicity[b] [white, non-Hispanic]										
Asian, non-Hispanic	0.092 ***	0.03	0.087 ***	0.03	0.117 ***	0.02	0.117 ***	0.02	0.112 ***	0.02
Black, non-Hispanic	0.028	0.02	0.027	0.02	0.017	0.02	0.014	0.02	0.013	0.02
Hispanic	0.053 **	0.02	0.048 **	0.02	0.052 ***	0.01	0.051 **	0.02	0.046 **	0.01
Other, non-Hispanic	-0.006	0.02	-0.011	0.02	-0.003	0.02	-0.005	0.02	-0.01	0.02
Socioeconomic status (SES) quartile[c] [second quartile]										
Lowest quartile	-0.04	0.02	-0.039	0.02	-0.041 *	0.02	-0.039	0.02	-0.039	0.02
Third quartile	0.067 ***	0.02	0.067 ***	0.02	0.067 ***	0.01	0.067 ***	0.01	0.066 ***	0.01
Highest quartile	0.152 ***	0.02	0.149 ***	0.02	0.148 ***	0.01	0.148 ***	0.01	0.145 ***	0.01
Disability status[d] [no disability]										
Has disability	-0.072 *	0.03	-0.075 **	0.03	-0.069 **	0.02	-0.069 **	0.02	-0.071 **	0.02
English learner status[e] [not currently ELL]										
Currently ELL	0.024	0.04	0.026	0.04	0.006	0.04	0.004	0.04	0.008	0.04
Don't know	-0.079 ***	0.02	-0.081 ***	0.02	-0.095 ***	0.01	-0.094 ***	0.01	-0.096 ***	0.01
School urbanicity[f] [suburban]										
Urban	0.005	0.02	0.005	0.02	-0.002	0.01	-0.002	0.01	-0.003	0.01
Rural	-0.025	0.01	-0.026	0.01	-0.024 *	0.01	-0.025 *	0.01	-0.024 *	0.01
Academic concentrator[g] [not an academic concentrator]										
Academic concentrator	0.147 ***	0.01	0.142 ***	0.01	0.159 ***	0.01	0.158 ***	0.01	0.154 ***	0.01

See notes at end of table.

Table 23. Average marginal effects of selected student and school characteristics on the probability that students in the HSLS cohort attended a postsecondary institution immediately following high school—continued

	CTE participants				All students					
	Without CTE concentration		With CTE concentration		Without CTE concentration		Without CTE concentration		With CTE concentration	
Student and school characteristics	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error
CTE access[h] [has CTE access]										
No CTE access	0.026	0.02	†	†	0.027	0.02	0.027	0.02	†	†
Access unknown	-0.001	0.02	†	†	-0.01	0.02	-0.009	0.02	†	†
CTE participation level[i] [samplers]										
Nonparticipants	†	†	†	†	†	†	-0.037 *	0.02	†	†
Explorers	-0.01	0.02	†	†	†	†	-0.011	0.02	†	†
Concentrators	-0.034	0.02	†	†	†	†	-0.034	0.02	†	†
CTE field[j] [did not concentrate in the field]										
Agriculture, food, and natural resources	†	†	-0.046	0.03	†	†	†	†	-0.04	0.02
Architecture and construction	†	†	-0.096 **	0.03	†	†	†	†	-0.085 **	0.03
Arts, A/V technology, and communication	†	†	0.064	0.04	†	†	†	†	0.071	0.04
Business management and administration	†	†	0.087 **	0.03	†	†	†	†	0.09 **	0.03
Education and training	†	†	—	—	†	†	†	†	—	—
Finance	†	†	—	—	†	†	†	†	—	—
Health science	†	†	0.004	0.04	†	†	†	†	0.009	0.04
Hospitality and tourism	†	†	-0.001	0.04	†	†	†	†	0.008	0.04
Human services	†	†	-0.137 *	0.06	†	†	†	†	-0.126 *	0.06
Information technology	†	†	-0.005	0.04	†	†	†	†	0	0.04
Law, public safety, corrections, and security	†	†	—	—	†	†	†	†	—	—
Manufacturing	†	†	-0.229 ***	0.07	†	†	†	†	-0.22 ***	0.06
Marketing	†	†	—	—	†	†	†	†	—	—
Science, technology, engineering, and mathematics	†	†	0.015	0.08	†	†	†	†	0.02	0.08
Transportation	†	†	-0.097 *	0.04	†	†	†	†	-0.083 *	0.04
Small concentrations[k]	†	†	-0.02	0.04	†	†	†	†	-0.009	0.04

See notes at end of table.

Table 23. Average marginal effects of selected student and school characteristics on the probability that students in the HSLS cohort attended a postsecondary institution immediately following high school—continued

	CTE participants				All students					
	Without CTE concentration		With CTE concentration		Without CTE concentration		Without CTE concentration		With CTE concentration	
Student and school characteristics	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error
Sample size (N)[l]	8,373	†	8,373	†	19,768	†	19,768	†	19,768	†

— Not available.
† Not applicable.
* p < 0.05; ** p < 0.01; *** p < 0.001.
[a] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are logistic regression models.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[d] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[e] Respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.
[f] Respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs. [g] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
[h] Respondents are defined as having access to CTE if the school counselor reported that CTE was offered in his or her district or if students were allowed to take Career Clusters, Pathways, or Programs of Study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program.
[i] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[j] Unlike the categories listed for other variables, the categories for CTE field are not mutually exclusive with each other, as a student may concentrate in more than one CTE field. The reference category, "did not concentrate in the field," applies to each CTE field individually.
[k] Small concentrations includes education and training; finance; law, public safety, corrections, and security; and marketing. A CTE field of study was defined as "small" if its number of concentrators made up less than 3.1 percent of all CTE concentrators; this was the threshold at which the models were able to support marginal effects estimation. The HSLS sample included no government and public administration concentrators.
[l] Sample sizes differ from those of other regressions because a number of students in the sample are missing information on postsecondary attendance. Among CTE participants, 688 students are missing postsecondary attendance data, and among all students, 890 students are missing this information.
NOTES: CTE = career and technical education; HSLS = High School Longitudinal Study of 2009. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. The category in brackets for each characteristic is the reference category.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File..

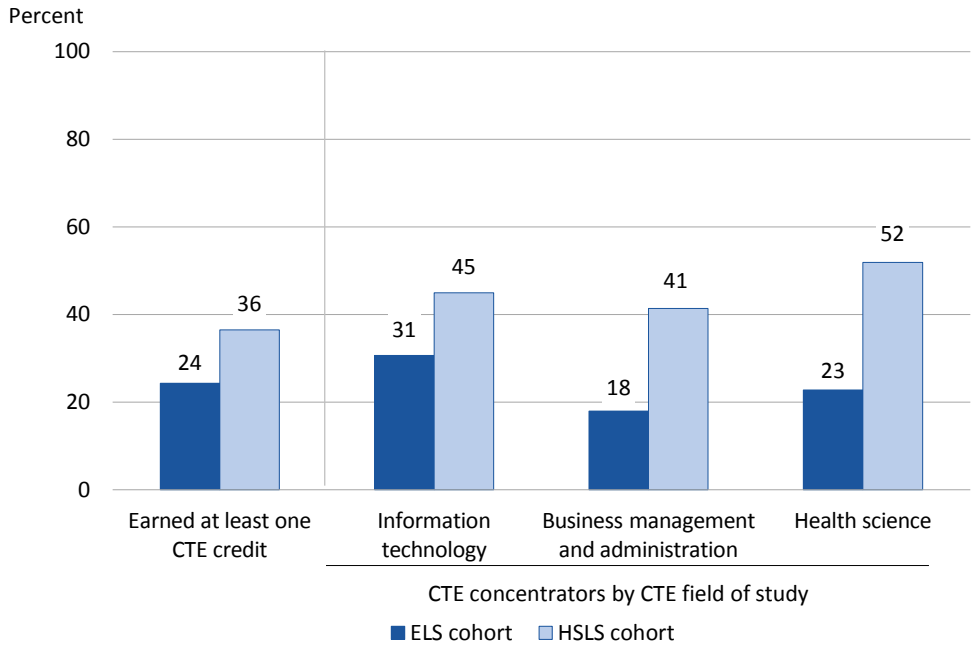
Educational Outcomes by CTE Field of Study

This section focuses on the educational outcomes of students in the ELS and HSLS cohorts by CTE field of study. As noted above, there were disparities in CTE coursetaking by race/ethnicity, class, socioeconomic status, and school urbanicity. The findings discussed here are descriptive and associative results of the relationships between CTE participation and field of study on educational outcomes. These findings should be considered in the context of the varied student populations by CTE field of study. Thus the results below cannot fully account for the precise relationships between student participation in CTE, characteristics and outcomes; they provide information on the associations as observed. These outcomes would all benefit from additional research taking selection into CTE fields of study into account.

Academic Concentration

As discussed above, the percentage of students who were academic concentrators increased between the ELS and HSLS cohorts. The increase was significant for the CTE fields of IT, business, health science, hospitality and tourism, and transportation, as shown in figure 12, although differences were large across most other CTE fields of study as well. However, there are wide differences between CTE fields of study in the percentage who academically concentrate: for the ELS cohort, the percentage of students who were academic concentrators ranged from almost 40 percent to lower than 10 percent (table 24). For the HSLS cohort, the percentage of students who were academic concentrators ranged from 61 percent for STEM to 11 percent for human services (table 25).

Figure 12. Among ELS and HSLS cohort students who had earned at least one CTE credit or who had concentrated in a CTE field, percentage who were academic concentrators, by selected CTE field



NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status. A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language. CTE fields of study are coded based on categories in the SCED taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table 24. Percentage of students in the ELS cohort who achieved selected educational outcomes, by CTE participation level and CTE field of study

CTE participation[a] and CTE field of study	Academic concentration[b]	On-time high school graduation[c]	Ever enrolled in postecondary education
All CTE participants	**24.3**	**92.7**	**78.0**
CTE concentrators by CTE field of study[d]			
Agriculture, food, and natural resources	13.7	93.0	71.4
Architecture and construction	14.0	96.4	62.3
Arts, A/V technology, and communication	36.5	97.7	82.0
Business management and administration	18.0	95.1	78.2
Education and training	‡	100.0 !	100.0
Finance	‡	96.5	86.6
Government and public administration	#	#	#
Health science	22.8	95.2	82.6
Hospitality and tourism	‡	89.4	63.1
Human services	7.9 !	94.0	66.9
Information technology	30.7	95.4	77.0
Law, public safety, corrections, and security	‡	59.6 !	65.1
Manufacturing	8.5	91.3	34.3
Marketing	20.3	98.4	76.8
Science, technology, engineering, and mathematics	‡	100.0	100.0
Transportation	‡	91.0	44.8

Rounds to zero.
! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[b] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
[c] Respondents are counted as having graduated on time if they received a high school diploma between fall 2003 and summer 2004.
[d] CTE fields of study are coded based on categories in the SCED taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table 25. Percentage of students in the HSLS cohort who achieved selected educational outcomes, by CTE participation level and CTE field of study

CTE participation[a] and CTE field of study	Academic concentration[b]	On-time high school graduation[c]	Enrolled in postsecondary institution immediately following high school
All CTE participants	**36.5**	**94.0**	**79.9**
CTE concentrators by CTE field of study[d]			
Agriculture, food, and natural resources	18.9	97.6	68.5
Architecture and construction	18.5	94.5	59.4
Arts, A/V technology, and communication	33.6	97.4	85.7
Business management and administration	41.4	98.0	89.6
Education and training	‡	97.7	93.6
Finance	55.7 !	100.0	99.2
Government and public administration	#	#	#
Health science	51.9	98.4	85.5
Hospitality and tourism	21.7 !	87.7	77.9
Human services	11.4 !	96.4	64.8
Information technology	45.0	91.6	80.6
Law, public safety, corrections, and security	‡	92.8	53.1
Manufacturing	15.0 !	97.2	43.5
Marketing	34.5	100.0	71.9
Science, technology, engineering, and mathematics	61.1	97.3	85.2
Transportation	18.9 !	96.7	56.2

Rounds to zero.
! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[b] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
[c] Respondents are counted as having graduated on time if they received a high school diploma between fall 2012 and summer 2013.
[d] CTE fields of study are coded based on categories in the SCED taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
NOTE: CTE = career and technical education; HSLS = High School Longitudinal Study of 2009. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

The multivariate table shows that, in both cohorts, CTE concentrators in the following CTE fields were less likely than students who did not concentrate in these CTE fields to be academic concentrators: agriculture, hospitality, human services, and manufacturing, controlling for student and school characteristics (table 26). Net of student and school characteristics, only health science and STEM CTE concentrators in the HSLS cohort had a

higher probability of being academic concentrators than did students who did not concentrate in health science or STEM (by 10 and 22 percentage points, respectively).

Table 26. Average marginal effects of selected student and school characteristics on the probability that students in the ELS and HSLS cohorts were academic concentrators, including CTE field of study

	ELS cohort				HSLS cohort		
Student and school characteristics	Marginal effect[a]		Standard error	Student and school characteristics	Marginal effect[a]		Standard error
Sex [female]				Sex [female]			
Male	-0.029	*	0.01	Male	-0.046	***	0.01
Race/ethnicity[b] [white, non-Hispanic]				Race/ethnicity[b] [white, non-Hispanic]			
Asian, non-Hispanic	0.146	***	0.03	Asian, non-Hispanic	0.165	***	0.04
Black, non-Hispanic	-0.054	*	0.02	Black, non-Hispanic	0.011		0.02
Hispanic	-0.105	***	0.02	Hispanic	-0.007		0.02
Other, non-Hispanic	-0.061	*	0.03	Other, non-Hispanic	-0.069	**	0.02
Socioeconomic status (SES) quartile[c] [second quartile]				Socioeconomic status (SES) quartile[c] [second quartile]			
Lowest quartile	-0.037	*	0.01	Lowest quartile	-0.09	***	0.02
Third quartile	0.095	***	0.02	Third quartile	0.065	***	0.02
Highest quartile	0.189	***	0.02	Highest quartile	0.21	***	0.02
Disability status[d] [no disability]				Disability status[d] [no disability]			
Has disability	-0.207	***	0.02	Has disability	-0.186	***	0.02
English learner status[e] [fluent]				English learner status[e] [not currently ELL]			
Not fluent	-0.07		0.04	Currently ELL	-0.044		0.05
Don't know	-0.02		0.05	Don't know	-0.075	***	0.02
School urbanicity[f] [suburban]				School urbanicity[f] [suburban]			
Urban	0.015		0.02	Urban	0.07	**	0.02
Rural	-0.021		0.02	Rural	0.034		0.02

See notes at end of table.

Table 26. Average marginal effects of selected student and school characteristics on the probability that students in the ELS and HSLS cohorts were academic concentrators, including CTE field of study—continued

	ELS cohort			HSLS cohort	
Student and school characteristics	Marginal effect[a]	Standard error	Student and school characteristics	Marginal effect[a]	Standard error
CTE field[g] [did not concentrate in the field]			CTE field[g] [did not concentrate in the field]		
Agriculture, food, and natural resources	-0.083 *	0.04	Agriculture, food, and natural resources	-0.155 ***	0.03
Architecture and construction	-0.056	0.03	Architecture and construction	-0.146 ***	0.03
Arts, A/V technology, and communication	0.062	0.04	Arts, A/V technology, and communication	-0.021	0.04
Business management and administration	-0.088 *	0.04	Business management and administration	0.055	0.06
Education and training	—	—	Education and training	—	—
Finance	—	—	Finance	—	—
Health science	-0.03	0.06	Health science	0.102 *	0.04
Hospitality and tourism	-0.202 ***	0.05	Hospitality and tourism	-0.125 *	0.06
Human services	-0.169 ***	0.04	Human services	-0.248 ***	0.04
Information technology	0.054	0.04	Information technology	0.076	0.05
Law, public safety, corrections, and security	—	—	Law, public safety, corrections, and security	—	—
Manufacturing	-0.183 ***	0.05	Manufacturing	-0.186 ***	0.05
Marketing	-0.042	0.05	Marketing	—	—
Science, technology, engineering, and mathematics	—	—	Science, technology, engineering, and mathematics	0.221 ***	0.07
Transportation	-0.204 ***	0.04	Transportation	-0.094	0.07
Small concentrations[h]	0.058	0.11	Small concentrations[h]	-0.097 *	0.04
Sample size (N)	12,657	†	Sample Size (N)	20,658	†

* See notes at end of table.

Table 26. Average marginal effects of selected student and school characteristics on the probability that students in the ELS and HSLS cohorts were academic concentrators, including CTE field of study—continued

— Not available.
† Not applicable.
* p < 0.05; ** p < 0.01; *** p < 0.001.
[a] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are logistic regression models.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in both ELS:2002 and HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[d] For the ELS cohort, respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities. For the HSLS cohort, respondents are defined as having a disability if they had an IEP, if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and Attention Deficit Disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[e] For the ELS cohort, respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent. For the HSLS cohort, respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.
[f] For the HSLS cohort, respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs.
[g] Unlike the categories listed for other variables, the categories for CTE field are not mutually exclusive with each other, as a student may concentrate in more than one CTE field. The reference category, "did not concentrate in the field," applies to each CTE field individually.
[h] For the ELS cohort, Small concentrations includes education and training; finance; science, technology, engineering, and mathematics; and law, public safety, corrections, and security. For the HSLS cohort, Small concentrations includes education and training; finance; law, public safety, corrections, and security; and marketing. A CTE field of study was defined as "small" if its number of concentrators made up less than 3.1 percent of all CTE concentrators; this was the threshold at which the models were able to support marginal effects estimation. The ELS and HSLS samples included no government and public administration concentrators.
NOTES: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language. The category in brackets for each characteristic is the reference category.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

On-Time High School Graduation

Based on descriptive results in table 24 and table 25, there is very little variation in the on-time graduation rate between the two cohorts by CTE field of study, as well as between CTE fields of study within each cohort. However, a significantly larger percentage of ELS students who concentrated in marketing graduated on time, compared to students in the ELS cohort who concentrated in agriculture, hospitality and tourism, manufacturing, and transportation.

Similarly, controlling for student and school characteristics, students in the ELS cohort who concentrated in marketing, as well as those concentrating in architecture, arts, and health science, had higher predicted probabilities of graduating on time than those not concentrating in those CTE fields (table 27). Among students in the HSLS cohort, the descriptive results show that the percentage of IT concentrators who graduated on time was 92 percent, significantly lower than that of students concentrating in the CTE fields of agriculture (98 percent), business (98 percent), finance (100 percent), health science (98 percent), and marketing (100 percent). However, when all student and school characteristics were accounted for in the multivariate models, students concentrating in IT did not have a probability of graduating on time that was significantly different from those who did not concentrate in IT.

Table 27. Average marginal effects of selected student and school characteristics on the probability that students in the ELS and HSLS cohorts graduated on time, including CTE field of study

	ELS cohort					HSLS cohort			
	CTE participants		All students			CTE participants		All students	
Student and school characteristics	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Student and school characteristics	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error
Sex [female]					Sex [female]				
Male	-0.028 ***	0.01	-0.032 ***	0.01	Male	-0.021 *	0.01	-0.025 ***	0.01
Race/ethnicity[b]					Race/ethnicity[b]				
[white, non-Hispanic]					[white, non-Hispanic]				
Asian, non-Hispanic	0.005	0.02	-0.003	0.02	Asian, non-Hispanic	-0.035	0.03	-0.025	0.02
Black, non-Hispanic	-0.05 ***	0.02	-0.046 ***	0.01	Black, non-Hispanic	-0.019	0.01	-0.028 *	0.01
Hispanic	-0.047 ***	0.01	-0.041 ***	0.01	Hispanic	0.002	0.01	-0.004	0.01
Other, non-Hispanic	-0.065 **	0.02	-0.06 **	0.02	Other, non-Hispanic	-0.031	0.02	-0.03	0.02
Socioeconomic status (SES) quartile[c]					Socioeconomic status (SES) quartile[c]				
[second quartile]					[second quartile]				
Lowest quartile	-0.019	0.01	-0.026 *	0.01	Lowest quartile	-0.042 ***	0.01	-0.061 ***	0.01
Third quartile	0.012	0.01	0.01	0.01	Third quartile	0.005	0.01	0.006	0.01
Highest quartile	0.024 *	0.01	0.034 ***	0.01	Highest quartile	0.031 ***	0.01	0.031 ***	0.01
Disability status[d] [no disability]					Disability status[d] [no disability]				
Has disability	-0.02	0.01	-0.027 *	0.01	Has disability	-0.025 *	0.01	-0.028 *	0.01
English learner status[e] [fluent]					English learner status[e] [not currently ELL]				
Not fluent	-0.008	0.03	-0.03	0.02	Currently ELL	0.028 *	0.01	0.002	0.02
Don't know	-0.019	0.03	-0.024	0.03	Don't know	-0.014	0.01	-0.028 ***	0.01
School urbanicity[f] [suburban]					School urbanicity[f] [suburban]				
Urban	-0.019	0.01	-0.02	0.01	Urban	-0.002	0.01	0	0.01
Rural	0.007	0.01	0.012	0.01	Rural	0.016	0.01	0.025 **	0.01

See notes at end of table.

Table 27. Average marginal effects of selected student and school characteristics on the probability that students in the ELS and HSLS cohorts graduated on time, including CTE field of study—continued

	ELS cohort					HSLS cohort				
	CTE participants		All students			CTE participants		All students		
Student and school characteristics	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error	Student and school characteristics	Marginal effect[a]	Standard error	Marginal effect[a]	Standard error
Academic concentrator[g] [not an academic concentrator]					Academic concentrator[g] [not an academic concentrator]				
Academic concentrator	0.076 ***	0.01	0.082 ***	0.01	Academic concentrator	0.064 ***	0.01	0.087 ***	0.01
CTE field[h] [did not concentrate in the field]					CTE field[h] [did not concentrate in the field]				
Agriculture, food, and natural resources	-0.009	0.02	-0.003	0.02	Agriculture, food, and natural resources	0.041 ***	0.01	0.055 ***	0.01
Architecture and construction	0.048 ***	0.01	0.052 ***	0.01	Architecture and construction	0.019	0.01	0.032 *	0.01
Arts, A/V technology, and communication	0.047 **	0.02	0.05 **	0.02	Arts, A/V technology, and communication	0.041 **	0.01	0.058 ***	0.01
Business management and administration	0.022	0.02	0.025	0.02	Business management and administration	0.041 **	0.01	0.054 ***	0.01
Education and training	—	—	—	—	Education and training	—	—	—	—
Finance	—	—	—	—	Finance	—	—	—	—
Health science	0.04 *	0.02	0.042 *	0.02	Health science	0.042 ***	0.01	0.057 ***	0.01
Hospitality and tourism	-0.009	0.04	-0.005	0.04	Hospitality and tourism	-0.042	0.04	-0.027	0.03
Human services	0.01	0.04	0.012	0.04	Human services	0.029	0.02	0.045 *	0.02
Information technology	0.01	0.01	0.013	0.01	Information technology	-0.042	0.03	-0.036	0.03
Law, public safety, corrections, and security	—	—	—	—	Law, public safety, corrections, and security	—	—	—	—
Manufacturing	-0.006	0.03	0	0.03	Manufacturing	0.038 *	0.02	0.051 **	0.02
Marketing	0.06 ***	0.01	0.062 ***	0.01	Marketing	—	—	—	—
Science, technology, engineering, and mathematics	—	—	—	—	Science, technology, engineering,	0.026	0.02	0.038	0.02
Transportation	0.029	0.02	0.035 *	0.02	Transportation	0.042 ***	0.01	0.057 ***	0.01
Small concentrations[i]	-0.079	0.1	-0.08	0.1	Small concentrations[i]	0.042 ***	0.01	0.058 ***	0.01
Sample size (N)	8,125	†	12,657	†	Sample Size (N)	9,061	†	20,658	†

See notes at end of table.

Table 27. Average marginal effects of selected student and school characteristics on the probability that students in the ELS and HSLS cohorts graduated on time, including CTE field of study—continued

— Not available.
† Not applicable.
* p < 0.05; ** p < 0.01; *** p < 0.001.
[a] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are logistic regression models.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in both ELS:2002 and HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[d] For the ELS cohort, respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities. For the HSLS cohort, respondents are defined as having a disability if they had an IEP, if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[e] For the ELS cohort, respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent. For the HSLS cohort, respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.
[f] For the HSLS cohort, respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs. [g] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
[h.] Unlike the categories listed for other variables, the categories for CTE field are not mutually exclusive with each other, as a student may concentrate in more than one CTE field. The reference category, "did not concentrate in the field," applies to each CTE field individually.
[i] For the ELS cohort, Small concentrations includes education and training; finance; science, technology, engineering, and mathematics; and law, public safety, corrections, and security. For the HSLS cohort, Small concentrations includes education and training; finance; law, public safety, corrections, and security; and marketing. A CTE field of study was defined as "small" if its number of concentrators made up less than 3.1 percent of all CTE concentrators; this was the threshold at which the models were able to support marginal effects estimation. The ELS and HSLS samples included no government and public administration concentrators.
NOTES: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school. ELS cohort respondents are counted as having graduated on time if they received a high school diploma between fall 2003 and summer 2004, and HSLS cohort respondents are counted as having graduated on time if they received a high school diploma between fall 2012 and summer 2013. The category in brackets for each characteristic is the reference category.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Postsecondary Enrollment

As with on-time graduation, rates of postsecondary enrollment by CTE field of study differed little between cohorts. However, enrollment varied among the CTE fields of study within each cohort. Significantly lower percentages of ELS students who concentrated in manufacturing or transportation enrolled in postsecondary education than did those in nearly all other CTE fields of study, with 34 percent of manufacturing CTE concentrators and 45 percent of transportation CTE concentrators enrolling (table 24). These patterns held even when student and school characteristics were controlled in the multivariate models. Among both ELS CTE participants and all ELS cohort students, students concentrating in manufacturing were significantly less likely than those not concentrating in manufacturing to enroll in postsecondary education, with a 30–31 percentage point gap in the average predicted probability of enrolling. Students concentrating in the CTE fields of human services and transportation were also less likely to enroll (table 21).

Among the CTE fields of study of students in the HSLS cohort, the CTE fields of business, education, and finance had the largest percentages of students enrolling in postsecondary education immediately after high school (90, 94, and 99 percent, respectively), while architecture, human services, law, manufacturing, and transportation had significantly lower percentages of students doing so (44–65 percent) (table 25). These patterns held for both HSLS CTE participants and all HSLS students even when student and school characteristics were controlled in the multivariate models. As in ELS, HSLS students concentrating in manufacturing were significantly less likely than those not concentrating in the field to enroll in postsecondary education, as were students in human services, transportation, and architecture and construction, controlling for all other student and school characteristics. Students in business management and administration were more likely to enroll (table 23).

For all of the educational outcome variables, there were significant differences by CTE field. Yet, the first section of the report details persistent and distinct patterns in student participation by CTE field in both cohorts. Thus, additional research is needed to contextualize to what degree the variation in educational outcomes by CTE fields are related to the CTE fields themselves or the processes by which students enroll in the different CTE fields of study.

CONCLUSION AND IMPLICATIONS

CONCLUSION

Most students in the Education Longitudinal Study of 2002 (ELS:2002) and High School Longitudinal Study of 2009 (HSLS:09) cohorts had access to career and technical education (CTE) in their school or district. There were few differences in CTE participation level, fields of study, and outcomes between the two cohorts. These differences, mostly related to declining participation in CTE, represent small shifts in the overall patterns of CTE participation (see "CTE Access and Participation Levels").

The analyses focused on CTE participation and field of study by student and school characteristics — race/ethnicity, sex, socioeconomic status (SES which includes parent education and family income), and urbanicity of school locale.[22] Altogether, in these analyses of student and school characteristics, there were differences in CTE participation by student and school characteristics both over time and across CTE participation levels and fields of study. Differences between the cohorts were small, although differences between student subgroups persisted. In general, male students were more likely than female students to participate in CTE courses, while students in the highest SES quartile were less likely than those in the second SES quartile to participate in CTE at almost every level of CTE participation. In addition, white students were more likely in some cases to concentrate in CTE than were other racial/ethnic groups.

The most pronounced differences in CTE participation, however, were found at the CTE field of study level: the largest differences in CTE participation were seen when looking across the CTE fields of study (see "Demographics of CTE Participation" and "Demographics of CTE Participants and Concentrators by CTE Field of Study"). Both the descriptive and multivariate analyses show large sex differences in participation in many CTE fields. Participation in CTE by CTE field varied by race/ethnicity and SES for many CTE fields of study. These findings highlight that selection into CTE fields of study varies greatly by student and school characteristics. In terms of the relationship between CTE access and participation and students' educational outcomes, there were few differences in academic concentration, on-time high school graduation, and in early postsecondary

[22] While disability status and English learner status were also of interest, the small size of the disabled and English language learner groups in the samples led to greater uncertainty and suppression of their estimates for confidentiality reasons. Thus, results for these groups are presented but not discussed in detail.

attendance between the two cohorts. While there were some significant differences by CTE field of study, the methods used in this report are not able to identify the distinct causal mechanisms behind these differences. This is an area that requires additional research.

IMPLICATIONS FOR POLICY AND PRACTICE

This report highlights the differences in CTE participation and academic outcomes of high school CTE students for the ELS and HSLS high school cohorts, examining HSLS students at the end of high school and ELS students two years after completing high school. Overall, the differences in CTE participation and CTE field of study are so great that other unobserved factors related to engaging with the different CTE fields likely distort any potential impact of CTE on outcomes.

As discussed in the conclusion, there were small differences by student and school characteristics in predicting CTE participation generally, and large differences in predicting CTE participation by CTE field of study. Since CTE participation by CTE field of study varies dramatically across student and school characteristics, this suggests that, at the district (county or state), school, and student level, decision-making around student participation in CTE should be examined. This includes which CTE courses are offered on- and off-site, the barriers to accessing CTE courses, how information about these courses gets shared with students, and student counseling concerning CTE courses.

Although this report found evidence of general access to CTE, these data do not include information about which CTE fields of study are offered at the school or district level. Thus an open question for future research, as well as for practice and policy, is about student and school-level access to CTE fields of study. For example, if students systematically have less access to courses in the science, technology, engineering, and mathematics (STEM) field of study due to school-level differences in which schools offer these courses, this could be a part of the disparities in CTE coursetaking in this CTE field. In order to better understand the differences in coursetaking by CTE field of study, schools, districts, and states will need to examine this aspect of access to CTE. This includes analyzing school characteristics and the demographic profile of schools which do and do not offer CTE courses focusing on CTE field of study.

At the school level, the process by which students enroll in CTE coursework deserves additional examination. How students enroll in CTE courses involves more than just student decision-making and includes how administrators, teachers, and counselors do or do not inform, encourage, and discuss CTE courses and opportunities with students. These processes could include subtle and/or overt differences by sex, race/ethnicity, SES, disability

status, or English learner status. Part of this process involves looking at when and where CTE courses are offered to ensure that all students have access to the courses. For example, some populations (like academic concentrators or English learners) may be kept out of CTE courses in some CTE fields of study based on scheduling. Similarly, just as teachers, administrators, and counselors influence students' coursetaking decisions, parents of students may also influence students' coursetaking decisions in the extent to which they discuss and encourage certain academic or career pathways. The knowledge that parents have of certain academic or career paths may vary based on their own demographic characteristics, and these differences in parental knowledge can shape the paths that students consider for themselves. Although some educational outcomes were examined in the analyses, the issues of selection into CTE participation levels generally and CTE fields of study make these associations less useful. Practitioners and policymakers may want to consider that the academic and educational outcomes associated with CTE are not well known because of these selection effects. In investigating differences in CTE access and participation for the four key characteristics of sex, race/ethnicity, SES, and urbanicity of school locale, this report provides a national look at the landscape of CTE coursetaking. Although the findings presented are largely descriptive and associational rather than causal, they lay the groundwork for further monitoring and analysis of data on CTE programs, which will better enable CTE stakeholders to work toward closing gaps in CTE participation, particularly by CTE field.

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APPENDIX A. TECHNICAL APPENDIX

OVERVIEW

The Education Longitudinal Study of 2002 (ELS:2002) high school transcript study base-year and first follow-up surveys gathered information on demographic characteristics and high school educational experiences for a cohort of high school sophomores in 2002. The High School Longitudinal Study of 2009 (HSLS:09) high school transcript study, base-year survey, and 2013 follow-up collected information about high school experiences and post-high school plans for a cohort of high school freshmen in 2009.

This study focuses primarily on the differences in individuals' career and technical education (CTE) participation, using students' demographic characteristics, high school experiences and coursetaking, and self-reported postsecondary education experiences drawn from survey data on two different cohorts of high school students. Analyses also provide important context about the outcomes of CTE participants by demographic group.

This technical appendix provides additional detail about the sizes of the analysis samples used in this report, measures used in figures and tables, and statistical procedures used to identify statistically significant differences.

ANALYSIS SAMPLES

Two analytical samples are used in this report, one from ELS:2002 and one from HSLS:09. ELS:2002 enables projections to the nationally representative population of students who were in grade 10 in 2002 or grade 12 in 2004. Because this report focuses on high school outcomes, the 10th-grade sample is used to best identify the ways in which CTE is related to student background characteristics, coursetaking, and completion. HSLS:09 enables projections to the nationally representative population of students who were in grade 9 in 2009. The base-year survey, asked of students in grade 9, and first follow-up, asked of students in grade 11, occurred one year earlier in students' high school careers than do the equivalent ELS:2002 surveys, so the HSLS cohort does not align perfectly with the ELS cohort. The HSLS:09 2013 Update includes high school outcomes that are similar to those in the ELS:2002 first follow-up. To align with public policy interests, the analysis only includes students who attended a public school.

The weighted student response rates for the ELS:2002 base-year and first follow-up surveys were 87.3 and 88.7 percent (Ingels et al. 2004, 2005, 2014), respectively, while the weighted response rate for the high school transcripts was 90.7 percent. The weighted student response rates for the HSLS:09 base-year survey and 2013 Update were 85.7 and 73.1 percent (Ingels et al. 2011), respectively, while the weighted response rate for the high school transcripts was 87.7 percent (Ingels et al. 2015). The unit weighted response rate for students with responses in the base-year student questionnaire, the 2013 Update, and the high school transcript collection was 64.4 percent (Ingels et al. 2015). The weights used in the analysis (described in the Statistical Procedures and Methods section below) adjust for nonresponse in each study.

The ELS:2002 analysis sample consists of public school students who were in grade 10 in 2002, who responded to the first follow-up in 2004, and who had complete high school transcript data available. A total of 9,709 ELS:2002 respondents met all sample criteria. The HSLS:09 analysis sample consists of public school students who were in grade 9 in 2009, who responded to both the base-year survey in 2009 and the 2013 Update, and who had complete high school transcript data in the HSLS:09 database. A total of 11,472 HSLS:09 respondents met all sample criteria. Table A-1 provides information about analysis sample sizes for both studies. The sample sizes of the descriptive analyses vary based on the number of observations missing from the variables included in each analysis. Observations were not excluded if they were missing information on individual variables.

Table A-1. Number of sample members in ELS:2002 high school sample and HSLS:09 high school sample

Respondent criteria	ELS:2002
In the grade 10 cohort (G10COHRT)	16,131
And attended only public school (F1CTLPTN)	12,657
And has complete (four years of) transcript data (F1RTRFLG)	9,709
And responded to the first follow-up (F1TRSCWT)	9,709
Respondent criteria	**HSLS:09**
In the grade 9 cohort (all students)	25,206
And attended only public school (X1CONTROL)	20,658
And has complete (four years of) transcript data (X3TCOVERAGE)	15,008
And responded to the base year and 2013 Update (W3W1STUTR)	11,472

MEASURES

This section explains the measures used, how they were collected, and how they are used in the analysis. Variable names from the ELS:2002 and HSLS:09 databases are listed in all capital letters. ELS:2002 variables are listed first, then HSLS:09 variables, where appropriate. ELS:2002 variables with the prefix BY refer to the base-year (2002) data collection, while F1, F2, and F3 refer to the first follow-up (2004), second follow-up (2006), and third follow-up (2012), respectively. For HSLS:09, variables with the prefix of X1, X2, and S3 refer to student-level composite variables from the base year (2009), first follow-up (2011), and 2013 Update, respectively. Variables with the prefixes P1 and P2 refer to parent instrument variables in each round; variables with the prefix of A refer to administrator variables.

Analysis Sample Criteria

For the ELS cohort, a flag indicated which students were in the grade 10 cohort (G10COHRT), and all students in the HSLS cohort were in the grade 9 cohort. Variables for school control identified students who attended public schools (F1CTLPTN/X1CONTROL). Composite transcript coverage flags were available in both surveys to identify students for whom high school transcript information was available for all four academic years of high school (F1RTRFLG/X3TCOVERAGE). Analyses included students with high school transcript weights (F1TRSCWT, W3W1STUTR).

Student Background, High School Education, and Postsecondary Education

Both ELS:2002 and HSLS:09 contain extensive information about students' demographic, socioeconomic, and educational backgrounds, listed below. The studies also include high school transcripts. These transcripts allow researchers to examine the high school coursetaking histories of respondents, while identifying CTE concentrators, levels of CTE participation, and academic coursetaking and performance.

Student Background Variables

In this report, student background measures are crucial for identifying differing access to and impact of CTE participation level and CTE field of study on student outcomes. The report focuses on four key student and school characteristics: sex, race/ethnicity, socioeconomic status (SES), and urbanicity of student's school locale.

In addition to results for the four key characteristics, results are included throughout the report for the student characteristics of disability status and English learner status. While these characteristics were also of interest, in many cases the relatively small numbers of

disabled and English language learner students in the study samples did not meet minimum sample size criteria (as described below in the "Statistical Procedures and Methods" section). As a result, estimates for the disabled and English language learner groups were subject to greater levels of suppression for confidentiality reasons, hindering discussion of the results for these characteristics. Thus, results for these groups are presented in the report but not discussed in detail.

Sex is defined using a dichotomous, self-reported measure (F2SEX/X1SEX).

For the race/ethnicity measure, respondents are divided into one of five racial or ethnic categories: Asian (non-Hispanic), Black (non-Hispanic), Hispanic, white (non-Hispanic), or Other (American Indian, Alaska Native, Native Hawaiian, Pacific Islander, and those reporting more than one race) (F1RACE_R/X1RACE). Hispanic ethnicity may be of any race; all race categories are non-Hispanic. ELS:2002 and HSLS:09 allowed for respondents to choose more than one race, reported as "Other" in the tables. Because of small percentages that result in unstable estimates, results for American Indians/Alaska Natives and Native Hawaiian/Pacific Islander are also included in "Other."

Family socioeconomic status (SES) is a composite variable created by the National Center for Education Statistics (NCES) using information about parental education and family income (F1SES2QR/X1SES and X2SES). In ELS:2002, a variable dividing the continuous measure of SES into quartiles is available on the data file, with categories for the lowest 25 percent, lower middle 26–50 percent, upper middle 51–75 percent, and highest 25 percent. In HSLS:09, a standardized continuous SES variable was weighted and divided into quartiles for consistency with ELS:2002.

Disability status is identified by the conjunction of several measures: reported individualized education plan (IEP) status, accommodations on the assessments, and special education services. A student that meets any of these requirements is classified as having a disability. The first measure is whether the student had an IEP in the base year, as identified by the school (BYIEPTYP/X1IEPFLAG). The second measure is whether the student had a special test or questionnaire accommodations as part of either the base-year (BYACCTYP/X1MACC) or first follow-up assessment/survey (F1ACCTYP/X2MACC). The third measure, which is used in the HSLS cohort only, is whether the student was reported by his or her parent to be receiving special education services at the time of the base-year interview in 2009 (P1SPECIALED).

English learner status is measured using different variables for the ELS and HSLS cohorts due to differences in data availability. In both surveys, the variable is coded as dichotomous, with a "Don't Know" category. For students in the ELS cohort, the variable categories are

based on English fluency in grade 10 (BYSTLNG2). If the student reported that they were not fluent or partially fluent, they are coded in the analysis variable as "Not Fluent." If they reported that they were fluent or a native English speaker, they are coded in the analysis variable as "Fluent." If the student was a non-native English speaker whose fluency was unknown, they were coded as "Don't Know." For the HSLS cohort, English learner status is based on parent survey questions about whether the student was ever or was currently in an English language learner (ELL) program (P1ELLEVER & P1ELLNOW). If the student had never been in an ELL program or had been but were not currently enrolled in one, the student is coded in the analysis variable as "Not Currently English Language Learner." If the student had ever been in an ELL program and was currently enrolled in one, the student is coded in the analysis variable as "Currently English Language Learner." The "Don't Know" category included students whose parents did not know if they had ever been or were currently enrolled in an ELL program.

The urbanicity of the school's locale (BYURBAN/X1LOCALE & X2LOCALE) includes three categories: urban, suburban, and rural. In the HSLS cohort, students who attended schools in towns are categorized with those who attended schools in suburbs.

CTE Access, Participation, and Field of Study

To determine whether students have access to CTE courses and/or CTE fields of study, the analysis uses questions from the ELS:2002 base-year school administrator interview (BYA16 and BYA17A-R) and the HSLS:09 base-year school counselor interview (C1CTE, C1CLUSTER, C1INDVCRS, and C1VOCTECH). In the ELS cohort, a student was defined as having access to CTE if he or she attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site. For the HSLS cohort, access to CTE is determined in part by whether the school counselor reported that CTE was offered in his or her district. If CTE was offered either on-site or off-site, the student attending the school is considered to have access to CTE. In addition, students are counted as having CTE access if Career Clusters, Pathways, or Programs of Study were offered at their school and if they were allowed to take individual courses in those programs even if not enrolled in them. Finally, students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program. Because the CTE access variable is based on administrator reports and CTE participation is based on transcripts, it is possible that students who do not have official access to CTE may have taken CTE courses.

The transcript-based CTE participation and field of study variables (as well as the academic concentrator variable discussed below) were coded using School Courses for the Exchange of Data (SCED) codes (Bradby et al. 2007). Utilizing SCED codes allowed for comparisons

between the ELS:2002 and HSLS:09 datasets because the definitions used were the same for each dataset. The SCED definitions are slightly different than the Classification of Secondary School Courses (CSSC) codes definitions natively coded into ELS:2002. Using NCES-provided crosswalks and files, the ELS:2002 data were recoded according to the newer SCED codes to ensure consistency across the ELS and HSLS cohorts. SCED codes were used because there is no such crosswalk or support for recoding HSLS:09 to CSSC.

While the SCED codes are advantageous because they provide a consistent set of definitions and allow for comparison between ELS:2002 and HSLS:09, there are some limitations to the SCED-coded ELS:2002 data. The first limitation is that the categories and counts in this report will not align with previously published reports and figures. Second, there was a shift in what was considered a CTE course between CSSC and SCED, thus some courses that were CTE in 2004 are not counted as CTE in SCED, and some courses that were not CTE in 2004 were counted as CTE in this report. This shift will result in less alignment between CTE access and coursetaking. Additionally, some ELS cohort students who took CTE may not be considered CTE participants, samplers, or concentrators in this report due to the new coding. Course-level SCED-coded transcript data are used to determine the degree to which students took CTE courses. High school students are classified according to their overall CTE participation level based on credits in CTE fields (Dalton et al. 2013):[1]

1. CTE nonparticipants (less than one CTE credit)
2. CTE samplers (one to two CTE credits in one or more CTE fields of study)
3. CTE explorers (three or more CTE credits but no three credits in any single CTE field of study)
4. CTE concentrators (three or more CTE credits in at least one CTE field of study)

CTE concentrators are further classified by their high school CTE field of study. Each course on respondents' high school transcripts was classified into the 16 CTE fields of study listed below. These categories are not mutually exclusive; a course may be counted in two different CTE fields. The SCED taxonomy used in this report follows:

1. Agriculture, food, and natural resources (Agriculture)
2. Architecture and construction (Architecture)
3. Arts, A/V technology, and communication (Arts)
4. Business management and administration (Business)
5. Education and training (Education)

[1] Note that these are not official designations of the U.S. Department of Education.

6. Finance
7. Government and public administration (Government)
8. Health science (Health)
9. Hospitality and tourism (Hospitality)
10. Human services
11. Information technology (IT)
12. Law, public safety, corrections, and security (Law)
13. Manufacturing
14. Marketing
15. Science, technology, engineering, and mathematics (STEM)
16. Transportation

A list of definitions for each of the 16 CTE fields is provided at the end of Appendix A. For more information on the definition of CTE participant status, see Dalton et al. (2013). For more information on fields of study see http://nces.ed.gov/forum/SCED.asp.

Educational Outcomes

On-time high school graduation is measured by whether an ELS survey member reported receiving a high school diploma between fall 2003 and summer 2004 (F3HSSTAT) and whether an HSLS:09 survey member reported receiving a high school diploma between fall 2012 and summer 2013 (X3HSCOMPSTAT, X3HSCOMPDATE).

Academic concentration describes the extent to which graduates completed a college-oriented academic curriculum in high school, as defined by NCES for ELS:2002. A graduate is deemed to be an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language. Because the ELS:2002 academic concentration variable was originally coded using CSSC definitions, a new version of the academic concentration variable was created using transcript data to align the ELS:2002 variable with the SCED definitions used in HSLS:09. In HSLS:09, the variable X3TACADTRCK was used.

The postsecondary educational outcome focuses on whether an individual enrolled in a postsecondary institution. In the ELS cohort, the measure is of whether the student ever attended a postsecondary institution since high school (F2EVRATT); in the HSLS cohort,

the measure is of whether the student attended a postsecondary institution as of the fall immediately after high school (November 2013) (X3CLASSES).

Imputation

In both surveys, some key analytical variables were imputed by NCES. For ELS:2002, these include race/ethnicity, English fluency in grade 10, and whether the student had attended postsecondary education as of two years after high school. For HSLS:09, these include sex, race/ethnicity, measures of SES from the base year and first follow-up, and whether the student was taking postsecondary classes immediately after high school. Only in the case of the HSLS:09 SES measures did the percentage of cases imputed exceed 10 percent. More information about imputation can be found in Ingels et al. (2014) for ELS:2002 and Ingels et al. (2015) for HSLS:09.

STATISTICAL PROCEDURES AND METHODS

The study primarily utilizes descriptive statistics (univariate and bivariate figures and tables) to examine differences in CTE participation rates and outcomes for students at different levels of CTE participation according to student and school characteristics. Because descriptive statistics present simple associations between two variables and do not take multiple characteristics such as race/ethnicity and family SES into account simultaneously, multivariate analyses were used to further explore the differences identified in the descriptive statistics. Logistic regression and multinomial logistic (MNL) regressions were used for dichotomous and categorical outcomes, respectively (see "Multivariate Methods" section).

Information on rounding and suppression procedures, use of survey weights, methods to establish statistical significance for descriptive results, and methods of multivariate analysis are described in this section. A glossary of statistical terms used in this report is also included.

Rounding

In summary tables, percentages and means (e.g., average age) are reported to the tenth, that is, the first digit after the decimal point (e.g., 44.3), but when referred to in the text, they are rounded to whole numbers. Standard errors for percentages and means were rounded to the nearest hundredth, that is, the second digit after the decimal place. Marginal effects estimates and standard errors are reported to the thousandth, that is, the third digit after the decimal place. Dollar amounts reported in Appendix C were rounded to the nearest hundred. Standard errors for dollar amounts were rounded to the nearest ten.

Rounding was conducted according to the following rules:

1. If the first digit to be dropped is less than 5, the last retained digit is not changed.

   Example: 6.1473 is rounded to 6.1 in a table and to 6 in the text.

2. If the first digit to be dropped is greater than or equal to 5, the last digit retained is increased by 1.

   Example: 6.6888 is rounded to 6.7 in a table and to 7 in the text.

3. A percentage or mean value that is reported to the tenth in a table but to a whole number in the text is rounded from the original value in both cases.

   Example: 5.451 is rounded to 5.5 in a table and to 5 in the text.

Suppression

Certain estimates and their corresponding standard errors are suppressed or flagged in the descriptive tables. To preserve the confidentiality of students participating in the ELS:2002 and HSLS:09 studies, estimates that are based on fewer than 30 cases, including percentages in which fewer than three cases are in the numerator, are suppressed. In addition, estimates are either suppressed or flagged for instability. Estimates whose relative standard errors exceed 50 percent are suppressed, while estimates with a relative standard error of between 30 and 50 percent of the estimate are flagged with an exclamation point (!) in the tables. Suppressed values are replaced with a double dagger symbol (‡), indicating that the estimate does not meet reporting standards.

Weighting

All results project to the national grade 10 population in 2002 (for ELS:2002) or the national grade 9 population in 2009 (for HSLS:09). The analyses take into account the complex survey designs of both studies to generate standard errors. To achieve this, all results are weighted to adjust standard errors for the complex survey designs of ELS:2002 and HSLS:09. Descriptive results are weighted using balanced repeated replication (BRR) weights. For the ELS cohort, results are weighted by the high school transcript weight F1TSCWT and utilize BRR weights F1TRS1 through F1TRS200.[2] The sample was subset using the grade 10 cohort flag (G10COHRT=1) to allow projection to the population of spring 2002 sophomores. Similarly, all results from HSLS:09 are weighted by the 2013

[2] The weighting command specified in Stata to weight the ELS high school descriptive outcomes was "svyset PSU [pw=F1TRSCWT], strata(STRAT_ID) brr(F1TRS1-F1TRS200) vce(brr) singleunit(scaled)."

Update transcript weight (W3W1STUTR) and utilize the BRR weights W3W1STUTR001 through W3W1STUTR200 to adjust the standard errors. [3]

To allow marginal effects to be estimated for the multivariate models, all multivariate models were weighted using the Taylor series weights provided by NCES, rather than the BRR weights. The weighting used in the multivariate models is discussed in greater detail in the "Multivariate Methods" section. For more information on Taylor series and BRR weights with ELS:2002 and HSLS:09, see Ingels et al. (2014) for ELS:2002 and Ingels et al. (2015) for HSLS:09.

Establishing Statistical Significance

The descriptive statistics include means (for continuous variables) and distributions (percentages, for categorical variables), along with their respective standard errors. The results provide a national comparison of the aforementioned indicators by student and school characteristics in order to highlight differences in CTE concentrators' outcomes, in addition to comparing CTE concentrators' outcomes to those of CTE nonconcentrators.

All comparisons cited in the report have been tested for statistical significance. Differences between means (or percentages) were tested using Student's *t* statistic at the $p<.05$ level of significance. The Student's *t*-test allows analysts to determine whether two estimates are different. It is recommended for testing differences between estimates generated from large samples, for example, ELS:2002 or HSLS:09. Adjustments are not made for multiple comparisons.

Differences between estimates were tested against the probability of a Type I error[4] or significance level. The statistical significance of each comparison was determined by calculating the *t* value for the difference between each pair of means or proportions and comparing the *t* value with published tables of significance levels for two-tailed hypothesis testing. Student's *t* values were computed to test differences between independent estimates using the following formula:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{SE_1^2 + SE_2^2}}$$

[3] The weighting command specified in Stata to weight the HSLS descriptive outcomes was "svyset [pweight=W3W1STUTR], brrweight(W3W1STUTR001-W3W1STUTR200) vce(brr) mse."
[4] See the "Statistical Definitions" section of Appendix A for the definition of "Type I error."

where $\bar{x}_1$ and $\bar{x}_2$ are the estimates to be compared, and se_1 and se_2 are their corresponding standard errors.

When making part-to-whole comparisons, for example, comparing the percentage of CTE concentrators who were employed full time to all students who were employed full time, the following formula was used. This formula takes the covariance of the two estimates into account when computing the *t* value:

$$t = \frac{\bar{x}_{subgroup} - \bar{x}_{whole}}{\sqrt{SE^2_{subgroup} + SE^2_{whole} - 2pSE^2_{subgroup}}}$$

There are hazards in reporting statistical tests for each comparison. First, comparisons based on large *t* statistics may appear to merit special attention. This can be misleading because the magnitude of the *t* statistic is related to the observed differences in the estimates and the number of respondents in the categories used for comparison. Hence, a small difference compared across a large number of respondents would produce a large (and thus possibly statistically significant) *t* statistic.

A second hazard in reporting statistical tests is the possibility that one can report a false positive or Type I error. Statistical tests are designed to limit the risk of this type of error using a value denoted by α (alpha), which defines the level of confidence that a finding is statistically significant by chance. In a single, two-tailed test of statistical significance, an alpha level of 0.05 is commonly chosen, representing a confidence level of 95 percent.

Values in the tables that do not meet minimum sample size criteria are suppressed in the tables and designated with a special symbol (‡). Values whose estimates are unstable are flagged with exclamation marks. For percentages, estimates are defined as unstable if the standard error is 5 or more (meaning that the true value lies in a range of about +/- 20 percentage points, based on an alpha level of 0.05); for means, estimates are defined as unstable if the standard error of the mean is one-third or more as large as the estimate.

Multivariate Methods

The multivariate techniques take multiple characteristics (such as race/ethnicity, sex, and family SES) into account at once. Specifically, the report includes logistic and MNL regression models with appropriate adjustments for the survey design of ELS:2002 and HSLS:09. Logistic (for dichotomous variables) and MNL regression (categorical dependent variables) are designed to describe the association between multiple factors and a single outcome, and are thus the correct models for this report. Additionally, these are some the

most common models used in examinations of educational outcomes. The multivariate methods used in this study provide important perspectives on the relative relationship between multiple characteristics and outcomes; these techniques only provide information on the association between these characteristics and outcomes. The estimates presented here do not support causal inferences.

The logistic and MNL regression results in this paper are presented as marginal effects for ease of interpretation and to allow comparisons across models (Mood 2010), which is vital in comparing results across the two surveys.

Logistic and Multinomial Logistic Regression

This study used logistic and MNL regression to examine the net association between each independent variable included in the model and students' coursetaking and educational outcomes. Logistic regression is a technique used in cases in which the outcome variable is dichotomous, such as whether or not a student had graduated on time, whereas MNL regression is used in cases in which the outcome had more than two categories, such as students' level of CTE participation. In both cases, the outcomes are observed as discrete (nonlinear) categories.

While the outcomes are observed as discrete categories, the models assume that there is an underlying or latent distribution even though only discrete categories are observed, or y* (Long 1997).[5] These latent distributions are linearly related to the outcome, as expressed in the following formula:

$$y_i^* = x_i\beta + \varepsilon_i$$

Where:
x_i=is a vector of values for the *i*th observation
β=is a vector of parameters
ε_i=unexplained error term
y_i^*=the latent variable y* linked to the observed variable by the following equation

$$y_i = \begin{cases} 1 \; if \; y_i^* > \tau \\ 0 \; if \; y_i^* \leq \tau \end{cases}$$

Where:
τ=the cut point needed to be observed in a discrete category

[5] There are several different ways to describe and discuss logit and multinomial logit models. For more information on the latent variable description described here, see Long (1997); for a generalized linear model approach to logistic regression models see Liao (1994). This section is adapted from Long (1997).

In order to estimate the variance of the errors for the unobserved y*, the errors (ε) are assumed to have a logistic distribution (mean=0 and variance=$\frac{\pi^2}{3}$).

The resulting probability density function is

$$\lambda(\varepsilon) = \frac{\exp(\varepsilon)}{[1 + \exp(\varepsilon)]^2}$$

While the cumulative distribution function is

$$\Lambda(\varepsilon) = \frac{\exp(\varepsilon)}{1 + \exp(\varepsilon)}$$

For more information on logistic and MNL regression, see Liao (1994), Long (1997), and Pampel (2000). The resulting models output "logits," which are generally not presented. In this report, marginal effects are presented for ease of discussion and accurate comparisons across models (discussed below).

MARGINAL EFFECTS

Because the logits estimated as part of the logistic and MNL regression equations described above are not intuitive, they must be transformed in order to meaningfully discuss estimates. In this report, marginal effects are used. Marginal effects provide an estimate of x_i on the probability of y=1, conditional on having the average characteristics of the analysis sample member[6] (Mood 2010). This method of controlling for covariates is referred to using the term "net of." Marginal effects are also considered more accurate than the traditionally used odds ratios for comparisons across models, because conditioning on average characteristics is a more meaningful baseline for comparisons (Mood 2010).

For dummy variables, marginal effects present the percentage point change in the predicated probability (or likelihood) of the focal outcome compared to the reference category (Williams 2012).

MAXIMUM LIKELIHOOD ESTIMATION AND SAMPLE SIZE CONSTRAINTS

Because CTE participants and concentrators represented small proportions of students in both the ELS and HSLS cohorts, some multivariate models encountered problems with small sample sizes and perfect prediction. Small sample sizes refer to CTE fields of study where there were not enough CTE concentrators to run a stable model. To enable estimation, the small CTE fields of study were grouped together in an aggregate "small concentrations" category in the marginal effects models. A CTE field of study was

[6] The marginal effects were estimated in Stata 14 using the margins with the dydx(*) option.

considered "small" if the number of CTE concentrators in that CTE field of study made up 3.1 percent or less of all CTE concentrators; this percentage was the threshold at which CTE fields of study were grouped such that logistic regression models were able to be estimated. In the ELS cohort, the small concentrations are education and training, finance, law, and STEM. In the HSLS cohort, they are education, finance, marketing, and law.

Perfect prediction occurs when one or more categories of an independent variable includes all observations in a category of the dependent variable; that is, when one explanatory variable does not vary in the dependent variable (Long and Freese 2006). Logistic regression cannot be estimated when outcomes are perfectly predicted due to the use of maximum likelihood estimation (MLE) in logistic regression. (For more information on MLE, see Long 1997.) Simply described, when there is perfect prediction, it is not possible to model the association between the independent and dependent variables for the perfectly predicted group in a logistic regression equation. As a result, several models were unable to include all cohort members in the logistic models.

In order to estimate models in the cases of perfect prediction, the subgroup that was perfectly predicted was removed from the model, or the variable with perfect prediction was removed; this change is noted in the table footnotes in the few cases where it occurred. In tables B-5B and B-7B, Asian students were dropped from the human services model in the ELS cohort and from the manufacturing model in the HSLS cohort because Asian students' CTE concentration status was perfectly predicted (as CTE nonconcentrators) in those CTE fields. The variable for English learner status was removed from several models due to problems with perfect prediction. This particularly affected the manufacturing field of study in both the ELS and HSLS cohorts.

STATISTICAL DEFINITIONS

Term	Definition
Alpha level	The minimum level of probability to conclude that a difference between findings is not due to chance, or the probability of rejecting the null hypothesis when it is true (Harris 1998). Denoted by α (alpha).
Bivariate statistics	A comparison or model showing the relationship between two variables (Woolridge 2009).
Descriptive statistics	Statistics such as means and percentages (Larson and Farber 2003).
Estimate (noun)	A statistic, calculated using sample data, that is meant to approximate that value in the larger population (U.S. Department of Education, Institute of Education Sciences 2012).
Imputation	The process of estimating a missing value of a variable by using the values of other variables (U.S. Department of Education, Institute of Education Sciences 2012).
Logistic regression	A statistical analytic technique that is used to estimate the relationship between multiple independent variables and an outcome variable with two distinct values (Long 1997).
Marginal effect	The percentage point change in the predicated probability (or likelihood) of the focal outcome compared to the reference category (Williams 2012). The phrases "net of" and "controlling for" describe point estimates where the other variables in the model are held constant.
Maximum likelihood estimation (MLE)	A statistical method for calculating the logistic and multinomial logistic estimates that best describe the data (Long 1997).
Mean	The mean is a measure of central tendency for a dataset, found by dividing the sum of the data entries by the number of entries (Larson and Farber 2003).
Multinomial logistic (MNL) regression	A statistical analytic technique that is used to estimate the relationship between multiple independent variables and an outcome variable with three or more nonlinear or distinct values (Long 1997).
Multivariate models	Also referred to as *multivariate statistics*. Analytic models that include multiple independent variables. In reference to logistic regression models, multivariate models estimate the relationship between multiple characteristics (e.g., race/ethnicity, sex, and family SES) and the outcome (Long 1997).
Null hypothesis	A hypothesis stating that any differences between estimates are due to chance, or that there are no real differences between estimates (Harris 1998).

Term	Definition
Percentage point (difference)	The simple difference between two percentages (Larson and Farber 2003).
Standard deviation	A measure of variation across observations in a sample. A low standard deviation indicates that the observations in the sample tend to be very close to the mean. A high standard deviation indicates that the observations in the sample tend to be spread out over a large range of values (U.S. Department of Education, Institute of Education Sciences 2015).
Standard error	The standard deviation of the sampling distribution (U.S. Department of Education 2012); also refers to the average amount of measurement error for an estimate (Wooldridge 2009).
Statistical significance	The likelihood that a finding based on sample data is due to chance rather than a real difference in the population from which the sample was drawn. When the probability that a finding is due to random chance is less than 5 percent (also referred to as $p<.05$), the finding is often considered to be *statistically significant* (U.S. Department of Education, Institute of Education Sciences 2015). In the report, this is also referred to as a *significant difference.*
t-test	A statistical significance test used to test hypotheses about one or two means when the population standard deviation is unknown (Harris 1998).
Type I error	Rejecting the null hypothesis when it is actually true. Also known as a *false positive* (Harris 1998).
Unstable estimate	Large standard errors that identify estimates with low confidence due to small numbers of cases, or large variation within the underlying data.
Weight/Weighting	A statistical method used to generalize sample data to the target population (U.S. Department of Education, Institute of Education Sciences 2012).

CTE FIELD OF STUDY DEFINITIONS

CTE Field	Definition
Agriculture, food, and natural resources	The production, processing, marketing, distribution, financing and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.
Architecture and construction	Designing, planning, managing, building, and maintaining the built environment.
Arts, audio-video technology, and communications	Designing, producing, exhibiting, performing, writing, and publishing multimedia content, including visual and performing arts and design, journalism, and entertainment services.
Business management and administration	Planning, organizing, directing, and evaluating business functions essential to efficient and productive business operations.
Education and training	Planning, managing, and providing education and training services, and related learning support services.
Finance	Planning services for financial and investment planning, banking, insurance, and business financial management.
Government and public administration	Executing governmental functions to include governance, national security, foreign service, planning, revenue and taxation, regulation, and management and administration at the local, state and federal levels.
Health science	Planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.
Hospitality and tourism	Management, marketing, and operations of restaurants and other food services, lodging, attractions, recreation events, and travel related services.
Human services	Preparing individuals for employment in career pathways that relate to families and human needs.
Information technology	The design development, support, and management of hardware, software, multimedia, and systems integration services.
Law, public safety, corrections, and security	Planning, managing, and providing legal, public safety, protective services, and homeland security, including professional and technical support services.
Manufacturing	Planning, managing, and performing the processing of material into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance, and manufacturing/process engineering.

CTE Field	Definition
Marketing	Planning, managing, and performing marketing activities to reach organizational objectives.
Science, technology, engineering, and mathematics	Planning, managing, and providing scientific research and professional and technical services (e.g., physical science, social science, engineering) including laboratory and testing services, and research and development services.
Transportation	Planning, management, and movement of people, materials, and goods by road, pipeline, air, rail, and water, and related professional and technical support services such as transportation infrastructure planning and management, logistics services, mobile equipment, and facilities maintenance.

Source: Bradby, Denise. 2007. *The 2007 Revision of the Career/Technical Education Portion of the Secondary School Taxonomy*. NCES 2008-030. Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

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APPENDIX B. SUPPLEMENTAL TABLES

Table B-1. Average marginal effects of selected student and school characteristics on the probability that students in the ELS and HSLS cohorts earned at least one CTE credit

	ELS cohort				HSLS cohort		
Student and school characteristics	Marginal effect[a]		Standard error	Student and school characteristics	Marginal effect[a]		Standard error
Sex [female]				Sex [female]			
Male	0.071	***	0.010	Male	0.059	***	0.010
Race/ethnicity[b] [white, non-Hispanic]				Race/ethnicity[b] [white, non-Hispanic]			
Asian, non-Hispanic	-0.026		0.020	Asian, non-Hispanic	-0.101	*	0.040
Black, non-Hispanic	0.028		0.020	Black, non-Hispanic	0.009		0.020
Hispanic	-0.036		0.020	Hispanic	-0.057	**	0.020
Other, non-Hispanic	0.032		0.020	Other, non-Hispanic	-0.020		0.020
Socioeconomic status (SES) quartile[c] [second quartile]				Socioeconomic status (SES) quartile[c] [second quartile]			
Lowest quartile	0.017		0.010	Lowest quartile	-0.028		0.020
Third quartile	-0.035	*	0.010	Third quartile	-0.019		0.010
Highest quartile	-0.103	***	0.020	Highest quartile	-0.056	***	0.020
Disability status[d] [no disability]				Disability status[d] [no disability]			
Has disability	-0.025		0.020	Has disability	-0.007		0.020
English learner status[e] [fluent]				English learner status[e] [not currently ELL]			
Not fluent	-0.100		0.050	Currently ELL	0.009		0.050
Don't know	-0.043		0.040	Don't know	-0.001		0.010
School urbanicity[f] [suburban]				School urbanicity[f] [suburban]			
Urban	-0.050	*	0.020	Urban	-0.010		0.020
Rural	0.004		0.020	Rural	0.044	*	0.020
Academic concentrator[g] [not an academic concentrator)				Academic concentrator[g] [not an academic concentrator)			
Academic concentrator	-0.050	***	0.010	Academic concentrator	0.006		0.010
Sample size (N)	12,657		†	Sample Size (N)	20,658		†

See notes at end of table.

Table B-1. Average marginal effects of selected student and school characteristics on the probability that students in the ELS and HSLS cohorts earned at least one CTE credit—continued

† Not applicable.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.
[a] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are logistic regression models.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in both ELS:2002 and HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[d] For the ELS cohort, respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities. For the HSLS cohort, respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[e] For the ELS cohort, respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent. For the HSLS cohort, respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.
[f] For the HSLS cohort, respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs.
[g] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
NOTES: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 Update surveys and had transcript data for all four years of high school. The category in brackets for each characteristic is the reference category.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table B-2. Percentage distribution of ELS cohort students' access to CTE and CTE participation level, by selected student and school characteristics

Student and school characteristics	Total	CTE access[a]		CTE participation level[b]			
		No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Sex							
Female	**50.9**	53.3	50.2	61.9	54.4	45.1	40.6
Male	**49.1**	46.8	49.8	38.1	45.6	54.9	59.5
Race/ethnicity[c]							
Asian, non-Hispanic	**4.1**	5.5 !	3.8	5.3	5.2	2.7	2.3
Black, non-Hispanic	**14.0**	12.5	12.4	11.6	15.2	13.6	13.7
Hispanic	**15.9**	5.8	15.8	18.3	17.4	15.2	11.3
White, non-Hispanic	**60.9**	70.7	62.9	61.1	56.4	63.9	66.9
Other, non-Hispanic	**5.2**	5.6	5.2	3.7	5.8	4.5	5.9
Socioeconomic status (SES) quartile[d]							
Lowest quartile	**24.0**	15.3	24.2	19.3	23.7	25.1	27.6
Second quartile	**26.3**	24.5	26.3	21.0	25.2	29.2	29.8
Third quartile	**25.7**	28.6	25.6	24.7	25.9	26.0	25.9
Highest quartile	**24.0**	31.6	24.0	35.0	25.2	19.7	16.7
Disability status[e]							
No disability	**92.5**	93.1	92.3	93.0	93.1	93.7	88.8
Has disability	**7.6**	6.9	7.7	7.0	6.9	6.4	11.2
English learner status[f]							
Not fluent	**1.7**	1.0 !	1.6	2.6	1.8	1.4	1.0
Fluent	**96.6**	98.4	96.7	95.2	96.5	97.1	97.6
Don't know	**1.7**	0.6 !	1.7	2.2	1.8	1.5	1.4
School urbanicity							
Urban	**25.7**	12.7 !	25.7	30.7	28.3	20.7	21.5
Suburban	**52.3**	74.0	50.4	50.5	53.3	53.4	50.3
Rural	**22.0**	13.4 !	24.0	18.8	18.4	25.9	28.2

See notes at end of table.

Table B-2. Percentage distribution of ELS cohort students' access to CTE and CTE participation level, by selected student and school characteristics—continued

! Interpret data with caution. Standard error is 5 percentage points or greater.
[a] Respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site.
[b] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[f] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table B-3. Percentage distribution of HSLS cohort students' access to CTE and CTE participation level, by selected student and school characteristics

		CTE access[a]		CTE participation level[b]			
Student and school characteristics	**Total**	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Sex							
Female	**50.2**	55.3	50.0	57.2	50.9	45.6	45.6
Male	**49.8**	44.7	50.1	42.8	49.1	54.4	54.4
Race/ethnicity[c]							
Asian, non-Hispanic	**3.9**	8.8 !	3.5	5.7	4.0	2.4	3.1
Black, non-Hispanic	**12.9**	21.7	12.3	11.3	14.5	12.6	11.1
Hispanic	**22.4**	30.2	21.5	26.8	22.5	20.8	18.6
White, non-Hispanic	**51.9**	34.1	53.6	47.0	49.6	54.8	60.0
Other, non-Hispanic	**9.0**	5.1 !	9.2	9.2	9.5	9.4	7.2
Socioeconomic status (SES) quartile[d]							
Lowest quartile	**24.0**	28.3	23.7	26.1	23.1	22.4	25.2
Second quartile	**26.0**	22.4	26.4	22.6	26.2	28.8	26.5
Third quartile	**25.9**	23.7	25.8	24.5	25.4	26.9	27.7
Highest quartile	**24.2**	25.6	24.0	26.8	25.4	22.0	20.6
Disability status[e]							
No disability	**90.0**	92.4	89.7	90.6	90.1	91.1	88.1
Has disability	**10.0**	7.6 !	10.3	9.5	9.9	8.9	11.9
English learner status[f]							
Currently ELL	**3.1**	6.5 !	3.0	3.4	3.3	2.0	3.4
Not currently ELL	**95.3**	90.0	95.4	95.3	94.7	96.6	95.3
Don't know	**1.6**	‡	1.6	1.3	2.0	1.4	1.2 !
School urbanicity[g]							
Urban	**29.6**	46.5	27.4	33.7	32.1	23.5	25.7
Suburban	**46.3**	45.5	46.8	47.3	44.7	49.1	45.5
Rural	**24.1**	‡	25.8	19.0	23.2	27.3	28.8

See notes at end of table.

Table B-3. Percentage distribution of HSLS cohort students' access to CTE and CTE participation level, by selected student and school characteristics—continued

! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] Respondents are defined as having access to CTE if the school counselor reported that career technical education was offered in their district or if students were allowed to take Career Clusters, Pathways, or Programs of Study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program.
[b] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[f] Respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.
[g] Respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs.
NOTE: CTE = career and technical education; HSLS = High School Longitudinal Study of 2009. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 Update surveys and had transcript data for all four years of high school. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table B-4A. Percentage of students in the ELS cohort who had concentrated in CTE, by CTE field of study and selected student and school characteristics

			CTE fields of study[a]					
Student and school characteristics	**Total**	All CTE concentrators	Agriculture, food, and natural resources	Architecture and construction	Arts, A/V technology, and communication	Business management and administration	Education and training	Finance
Sex								
Female	**50.9**	40.6	27.2	8.4	63.7	63.7	77.8 !	55.4 !
Male	**49.1**	59.5	72.8	91.6	36.3	36.3	‡	‡
Race/ethnicity[b]								
Asian, non-Hispanic	**4.1**	2.3	‡	3.0 !	2.5 !	1.0 !	#	‡
Black, non-Hispanic	**14.0**	13.7	3.9 !	10.1	8.1	17.3	#	‡
Hispanic	**15.9**	11.3	4.6 !	9.5	15.0	7.4 !	#	‡
White, non-Hispanic	**60.9**	66.9	83.4	71.7	71.0	70.2	90.4 !	‡
Other, non-Hispanic	**5.2**	5.9	7.2	5.7	3.5 !	4.2 !	‡	‡
Socioeconomic status (SES) quartile[c]								
Lowest quartile	**24.0**	27.6	35.4	27.1	16.5	28.3	‡	‡
Second quartile	**26.3**	29.8	30.0	35.3	25.5	29.8	‡	‡
Third quartile	**25.7**	25.9	24.2	23.2	29.6	29.0	‡	‡
Highest quartile	**24.0**	16.7	10.4	14.4	28.4	12.9	#	‡
Disability status[d]								
No disability	**92.5**	88.8	87.3	83.3	92.0	93.4	100.0 !	100.0
Has disability	**7.6**	11.2	12.7	16.7	8.0	6.6 !	#	#
English learner status[e]								
Not fluent	**1.7**	1.0	‡	‡	‡	‡	#	#
Fluent	**96.6**	97.6	97.4	95.4	99.6	97.9	100.0 !	84.3
Don't know	**1.7**	1.4	2.1 !	2.7 !	‡	‡	#	‡

See notes at end of table.

Table B-4A. Percentage of students in the ELS cohort who had concentrated in CTE, by CTE field of study and selected student and school characteristics—continued

Student and school characteristics	Total	All CTE concentrators	CTE fields of study[a] Agriculture, food, and natural resources	Architecture and construction	Arts, A/V technology, and communication	Business management and administration	Education and training	Finance
School urbanicity								
Urban	**25.7**	21.5	1.9 !	15.0	26.0	21.2	‡	‡
Suburban	**52.3**	50.3	39.0	55.4	54.0	49.9	‡	‡
Rural	**22.0**	28.2	59.2	29.7	20.0	29.0	#	‡

Rounds to zero.
! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[d] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[e] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table B-4B. Percentage of students in the ELS cohort who had concentrated in CTE, by CTE field of study and selected student and school characteristics

Student and school characteristics	CTE fields of study[a]								
	Health science	Hospitality and tourism	Human services	Information technology	Law, public safety, corrections and security	Manufacturing	Marketing	Science, technology, engineering, and mathematics	Transportation
Sex									
Female	80.0	51.5	95.1	29.5	‡	7.5 !	47.9	‡	‡
Male	20.0	48.5	‡	70.5	59.7 !	92.5	52.1	77.5	96.8
Race/ethnicity[b]									
Asian, non-Hispanic	2.7 !	‡	‡	5.4	‡	‡	1.8 !	#	‡
Black, non-Hispanic	29.5	17.5 !	25.8	21.2	‡	‡	15.2	‡	7.6 !
Hispanic	20.0 !	16.6 !	12.2 !	9.4	‡	5.3 !	15.4 !	‡	12.2
White, non-Hispanic	42.6	51.8	58.5	60.5	60.7 !	80.8	56.8	68.0 !	68.8
Other, non-Hispanic	5.3 !	13.7 !	3.3 !	3.5 !	#	‡	10.8 !	‡	9.7
Socioeconomic status (SES) quartile[c]									
Lowest quartile	26.3	24.7	29.4	27.2	‡	27.4	27.9	‡	38.2
Second quartile	29.2	40.3	32.9	26.9	‡	27.1	25.5	‡	34.9
Third quartile	28.5	19.5 !	25.8	25.6	‡	28.8	22.9	‡	21.1
Highest quartile	16.0	15.6 !	11.9	20.3	‡	16.7	23.7	‡	5.9 !
Disability status[d]									
No disability	96.4	69.0	89.6	94.1	83.2	78.3	97.4	77.4	73.8
Has disability	3.6 !	31.0	10.4 !	5.9 !	‡	21.7	‡	‡	26.3
English learner status[e]									
Not fluent	#	‡	‡	‡	‡	‡	‡	#	‡
Fluent	98.5	96.7	96.2	98.7	98.4	99.9	96.2	100.0	96.3
Don't know	‡	#	‡	‡	#	#	‡	#	‡

See notes at end of table.

Table B-4B. Percentage of students in the ELS cohort who had concentrated in CTE, by CTE field of study and selected student and school characteristics—continued

Student and school characteristics	CTE fields of study[a]								
	Health science	Hospitality and tourism	Human services	Information technology	Law, public safety, corrections and security	Manufacturing	Marketing	Science, technology, engineering, and mathematics	Transportation
School urbanicity									
Urban	32.2	39.5	28.6	26.7	‡	19.3	31.5	#	18.7
Suburban	46.6	32.4	55.8	48.8	86.4	56.3	49.4	‡	64.8
Rural	21.2	28.0	15.6	24.5	‡	24.5 !	19.2	85.9	16.5

Rounds to zero.
! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in both ELS:2002 and HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[d] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[e] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File..

Table B-5A. Average marginal effects of selected student and school characteristics on the probability that CTE participants in the ELS cohort concentrated in any CTE field of study, and on the probability that CTE concentrators concentrated in a given CTE field of study for each field of study

			CTE fields of study[a]									
	Any CTE concentration		Agriculture, food, and natural resources		Architecture and construction		Arts, A/V technology and communication		Business management and administration		Health science	
Student and school characteristics	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error
Sex [female]												
Male	0.077 ***	0.01	0.061 **	0.02	0.216 ***	0.02	-0.143 ***	0.02	-0.11 ***	0.02	-0.093 ***	0.02
Race/ethnicity[c] [white, non-Hispanic]												
Asian, non-Hispanic	-0.1 ***	0.02	-0.072 *	0.03	0.065	0.05	-0.018	0.04	-0.065	0.03	0.041	0.03
Black, non-Hispanic	-0.032	0.02	-0.084 **	0.03	-0.04	0.03	-0.09 ***	0.02	0.023	0.03	0.08 **	0.03
Hispanic	-0.068 ***	0.02	-0.062 *	0.03	-0.025	0.03	0.03	0.04	-0.047	0.03	0.058	0.03
Other, non-Hispanic	-0.029	0.03	0.009	0.04	-0.015	0.05	-0.055	0.05	-0.043	0.04	0.028	0.03
Socioeconomic status (SES) quartile[d] [second quartile]												
Lowest quartile	0.016	0.02	0.081 ***	0.02	-0.012	0.03	-0.045	0.03	0.001	0.02	0.005	0.02
Third quartile	-0.021	0.02	0.012	0.02	-0.048	0.03	0.006	0.03	0.029	0.03	0.028	0.02
Highest quartile	-0.062 ***	0.02	-0.01	0.02	-0.042	0.03	0.055	0.03	-0.021	0.03	0.008	0.02
Disability status[e] [no disability]												
Has disability	0.054 *	0.02	-0.009	0.03	0.075	0.04	-0.013	0.04	-0.039	0.03	-0.031	0.02
School urbanicity [suburban]												
Urban	0.001	0.02	-0.064 ***	0.02	-0.053	0.03	0	0.04	0.017	0.04	0	0.02
Rural	0.037	0.02	0.152 ***	0.04	0.002	0.03	-0.049	0.03	0.009	0.03	-0.008	0.02

See notes at end of table.

Table B-5A. Average marginal effects of selected student and school characteristics on the probability that CTE participants in the ELS cohort concentrated in any CTE field of study, and on the probability that CTE concentrators concentrated in a given CTEield of study for each field of study—continued

			CTE fields of study[a]									
	Any CTE concentration		Agriculture, food, and natural resources		Architecture and construction		Arts, A/V technology and communication		Business management and administration		Health science	
Student and school characteristics	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error
Academic concentrator[f] [not an academic concentrator]												
Academic concentrator	-0.038 *	0.02	-0.013	0.02	0.002	0.03	0.094 ***	0.03	-0.028	0.02	-0.004	0.02
Sample size (N)	8,125	†	1,819	†	1,819	†	1,819	†	1,819	†	1,819	†

† Not applicable.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.
[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
[b] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are logistic regression models.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[f] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
NOTES: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. The ELS sample included no government and public administration concentrators. The category in brackets for each characteristic is the reference category. The English learner status variable was excluded from the model due to problems with perfect prediction, as the "Not fluent" or "Don't Know" categories perfectly predicted not concentrating in manufacturing.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table B-5B. Average marginal effects of selected student and school characteristics on the probability that CTE participants in the ELS cohort concentrated in any CTE field, and on the probability that CTE concentrators concentrated in a given CTE field of study for each field of study

	CTE fields of study[a]													
	Hospitality and tourism		Human services[b]		Information technology		Manufacturing		Marketing		Transportation		Small concentrations[c]	
Student and school characteristics	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error
Sex [female]														
Male	-0.012	0.01	-0.142 ***	0.02	0.098 ***	0.02	0.059 ***	0.01	-0.018	0.01	0.121 ***	0.02	-0.002	0.01
Race/ethnicity[e] [white, non-Hispanic]														
Asian, non-Hispanic	-0.019	0.01	—	—	0.178 **	0.06	-0.059 ***	0.01	0.001	0.03	-0.03	0.04	0.026	0.03
Black, non-Hispanic	-0.002	0.01	0.047 *	0.02	0.094 **	0.04	-0.056 ***	0.01	0.008	0.02	-0.035	0.02	0.008	0.02
Hispanic	0.005	0.02	0.004	0.02	-0.017	0.03	-0.036 *	0.02	0.021	0.03	-0.005	0.03	0.023	0.02
Other, non-Hispanic	0.022	0.03	-0.02	0.02	-0.06	0.04	-0.041 *	0.02	0.107 *	0.05	0.015	0.03	0.013	0.03
Socioeconomic status (SES) quartile[f] [second quartile]														
Lowest quartile	-0.036 *	0.02	-0.007	0.02	0.007	0.03	0.004	0.02	-0.011	0.02	0.011	0.02	-0.012	0.01
Third quartile	-0.036 *	0.02	0.005	0.02	-0.019	0.03	0.003	0.02	0.011	0.02	-0.021	0.02	-0.006	0.01
Highest quartile	-0.029	0.02	-0.013	0.02	0.027	0.03	0.012	0.02	0.036	0.02	-0.068 **	0.02	0.015	0.02
Disability status[g] [no disability]														
Has disability	0.039	0.02	0.031	0.03	-0.067	0.04	0.03	0.03	-0.061 ***	0.01	0.057 *	0.03	-0.002	0.01
School urbanicity [suburban]														
Urban	0.055	0.03	-0.005	0.02	0.021	0.03	0.025	0.03	0.01	0.02	-0.023	0.03	-0.004	0.01
Rural	0.004	0.01	-0.035 *	0.02	0.002	0.03	-0.009	0.02	-0.019	0.02	-0.073 ***	0.02	-0.005	0.01

See notes at end of table.

Table B-5B. Average marginal effects of selected student and school characteristics on the probability that CTE participants in the ELS cohort concentrated in any CTE field, and on the probability that CTE concentrators concentrated in a given CTE field oftudy for each field of study—continued

	CTE fields of study[a]													
	Hospitality and tourism		Human services[b]		Information technology		Manufacturing		Marketing		Transportation		Small concentrations[c]	
Student and school characteristics	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error
Academic concentrator[h] [not an academic concentrator]														
Academic concentrator	-0.028 *	0.01	-0.05 ***	0.01	0.092 **	0.03	-0.036 *	0.01	-0.004	0.02	-0.069 ***	0.02	0.007	0.01
Sample size (N)	1,819	†	1,727	†	1,819	†	1,819	†	1,819	†	1819	†	1,819	†

† Not applicable.

* p < 0.05; ** p < 0.01; *** p < 0.001.

[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.

[b] The human services model contains 1727 members rather than 1819 because 89 Asian students were dropped from the regression. The Asian category was dropped because it perfectly predicted the outcome of not concentrating in human services, and a marginal effect could not be estimated for that category.

[c] Small concentrations includes education and training; finance; science, technology, engineering and mathematics; and law, public safety, corrections and security. A CTE field of study was defined as "small" if its number of concentrators made up less than 3.1 percent of all CTE concentrators; this was the threshold at which the models were able to support marginal effects estimation. The ELS sample included no government and public administration concentrators.

[d] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are logistic regression models.

[e] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.

[f] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.

[g] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.

[h] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.

NOTES: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. The category in brackets for each characteristic is the reference category. The English learner status variable was excluded from the model due to problems with perfect prediction, as the "Not fluent" or "Don't Know" categories perfectly predicted not concentrating in manufacturing.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table B-6A. Percentage of students in the HSLS cohort who had concentrated in CTE, by CTE field of study and selected student and school characteristics

			CTE fields of study[a]					
Student and school characteristics	**Total**	All CTE concentrators	Agriculture, food, and natural resources	Architecture and construction	Arts, A/V technology, and communication	Business management and administration	Education and training	Finance
Sex								
Female	**50.2**	45.6	40.7	7.7	60.8	48.1	97.5	47.0
Male	**49.8**	54.4	59.3	92.3	39.2	51.9	‡	53.0
Race/ethnicity[b]								
Asian, non-Hispanic	**3.9**	3.1	‡	‡	2.3	4.5	‡	‡
Black, non-Hispanic	**12.9**	11.1	‡	6.2	3.6	14.8	14.1	‡
Hispanic	**22.4**	18.6	11.8	6.7	30.0	15.3	‡	‡
White, non-Hispanic	**51.9**	60.0	80.8	79.3	56.6	57.5	69.1	63.3
Other, non-Hispanic	**9.0**	7.2	3.6	6.4	7.5	7.8	‡	‡
Socioeconomic status (SES) quartile[c]								
Lowest quartile	**24.0**	25.2	25.4	20.2	31.0	21.9	‡	‡
Second quartile	**26.0**	26.5	26.4	31.0	20.7	24.7	26.7	31.2
Third quartile	**25.9**	27.7	31.7	34.3	23.6	31.1	45.5	‡
Highest quartile	**24.2**	20.6	16.6	14.6	24.8	22.4	‡	36.7
Disability status[d]								
No disability	**90.0**	88.1	88.3	81.5	86.2	85.0	89.0	100.0
Has disability	**10.0**	11.9	11.7	18.5	13.8	15.0	‡	#
English learner status[e]								
Currently ELL	**3.1**	3.4	3.6	‡	‡	‡	#	#
Not currently ELL	**95.3**	95.3	94.9	96.4	93.1	98.7	100.0	100.0
Don't know	**1.6**	1.2 !	‡	‡	‡	#	#	#
School urbanicity[f]								
Urban	**29.6**	25.7	‡	20.4	27.4	17.1	21.4	‡
Suburban	**46.3**	45.5	37.6	46.3	47.3	52.6	54.8	75.5
Rural	**24.1**	28.8	52.6	33.4	25.3	30.2	23.8	‡

See notes at end of table.

Table B-6A. Percentage of students in the HSLS cohort who had concentrated in CTE, by CTE field of study and selected student and school characteristics—continued

Rounds to zero.
! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[d] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[e] Respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.
[f] Respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs.
NOTE: CTE = career and technical education; HSLS = High School Longitudinal Study of 2009. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 Update surveys and had transcript data for all four years of high school. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table B-6B. Percentage of students in the HSLS cohort who had concentrated in CTE, by CTE field of study and selected student and school characteristics

	CTE fields of study[a]								
Student and school characteristics	Health science	Hospitality and tourism	Human services	Information technology	Law, public safety, corrections and security	Manufacturing	Marketing	Science, technology, engineering, and mathematics	Transportation
Sex									
Female	78.3	66.2	95.7	31.1	18.4 !	‡	67.0	12.8 !	5.8 !
Male	21.7	33.8	‡	68.9	81.6	94.3	33.1 !	87.2	94.2
Race/ethnicity[b]									
Asian, non-Hispanic	‡	‡	‡	7.1 !	‡	#	‡	3.5 !	‡
Black, non-Hispanic	17.6	15.6 !	‡	6.2 !	32.7 !	‡	‡	‡	15.9 !
Hispanic	20.6	35.5	26.6	14.4	14.2 !	18.2 !	‡	‡	18.6
White, non-Hispanic	44.6	39.3	52.0	63.9	48.5	74.9	48.4	61.6	55.3
Other, non-Hispanic	9.7	8.8 !	‡	8.5 !	‡	4.8 !	‡	5.6 !	9.4 !
Socioeconomic status (SES) quartile[c]									
Lowest quartile	24.8	32.3	34.4	14.9	23.3 !	20.8 !	33.6 !	18.9 !	39.8
Second quartile	22.6	31.4	20.6	30.6	40.5	37.9	20.3 !	19.7 !	31.6
Third quartile	26.2	18.5 !	37.1	31.5	‡	26.6	19.3 !	18.1	20.5
Highest quartile	26.4	17.8	7.9 !	23.1	‡	14.7 !	26.8 !	43.3	8.1
Disability status[d]									
No disability	96.6	89.0	93.5	86.9	88.0	89.7	94.3	85.3	79.1
Has disability	3.4 !	11.0 !	‡	13.1	‡	‡	‡	‡	20.9
English learner status[e]									
Currently ELL	‡	‡	‡	‡	‡	#	‡	‡	‡
Not currently ELL	95.0	93.7	91.7	95.1	91.0	100.0	91.4	98.7	94.2
Don't know	‡	‡	‡	‡	#	#	‡	‡	‡
School urbanicity[f]									
Urban	35.2	26.6 !	32.8 !	27.2	21.7 !	17.6 !	‡	38.5	29.6
Suburban	40.2	47.1	48.4	42.0	63.5	49.5	55.3	49.7	50.3
Rural	24.7	26.3	18.9	30.9	‡	32.9	27.2 !	11.7 !	20.1

See notes at end of table.

Table B-6B. Percentage of students in the HSLS cohort who had concentrated in CTE, by CTE field of study and selected student and school characteristics—continued

Rounds to zero.
! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[d] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[e] Respondents are defined as English learners if they were currently enrolled in a program for English language learners (ELLs), as reported by the responding parent in the parent survey. Respondents were counted as "Don't Know" if a parent did not know whether the child was enrolled in an ELL program.
[f] Respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs. NOTE: CTE = career and technical education; HSLS = High School Longitudinal Study of 2009. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 Update surveys and had transcript data for all four years of high school. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table B-7A. Average marginal effects of selected student and school characteristics on the probability that CTE participants in the HSLS cohort concentrated in any CTE field, and on the probability that CTE concentrators concentrated in a given CTE field of study for each field of study

			CTE fields of study[a]									
	Any CTE concentration		Agriculture, food, and natural resources		Architecture and construction		Arts, A/V technology and communication		Business management and administration		Health science	
Student and school characteristics	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error
Sex [female]												
Male	0.019	0.01	0.023	0.02	0.164 ***	0.02	-0.07 **	0.02	-0.01	0.02	-0.202 ***	0.02
Race/ethnicity[c] [white, non-Hispanic]												
Asian, non-Hispanic	-0.038	0.05	-0.136 ***	0.02	-0.068	0.04	-0.026	0.03	0.063	0.06	0.173	0.10
Black, non-Hispanic	-0.069 **	0.03	-0.121 ***	0.03	-0.065 *	0.03	-0.07 ***	0.02	0.058	0.04	0.084 *	0.04
Hispanic	-0.068 **	0.02	-0.058 **	0.02	-0.098 ***	0.03	0.064	0.04	0.007	0.03	0.028	0.03
Other, non-Hispanic	-0.077 ***	0.02	-0.102 ***	0.02	-0.044	0.03	0.01	0.03	0.013	0.03	0.092 **	0.03
Socioeconomic status (SES) quartile[d] [second quartile]												
Lowest quartile	0.033	0.02	0.027	0.02	-0.019	0.02	0.033	0.03	-0.007	0.02	-0.003	0.03
Third quartile	0.007	0.02	0.016	0.02	0.004	0.02	0.009	0.02	0.017	0.03	0.003	0.03
Highest quartile	-0.032	0.02	-0.013	0.02	-0.05 *	0.02	0.057 *	0.03	0.008	0.02	0.044	0.03
Disability status[e] [no disability]												
Has disability	0.022	0.03	-0.027	0.02	0.022	0.02	0.03	0.04	0.065	0.05	-0.089 ***	0.03
School urbanicity[f] [suburban]												
Urban	-0.001	0.04	-0.044 *	0.02	0.006	0.03	-0.012	0.03	-0.06 **	0.02	0.057	0.04
Rural	0.027	0.02	0.125 ***	0.03	0.01	0.02	-0.017	0.02	-0.013	0.03	0.002	0.02

See notes at end of table.

Table B-7A. Average marginal effects of selected student and school characteristics on the probability that CTE participants in the HSLS cohort concentrated in any CTE field, and on the probability that CTE concentrators concentrated in a given CTE field o study for each field of study—continued

			CTE fields of study[a]									
	Any CTE concentration		Agriculture, food, and natural resources		Architecture and construction		Arts, A/V technology and communication		Business management and administration		Health science	
Student and school characteristics	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error	Marginal effect[b]	Standard error
Academic concentrator[g] [not an academic concentrator]												
Academic concentrator	-0.026	0.01	-0.075 ***	0.02	-0.055**	0.02	0.001	0.02	0.048	0.03	0.099 ***	0.02
Sample size (N)	9,061	†	2,190	†	2,190	†	2,190	†	2,190	†	2,190	†

† Not applicable.
* p < 0.05; ** p < 0.01; *** p < 0.001.
[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
[b] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are logistic regression models.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[f] Respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs. [g] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
NOTES: CTE = career and technical education; HSLS = High School Longitudinal Study of 2009. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 Update surveys and had transcript data for all four years of high school. The HSLS sample included no government and public administration concentrators. The HSLS sample included no government and public administration concentrators. The category in brackets for each characteristic is the reference category. The English learner status variable was excluded from the model due to problems with perfect prediction, as the "Not fluent" or "Don't Know" categories perfectly predicted not concentrating in manufacturing.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table B-7B. Average marginal effects of selected student and school characteristics on the probability that CTE participants in the HSLS cohort concentrated in any CTE field, and on the probability that CTE concentrators concentrated in a given CTE field of study for each field of study

	CTE fields of study[a]													
	Hospitality and tourism		Human services		Information technology		Manufacturing[b]		Science, technology, engineering, and mathematics		Transportation		Small concentrations[c]	
Student and school characteristics	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error
Sex [female]														
Male	-0.047 **	0.02	-0.088 ***	0.01	0.054 **	0.02	0.053 ***	0.01	0.077 ***	0.01	0.122 ***	0.02	-0.062 **	0.02
Race/ethnicity[e] [white, non-Hispanic]														
Asian, non-Hispanic	-0.021	0.02	-0.023	0.01	0.097	0.07	—	—	-0.022	0.02	-0.048 **	0.02	-0.029	0.03
Black, non-Hispanic	0.041	0.03	0.012	0.03	-0.04	0.02	-0.03 **	0.01	0.001	0.03	0.034	0.04	0.054	0.04
Hispanic	0.079	0.04	0.009	0.02	-0.021	0.02	0.001	0.02	-0.003	0.02	-0.011	0.03	0.004	0.03
Other, non-Hispanic	0.033	0.02	-0.027 **	0.01	0.013	0.04	-0.016	0.01	-0.012	0.02	0.022	0.03	0.008	0.03
Socioeconomic status (SES) quartile[f] [second quartile]														
Lowest quartile	-0.014	0.02	0.007	0.01	-0.046	0.02	-0.014	0.02	0.003	0.03	0.038	0.03	-0.02	0.02
Third quartile	-0.026	0.02	0.026	0.02	-0.004	0.02	-0.015	0.01	-0.008	0.03	-0.024	0.02	-0.007	0.02
Highest quartile	0	0.02	-0.013	0.01	-0.02	0.03	-0.022	0.01	0.053*	0.02	-0.051 **	0.02	0.014	0.02
Disability status[g] [no disability]														
Has disability	0	0.03	-0.01	0.02	0.018	0.03	-0.018	0.01	0.025	0.03	0.014	0.02	-0.018	0.03

See notes at end of table.

Table B-7B. Average marginal effects of selected student and school characteristics on the probability that CTE participants in the HSLS cohort concentrated in any CTE field, and on the probability that CTE concentrators concentrated in a given CTE field of study for each field of study—continued

	CTE fields of study[a]													
	Hospitality and tourism		Human services		Information technology		Manufacturing[b]		Science, technology, engineering, and mathematics		Transportation		Small concentrations[c]	
Student and school characteristics	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error	Marginal effect[d]	Standard error
School urbanicity[h] [suburban]														
Urban	-0.013	0.02	0.014	0.02	0.011	0.04	-0.01	0.01	0.015 ***	0.02	0	0.02	-0.043	0.03
Rural	-0.001	0.02	-0.016	0.01	0.011	0.02	0.002	0.01	-0.042	0.01	-0.031 *	0.02	-0.047 *	0.02
Academic concentrator[i] [not an academic concentrator]														
Academic concentrator	-0.031	0.02	-0.044 ***	0.01	0.053 *	0.02	-0.023 **	0.01	0.071 ***	0.02	-0.029	0.02	-0.027	0.02
Sample size (N)	2,190	†	2,190	†	2,190	†	2,023	†	2,190	†	2,190	†	2,190	†

See notes at end of table.

Table B-7B. Average marginal effects of selected student and school characteristics on the probability that CTE participants in the HSLS cohort concentrated in any CTE field, and on the probability that CTE concentrators concentrated in a given CTE field of study for each field of study—continued

† Not applicable.
* p < 0.05; ** p < 0.01; *** p < 0.001.
[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
[b] The manufacturing model contains 2023 members rather than 2190 because 167 Asian students were dropped from the regression. The Asian category was dropped because it perfectly predicted the outcome of not concentrating in manufacturing, and a marginal effect could not be estimated for that category.
[c] Small concentrations includes education and training; finance; law, public safety, corrections and security; and marketing. A CTE field of study was defined as "small" if its number of concentrators made up less than 3.1 percent of all CTE concentrators; this was the threshold at which the models were able to support marginal effects estimation. The HSLS sample included no government and public administration concentrators.
[d] Marginal effect measures the average percentage point change in the predicted probability of having an education outcome associated with a one-unit change in an independent variable, after controlling for the covariation of the variables in the model. The regressions on which these marginal effects are estimated are logistic regression models.
[e] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[f] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[g] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP), if they received test accommodations, and/or if they were receiving special education services as reported by the respondents' parents. Disabilities include specific learning disabilities; developmental delays; autism or other autism spectrum disorders; hearing/vision problems; bone, joint, or muscle problems; intellectual disabilities; and attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD).
[h] Respondents who attended schools in towns were categorized under "Suburban" with respondents who attended schools in suburbs. [i] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
NOTES: CTE = career and technical education; HSLS = High School Longitudinal Study of 2009. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 Update surveys and had transcript data for all four years of high school. The category in brackets for each characteristic is the reference category. The English learner status variable was excluded from the model due to problems with perfect prediction, as the "Not fluent" or "Don't Know" categories perfectly predicted not concentrating in manufacturing.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

APPENDIX C. ELS COHORT POSTSECONDARY OUTCOMES

ELS:2002 and HSLS:09 both contain information on the post-high school plans of students in grade 12. The student background predictors and outcomes used from ELS and from HSLS are similar. However, the outcomes studied are more extensive for ELS because ELS contains data for eight years after high school graduation and HSLS only contains data through the end of high school. This appendix describes measures and procedures used for the analysis of these longer-term outcomes in ELS.

ANALYSIS SAMPLES

For the questions focused on post-high school indicators, the analysis sample uses the grade 12 nationally representative sample in ELS:2002. Because these questions focus on labor market and postsecondary outcomes, this sample provides a larger set of respondents. Analysis sample members were in grade 12 in 2004, responded to both the first follow-up (end of high school survey) and the third follow-up survey, and have complete high school transcript data in the ELS:2002 database.

MEASURES

Student Background, High School Education, and Postsecondary Education

Measures include postsecondary attendance, the level of institution attended, and attainment, as well as labor market outcomes.

Educational and Labor Market Outcomes

The measure for the highest degree earned by an individual categorizes all attainment higher than a bachelor's degree into one category, including post-baccalaureate certificates, master's degrees, post-master's certificates, and doctoral degrees (F3ATTAINMENT). A binary version of this variable describes whether the student ever earned a postsecondary degree.

Students who earned no high school credential, students who only earned a high school credential, and students with some postsecondary attendance but no credential are classified as never having earned a postsecondary credential, whereas students who earned a certificate or degree are counted as having earned a postsecondary credential.

One labor market outcome is whether the student had ever held a job since high school (F2EVRJOB). Students' employment status is measured as of the third follow-up interview in 2012 (F3EMPSTAT). "Working full-time" is defined as working a total of 35 or more hours a week at one or more jobs, and "Working part time" as working fewer than 35 hours a week. For individuals employed in 2011, respondents' individual employment income for the 2011 calendar year is analyzed (F3ERN2011). For disclosure avoidance purposes, F3ERN2011 was top-coded at $600,000.

STATISTICAL PROCEDURES AND METHODS

The study primarily uses descriptive statistics (univariate and bivariate figures and tables) to examine differences in CTE participation rates and outcomes for students at different levels of CTE participation according to student and school characteristics. Because descriptive statistics present simple associations and do not take multiple characteristics such as race/ethnicity and family SES into account, multivariate analyses were used to further explore the differences identified in the descriptive statistics. For continuous outcomes, ordinary-least squares (OLS) regressions were used.

Weighting

For the ELS post-high school cohort, results are weighted by F3F1TSCWT and project to the grade 12 population of 2004 (G12COHRT=1 or 2). BRR weights (F3F1T001 through F3F1T200) are used to adjust standard errors for the complex survey design of ELS:2002.

Multivariate Methods

The multivariate techniques take multiple characteristics (such as race/ethnicity, sex, and family SES) into account at once. Specifically, the report includes OLS and logistic regression models with appropriate adjustments for survey design. Linear regression (for continuous outcomes such as income), logistic (for dichotomous variables) and multinomial logistic regression are the dominant models used in examinations of educational attainment and income research because they describe the association between multiple factors and a single outcome. While the multivariate methods used in this study provide important perspectives on the relative relationship between multiple characteristics and outcomes,

these techniques only provide information on the association between these characteristics and outcomes. The estimates presented here do not support causal inferences.

Ordinary Least Squares Regression

This study used OLS regression to examine the net association between each independent variable included in the model and hourly wage for students' 2012 job. OLS was used because this outcome is a continuous variable. In general, OLS is a statistical method that attempts to find a linear function that most closely approximates the observed data by minimizing the sum of the squares of the deviations between observed and expected values. In other words, this method tries to find a "best-fit" line through a set of observed data points by minimizing the sum of the squared differences between the observed data values and the predicted data values based on the linear approximation. An OLS model may be written as follows:

$$y = \beta_0 + x_1\beta_1 + x_2\beta_2 + \ldots + x_n\beta_n + \varepsilon$$

where y represents an outcome variable of interest; x_i is the i^{th} independent or predicted variable (i=1, 2, …, n) included in the model; the intercept, β_0, represents the estimated value of y when all values of the independent variables (x_1, x_2, …, x_n) are zero; the regression coefficient, β_i, indicates the average change in the predicted value of y that is associated with a one-unit change in x_i while keeping all other independent variables constant in the model; and the error term, ε, assumed to follow a normal distribution and be statically independent (i.e., uncorrelated to each other), have a homogeneous variance and an expected value of zero (Cohen and Cohen 1983). The variable x_i is said to have a significant association with the outcome y if β_i is tested to be statistically significant from zero. More information on OLS can be found in *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences* (Cohen and Cohen 1983).

EDUCATIONAL AND LABOR MARKET OUTCOMES OF THE ELS COHORT

As discussed above, the descriptive and multivariate educational outcomes for the ELS cohort did not vary greatly by CTE status. The primary association between CTE and educational and labor market outcomes is related to who participated in CTE, and these differences in outcomes by CTE status should be viewed with this moderator in mind.

While there were some descriptive associations between CTE participation and educational and labor market outcomes, there were few multivariate associations. CTE participation was

not associated with race/ethnicity, sex and SES gaps in the level of postsecondary institution attended, remedial coursetaking, earning a postsecondary credential, or educational attainment (Tables C-1A through C-4C).

Descriptively, larger proportions of CTE concentrators who were Hispanic (18 percent) earned associate degrees compared with all other CTE concentrators (5–10 percent) and compared with all Hispanic students (10 percent). Additionally, larger proportions of CTE concentrators who were black (19 percent) earned certificates compared with all other CTE concentrators (6–13 percent), and compared with all black students (14 percent). Twenty-seven percent of CTE concentrators from the first SES quartile ended their education with their high school diploma. About one-quarter (26 percent) of female CTE concentrators earned bachelor's and advanced degrees (9 percent), while 20 percent and 3 percent, respectively, of male CTE concentrators earned bachelor's or advanced degrees.

Without controlling for CTE field of study, CTE concentrators are less likely than CTE participants overall, who have taken at least one CTE credit, to have ever attended a postsecondary institution than CTE nonconcentrators. After controlling for CTE field of study, there is no significant difference between the likelihood of enrollment for CTE concentrators and CTE participants. While for all students rural students were less likely to immediately attend a postsecondary institution compared to suburban students, there was no significant difference in the model with only CTE participants.

Educational Outcomes by CTE Field of Study and Student and School Characteristics

Table C-1A. Percentage distribution of the educational attainment level of ELS cohort students, by selected student and school characteristics

Student and school characteristics	High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
All students						
Sex						
Female	8.3	30.5	11.4	10.5	28.7	10.0
Male	14.0	34.6	8.6	8.6	27.7	5.7
Race/ethnicity[a]						
Asian, non-Hispanic	4.5	25.2	7.7	6.4	42.4	13.8
Black, non-Hispanic	10.2	40.3	14.5	9.2	19.8	4.7
Hispanic	12.3	41.8	12.7	10.5	17.7	3.6
White, non-Hispanic	10.7	29.0	8.8	9.6	32.1	9.4
Other, non-Hispanic	18.9	32.6	8.3	10.9	21.3	6.0
Socioeconomic status (SES) quartile[b]						
Lowest quartile	19.6	37.6	13.1	9.9	15.1	3.0
Second quartile	14.7	36.0	13.0	10.2	21.0	4.5
Third quartile	8.1	32.1	8.4	11.4	31.4	8.2
Highest quartile	2.3	24.4	5.9	7.0	44.4	15.7
Disability status[c]						
No disability	9.8	32.5	9.6	9.6	29.6	8.4
Has disability	27.3	32.5	16.1	9.8	9.9	1.9 !
English learner status[d]						
Not fluent	25.1	28.8	17.7	7.0 !	14.6	3.4 !
Fluent	10.7	32.3	9.8	9.7	28.8	8.1
Don't know	16.1	44.8	16.7	8.6 !	5.8 !	‡
School urbanicity						
Urban	10.1	35.7	10.3	8.2	28.4	6.4
Suburban	10.8	31.6	10.2	9.7	28.1	9.0
Rural	12.3	30.8	9.5	11.2	28.3	7.1

See notes at end of table.

Table C-1A. Percentage distribution of the educational attainment level of ELS cohort students, by selected student and school characteristics—continued

! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[b] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[c] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[d] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table C-1B. Percentage distribution of the educational attainment level of ELS cohort students, by access to CTE and selected student and school characteristics

CTE access[a] and student and school characteristics	High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
No access to CTE						
Sex						
Female	6.6	27.1	9.6	10.2	32.0	14.5
Male	10.3	31.9	8.8	8.0	32.2	8.9
Race/ethnicity[b]						
Asian, non-Hispanic	#	19.4 !	‡	‡	57.0	19.0 !
Black, non-Hispanic	‡	41.3	8.5 !	‡	28.1 !	13.4 !
Hispanic	‡	50.3	13.9 !	‡	26.6 !	#
White, non-Hispanic	9.4	28.0	9.6	10.2	30.1	12.7
Other, non-Hispanic	‡	‡	‡	‡	39.3	‡
Socioeconomic status (SES) quartile[c]						
Lowest quartile	24.3	32.6	‡	9.9 !	24.8	‡
Second quartile	13.1	27.8	13.9	12.3	28.4	4.5 !
Third quartile	5.1 !	30.5	9.3 !	10.2	29.7	15.2
Highest quartile	‡	27.9	6.5 !	5.3 !	40.4	18.7
Disability status[d]						
No disability	7.1	29.2	8.5	8.5	33.8	12.8
Has disability	25.5 !	30.1	19.2 !	‡	‡	#
English learner status[e]						
Not fluent	#	‡	‡	‡	‡	‡
Fluent	8.5	29.1	9.2	9.0	32.3	12.0
Don't know	#	‡	#	‡	#	#
School urbanicity						
Urban	‡	34.1 !	‡	‡	44.1	‡
Suburban	8.2	29.1	8.9	8.8	30.9	14.2
Rural	15.1 !	25.9	14.5 !	15.7	27.3	‡
Access to CTE						
Sex						
Female	8.5	30.3	11.8	9.9	29.0	10.0
Male	14.2	34.6	8.7	8.5	27.7	5.5
Race/ethnicity[b]						
Asian, non-Hispanic	5.0	26.1	7.5	6.8	40.7	13.8
Black, non-Hispanic	10.3	41.5	15.9	7.8	19.5	4.1
Hispanic	12.9	40.3	13.4	10.7	17.9	3.9
White, non-Hispanic	10.8	29.1	8.9	9.2	32.4	9.2
Other, non-Hispanic	19.2	34.8	8.4	9.9	18.9	6.3

See notes at end of table.

Table C-1B. Percentage distribution of the educational attainment level of ELS cohort students, by access to CTE and selected student and school characteristics—continued

CTE access[a] and student and school characteristics	High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
Socioeconomic status (SES) quartile[c]						
Lowest quartile	19.7	37.3	13.8	9.7	14.6	3.3
Second quartile	15.1	35.3	13.0	9.8	21.5	4.7
Third quartile	8.2	33.3	8.6	10.5	31.9	7.4
Highest quartile	2.5	23.9	6.0	6.9	44.7	15.8
Disability status[d]						
No disability	9.9	32.4	9.8	9.3	29.8	8.2
Has disability	30.0	32.8	16.6	7.5	9.0	2.3 !
English learner status[e]						
Not fluent	31.3	22.5	18.9	‡	15.3	‡
Fluent	10.8	32.3	10.0	9.3	28.9	8.0
Don't know	17.4	44.6	17.7	8.0 !	6.8 !	‡
School urbanicity						
Urban	10.3	34.8	11.2	7.4	29.1	6.8
Suburban	11.4	31.9	10.2	9.5	27.9	8.6
Rural	12.0	30.9	9.6	10.6	28.7	7.5

Rounds to zero.
! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] Respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in both ELS:2002 and HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[d] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[e] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table C-1C. Percentage distribution of the educational attainment level of ELS cohort students, by CTE participation level and selected student and school characteristics

CTE participation level[a] and student and school characteristics	High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
CTE nonparticipants						
Sex						
Female	4.4	30.5	8.4	6.7	34.3	14.9
Male	10.6	33.1	5.3	4.3 !	35.1	9.7
Race/ethnicity[b]						
Asian, non-Hispanic	6.6 !	24.3	2.8 !	4.0 !	44.9	17.5
Black, non-Hispanic	8.9 !	41.6	8.9 !	5.5 !	23.8	7.2 !
Hispanic	15.9	39.8	8.0	8.4	19.5	5.8 !
White, non-Hispanic	3.9	28.8	7.1	5.0	39.7	15.2
Other, non-Hispanic	‡	19.9 !	‡	10.6 !	31.2	16.9 !
Socioeconomic status (SES) quartile[c]						
Lowest quartile	19.6	34.4	7.8 !	7.8 !	18.1	9.4
Second quartile	9.7	36.8	12.2	8.5	23.4	7.3
Third quartile	4.5 !	34.9	8.6	3.9 !	31.1	15.3
Highest quartile	‡	24.7	3.3 !	4.6	50.6	16.0
Disability status[d]						
No disability	5.8	31.1	6.7	6.0	35.6	13.9
Has disability	19.7 !	36.2	15.2 !	‡	19.7 !	#
English learner status[e]						
Not fluent	22.2 !	‡	24.7 !	‡	14.9 !	‡
Fluent	6.0	31.7	6.5	5.9	35.7	13.4
Don't know	21.4 !	33.3 !	21.0 !	‡	‡	‡
School urbanicity						
Urban	12.0	30.5	7.1	7.9	36.1	4.4
Suburban	3.9	33.1	8.2	4.0	31.8	17.7
Rural	5.4	28.8	5.2	6.8	39.2	14.3
CTE samplers						
Sex						
Female	8.3	29.5	11.8	10.7	29.0	10.2
Male	11.8	36.3	8.0	6.7	29.9	6.8
Race/ethnicity[b]						
Asian, non-Hispanic	3.7 !	26.3	8.0	7.1	42.2	12.5
Black, non-Hispanic	10.4	38.5	15.9	8.5	21.1	4.5
Hispanic	11.5	45.2	12.1	7.4	19.3	3.6 !
White, non-Hispanic	9.0	27.8	8.3	9.4	34.1	11.1
Other, non-Hispanic	18.4	34.8	10.0 !	11.2	19.2	5.5 !

See notes at end of table.

Table C-1C. Percentage distribution of the educational attainment level of ELS cohort students, by CTE participation level and selected student and school characteristics—continued

CTE participation level[a] and student and school characteristics	High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
Socioeconomic status (SES) quartile[c]						
Lowest quartile	16.8	39.2	14.1	8.6	17.8	2.2
Second quartile	14.3	37.8	10.8	9.6	21.7	5.1
Third quartile	7.7	29.4	10.0	10.5	33.7	8.6
Highest quartile	1.4 !	24.4	6.0	6.9	43.1	17.9
Disability status[d]						
No disability	9.0	32.4	9.7	8.7	30.7	9.1
Has disability	22.7	34.4	16.0	12.7	9.6	‡
English learner status[e]						
Not fluent	16.4 !	41.4	11.5 !	4.3 !	19.6 !	‡
Fluent	9.6	32.3	10.0	9.0	29.8	8.8
Don't know	19.9 !	36.0	17.4 !	10.0 !	13.5 !	‡
School urbanicity						
Urban	10.4	37.9	9.6	6.4	27.2	7.9
Suburban	9.6	30.6	10.8	10.0	29.2	9.3
Rural	9.5	30.0	9.1	9.3	33.1	7.9
CTE explorers						
Sex						
Female	9.6	32.9	12.4	14.5	24.8	5.8
Male	12.1	34.9	8.4	11.5	27.9	4.4
Race/ethnicity[b]						
Asian, non-Hispanic	‡	23.0	9.6	8.0 !	42.8	14.8
Black, non-Hispanic	9.4	43.3	10.9	15.4	16.3	4.3 !
Hispanic	12.8	38.5	18.0	13.7	13.7	‡
White, non-Hispanic	10.6	31.6	8.9	12.5	30.6	5.7
Other, non-Hispanic	19.3 !	33.7	6.8 !	14.2 !	22.3	‡
Socioeconomic status (SES) quartile[c]						
Lowest quartile	18.0	38.2	14.6	14.3	11.7	1.9 !
Second quartile	13.2	34.4	13.7	11.5	23.8	3.1
Third quartile	7.4	36.2	5.5	16.3	29.8	4.6
Highest quartile	3.9 !	25.7	6.9	9.3	42.3	12.0
Disability status[d]						
No disability	10.0	34.0	9.6	13.2	27.5	5.2
Has disability	24.6	32.0	22.3	9.2 !	8.8 !	‡
English learner status[e]						
Not fluent	38.7 !	22.7 !	‡	‡	‡	#
Fluent	10.3	33.9	10.2	12.9	27.0	5.2
Don't know	17.2 !	48.4	‡	‡	‡	#

See notes at end of table.

Table C-1C. Percentage distribution of the educational attainment level of ELS cohort students, by CTE participation level and selected student and school characteristics—continued

CTE participation level[a] and student and school characteristics	High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
School urbanicity						
Urban	8.0	37.9	14.3	10.6	23.7	4.7
Suburban	10.7	33.0	9.2	12.7	28.4	5.5
Rural	13.3	32.8	9.6	15.3	24.1	4.5
CTE concentrators						
Sex						
Female	11.6	30.5	12.8	9.5	26.2	9.3
Male	21.5	32.2	11.6	11.2	19.5	2.9
Race/ethnicity[b]						
Asian, non-Hispanic	8.1 !	24.8	13.2 !	5.4 !	37.3	11.2 !
Black, non-Hispanic	11.8	40.3	19.3	6.0 !	18.2	3.7 !
Hispanic	9.6	38.6	12.9	17.8	16.1	‡
White, non-Hispanic	19.6	28.5	10.9	10.5	24.0	6.2
Other, non-Hispanic	27.6	34.3	5.8 !	‡	18.7	‡
Socioeconomic status (SES) quartile[c]						
Lowest quartile	26.6	35.9	12.5	8.3	12.3	2.1 !
Second quartile	20.1	34.1	16.7	11.0	14.8	3.4 !
Third quartile	12.9	30.4	8.5	13.7	28.7	5.8
Highest quartile	5.9	22.1	8.8	8.3	40.7	13.8
Disability status[d]						
No disability	15.0	31.9	12.1	10.4	24.1	5.9
Has disability	40.6	27.7	12.0	11.1	5.2 !	‡
English learner status[e]						
Not fluent	37.7 !	‡	43.8 !	‡	#	‡
Fluent	17.5	31.0	11.8	10.6	22.9	5.6
Don't know	‡	69.6	‡	‡	#	‡
School urbanicity						
Urban	9.2	33.6	11.6	10.5	27.5	6.5
Suburban	19.7	31.0	11.8	9.6	21.8	5.7
Rural	19.9	30.7	12.9	12.1	19.1	4.4

See notes at end of table.

Table C-1C. Percentage distribution of the educational attainment level of ELS cohort students, by CTE participation level and selected student and school characteristics—continued

Rounds to zero.
! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in both ELS:2002 and HSLS:09 are divided into quartiles based on weighted distributions of the variables.
[d] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[e] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table C-2. Percentage of the ELS cohort who had ever earned a postsecondary credential, by access to CTE, CTE participation level, and selected student and school characteristics

		CTE access[a]		CTE participation level[b]			
Student and school characteristics	**Total**	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Sex							
Female	**60.7**	66.3	60.7	64.2	61.7	57.4	57.8
Male	**50.5**	57.8	50.4	54.3	51.4	52.3	45.2
Race/ethnicity[c]							
Asian, non-Hispanic	**70.2**	80.6	68.7	69.2	69.8	75.2	67.1
Black, non-Hispanic	**48.2**	54.3	47.2	45.4	50.0	46.9	47.3
Hispanic	**44.4**	46.9	45.9	41.7	42.3	47.4	49.8
White, non-Hispanic	**60.0**	62.6	59.7	67.0	62.9	57.6	51.5
Other, non-Hispanic	**46.4**	69.3	43.5	67.1	45.9	44.6	36.5
Socioeconomic status (SES) quartile[d]							
Lowest quartile	**41.1**	43.0	41.4	43.0	42.8	42.5	35.1
Second quartile	**48.6**	59.1	48.9	51.4	47.2	52.0	45.8
Third quartile	**59.5**	64.4	58.4	58.9	62.9	56.2	56.7
Highest quartile	**73.1**	70.9	73.3	74.5	73.9	70.5	71.5
Disability status[e]							
No disability	**57.2**	63.7	57.2	62.2	58.2	55.5	52.5
Has disability	**37.7**	44.3	35.3	36.7	40.6	43.3	29.8
English learner status[f]							
Not fluent	**42.7**	70.3 !	42.9	47.7	39.8	38.6	53.3 !
Fluent	**56.4**	62.5	56.3	61.6	57.6	55.3	50.9
Don't know	**32.4**	‡	34.1	25.8 !	43.1	34.4 !	18.1 !
School urbanicity							
Urban	**53.2**	63.7	54.4	55.5	51.2	53.4	56.0
Suburban	**56.9**	62.8	56.1	61.7	59.3	55.8	48.9
Rural	**56.2**	59.0	56.3	65.5	59.4	53.5	48.5

See notes at end of table.

Table C-2. Percentage of the ELS cohort who had ever earned a postsecondary credential, by access to CTE, CTE participation level, and selected student and school characteristics—continued

! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] Respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site.
[b] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[f] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Labor Market Outcomes

Table C-3A. Percentage distribution of the labor market outcomes of ELS cohort students, by selected student and school characteristics

Student and school characteristics	Ever held a job	Employment status, June 2013[a]			
		Working full time	Working part time	Unemployed	Out of labor force
All students					
Sex					
Female	93.2	65.1	15.8	10.7	8.4
Male	93.4	77.6	9.9	9.1	3.5
Race/ethnicity[b]					
Asian, non-Hispanic	78.9	61.8	15.5	12.7	10.0
Black, non-Hispanic	91.5	63.8	16.6	16.2	3.4
Hispanic	89.3	65.7	14.5	14.1	5.7
White, non-Hispanic	95.8	75.2	11.3	7.1	6.4
Other, non-Hispanic	91.9	62.2	17.7	13.1	7.1
Socioeconomic status (SES) quartile[c]					
Lowest quartile	91.6	65.6	14.2	12.9	7.4
Second quartile	92.8	71.1	12.2	11.5	5.3
Third quartile	94.6	72.8	13.6	8.6	5.0
Highest quartile	94.0	74.2	12.0	7.0	6.9
Disability status[d]					
No disability	93.7	71.8	12.9	9.3	6.1
Has disability	88.3	61.5	14.1	18.6	5.8
English learner status[e]					
Not fluent	74.7	62.8	17.3	13.9	6.1
Fluent	93.7	71.4	12.8	9.7	6.1
Don't know	90.0	58.1	17.7	17.2	7.0
School urbanicity					
Urban	90.9	66.3	14.9	12.1	6.7
Suburban	93.2	71.7	13.1	10.0	5.3
Rural	96.3	74.9	10.6	7.3	7.2

[a] In the labor force includes employed full time, employed part time, or unemployed.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[d] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[e] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table C-3B. Percentage distribution of the labor market outcomes of ELS cohort students, by access to CTE and selected student and school characteristics

CTE access[b] and student and school characteristics	Ever held a job	Employment status, June 2013[a]			
		Working full time	Working part time	Unemployed	Out of labor force
No access to CTE					
Sex					
Female	94.4	71.1	16.2	7.2	5.6
Male	93.9	82.3	6.4	7.0	4.3 !
Race/ethnicity[c]					
Asian, non-Hispanic	77.5	59.5	12.9 !	19.3 !	8.3 !
Black, non-Hispanic	90.8	69.2	20.5	6.9 !	‡
Hispanic	100.0	63.0	‡	‡	‡
White, non-Hispanic	96.7	80.8	9.8	5.0	4.4 !
Other, non-Hispanic	84.0	66.2	21.0 !	‡	#
Socioeconomic status (SES) quartile[d]					
Lowest quartile	93.1	74.1	15.3 !	7.1 !	‡
Second quartile	95.6	73.0	13.7	8.4 !	5.0 !
Third quartile	96.2	74.1	12.4	9.8	3.8 !
Highest quartile	91.3	81.9	8.0	3.4 !	6.8 !
Disability status[e]					
No disability	95.2	77.7	11.5	6.2	4.7
Has disability	79.1	55.8	15.1 !	‡	‡
English learner status[f]					
Not fluent	96.1	87.8	‡	#	#
Fluent	94.1	76.5	11.3	7.2	5.1
Don't know	100.0 !	‡	‡	#	#
School urbanicity					
Urban	89.9	67.0	12.1 !	‡	‡
Suburban	94.3	78.2	10.9	6.7	4.2 !
Rural	97.2	74.3	15.8 !	‡	‡
Access to CTE					
Sex					
Female	93.4	64.8	15.6	10.8	8.8
Male	93.5	78.2	10.0	8.7	3.2
Race/ethnicity[c]					
Asian, non-Hispanic	79.7	60.6	16.8	11.8	10.9
Black, non-Hispanic	91.0	63.9	15.7	17.7	2.7
Hispanic	89.7	65.3	16.5	13.0	5.2
White, non-Hispanic	95.7	75.2	11.0	7.3	6.5
Other, non-Hispanic	92.9	63.5	16.3	12.6	7.6

See notes at end of table.

Table C-3B. Percentage distribution of the labor market outcomes of ELS cohort students, by access to CTE and selected student and school characteristics—continued

CTE access[b] and student and school characteristics	Ever held a job	Employment status, June 2013[a]			
		Working full time	Working part time	Unemployed	Out of labor force
Socioeconomic status (SES) quartile[d]					
Lowest quartile	91.3	64.7	14.3	13.3	7.7
Second quartile	93.1	72.1	11.7	11.3	5.0
Third quartile	95.0	73.5	13.1	8.3	5.0
Highest quartile	94.3	74.1	12.6	6.5	6.8
Disability status[e]					
No disability	93.8	71.9	12.8	9.2	6.1
Has disability	89.5	62.4	13.5	18.4	5.7
English learner status[f]					
Not fluent	78.7	63.8	19.2	12.4 !	‡
Fluent	93.8	71.5	12.7	9.7	6.1
Don't know	89.5	61.0	19.7	14.3 !	5.0 !
School urbanicity					
Urban	91.4	67.0	15.1	11.4	6.6
Suburban	93.1	71.6	13.1	10.0	5.2
Rural	96.4	74.9	10.1	7.6	7.4

Rounds to zero.
! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] In the labor force includes employed full time, employed part time, or unemployed.
[b] Respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[f] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table C-3C. Percentage distribution of the labor market outcomes of ELS cohort students, by CTE participation level and selected student and school characteristics

CTE participation level[b] and student and school characteristics	Ever held a job	Employment status, June 2013[a]			
		Working full time	Working part time	Unemployed	Out of labor force
CTE nonparticipants					
Sex					
Female	92.9	66.4	15.8	9.4	8.4
Male	91.7	74.4	9.7	12.0	3.9
Race/ethnicity[c]					
Asian, non-Hispanic	76.3	60.9	16.2	10.8	12.0
Black, non-Hispanic	93.9	57.6	21.6	17.6	‡
Hispanic	88.7	63.7	11.3	17.9	7.2 !
White, non-Hispanic	95.1	74.7	12.4	6.8	6.1
Other, non-Hispanic	84.6	51.8	15.9 !	14.2 !	18.1 !
Socioeconomic status (SES) quartile[d]					
Lowest quartile	87.4	61.7	10.2	17.7	10.5
Second quartile	91.7	71.0	13.7	12.2	3.1 !
Third quartile	95.0	70.8	17.4	6.5	5.4
Highest quartile	93.3	71.0	12.2	8.9	8.0
Disability status[e]					
No disability	93.0	70.8	13.4	9.3	6.5
Has disability	84.0	49.8	15.9 !	24.7	9.6 !
English learner status[f]					
Not fluent	67.0	64.4	20.3 !	‡	‡
Fluent	93.3	70.2	13.4	9.9	6.5
Don't know	79.2	40.2	‡	27.9 !	18.8 !
School urbanicity					
Urban	90.8	64.8	15.2	11.8	8.2
Suburban	91.7	69.8	14.7	9.9	5.7
Rural	97.0	75.7	7.9	9.3	7.2
CTE samplers					
Sex					
Female	94.0	65.6	15.8	10.4	8.2
Male	91.9	#	10.4	9.2	4.0
Race/ethnicity[c]					
Asian, non-Hispanic	79.8	60.2	15.5	14.1	10.2
Black, non-Hispanic	92.5	67.3	15.3	14.3	3.1 !
Hispanic	89.2	66.0	15.2	13.3	5.6
White, non-Hispanic	95.9	74.5	11.6	7.0	6.9
Other, non-Hispanic	89.1	57.2	20.0	14.6	8.3 !

See notes at end of table.

Table C-3C. Percentage distribution of the labor market outcomes of ELS cohort students, by CTE participation level and selected student and school characteristics—continued

CTE participation level[b] and student and school characteristics	Ever held a job	Employment status, June 2013[a]			
		Working full time	Working part time	Unemployed	Out of labor force
Socioeconomic status (SES) quartile[d]					
Lowest quartile	92.1	64.3	14.5	14.6	6.6
Second quartile	92.0	68.8	14.8	10.1	6.3
Third quartile	94.2	73.5	11.9	9.2	5.4
Highest quartile	93.9	74.1	12.5	6.2	7.2
Disability status[e]					
No disability	93.5	71.1	13.4	9.1	6.4
Has disability	86.0	58.8	13.6	21.6	6.0 !
English learner status[f]					
Not fluent	74.6	62.3	14.4 !	12.6 !	‡
Fluent	93.4	70.6	13.4	9.7	6.3
Don't know	94.2	63.3	12.3 !	21.0 !	‡
School urbanicity					
Urban	91.2	65.0	15.2	12.4	7.5
Suburban	92.9	71.9	13.1	9.5	5.6
Rural	96.3	74.1	11.8	7.4	6.8
CTE explorers					
Sex					
Female	92.8	62.4	15.9	12.4	9.3
Male	94.5	77.4	11.1	8.3	3.2
Race/ethnicity[c]					
Asian, non-Hispanic	75.1	64.9	16.8	13.3	5.0 !
Black, non-Hispanic	92.1	59.0	16.2	21.0	3.7 !
Hispanic	88.3	63.1	17.9	14.3	4.7 !
White, non-Hispanic	95.9	74.3	11.4	7.0	7.3
Other, non-Hispanic	96.1	68.5	18.0	11.9 !	‡
Socioeconomic status (SES) quartile[d]					
Lowest quartile	91.8	64.1	15.9	11.0	9.0
Second quartile	94.9	71.3	11.2	12.4	5.2
Third quartile	94.3	69.7	15.9	10.2	4.2 !
Highest quartile	93.5	76.5	10.3	6.9	6.4
Disability status[e]					
No disability	93.8	70.4	13.2	10.2	6.2
Has disability	91.9	66.6	16.2 !	11.5 !	5.7 !
English learner status[f]					
Not fluent	69.8	57.8	21.3 !	21.0 !	#
Fluent	94.1	70.7	12.9	10.0	6.3
Don't know	90.9	46.6	36.9 !	‡	‡

See notes at end of table.

Table C-3C. Percentage distribution of the labor market outcomes of ELS cohort students, by CTE participation level and selected student and school characteristics—continued

CTE participation level[b] and student and school characteristics	Ever held a job	Employment status, June 2013[a]			
		Working full time	Working part time	Unemployed	Out of labor force
School urbanicity					
Urban	88.5	67.1	15.2	13.0	4.7 !
Suburban	93.8	69.9	13.5	11.6	5.0
Rural	97.4	73.2	11.7	5.5	9.6
CTE concentrators					
Sex					
Female	91.7	65.4	15.9	10.9	7.9
Male	95.6	81.9	7.7	7.9	2.6
Race/ethnicity[c]					
Asian, non-Hispanic	86.0	67.5	12.2 !	8.0 !	12.3 !
Black, non-Hispanic	86.6	65.3	16.8	14.0	3.8 !
Hispanic	91.5	71.0	11.8	11.5	5.7 !
White, non-Hispanic	95.8	78.2	9.6	7.7	4.6
Other, non-Hispanic	99.1	73.5	13.2 !	10.3 !	‡
Socioeconomic status (SES) quartile[d]					
Lowest quartile	92.7	71.8	13.8	9.1	5.3
Second quartile	92.7	75.2	7.5	12.6	4.6
Third quartile	95.3	77.1	11.1	7.2	4.6
Highest quartile	96.1	76.9	12.7	6.0	4.4 !
Disability status[e]					
No disability	94.3	75.8	10.9	8.4	4.9
Has disability	91.1	68.7	12.2 !	16.1	‡
English learner status[f]					
Not fluent	100.0	72.0	‡	‡	‡
Fluent	93.9	75.1	11.0	9.3	4.7
Don't know	92.3	79.2	‡	#	‡
School urbanicity					
Urban	92.5	71.2	13.2	10.9	4.7 !
Suburban	94.2	75.3	11.2	9.0	4.6
Rural	94.7	77.9	9.1	8.0	5.0

See notes at end of table.

Table C-3C. Percentage distribution of the labor market outcomes of ELS cohort students, by CTE participation level and selected student and school characteristics—continued

Rounds to zero.
! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] In the labor force includes employed full time, employed part time, or unemployed.
[b] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[c] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[d] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[e] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[f] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Educational Attainment

Table C-4A. Median earnings of the ELS cohort, by level of educational attainment and selected student and school characteristics

Student and school characteristics	**Median earnings (Total)**	Educational attainment: High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
All students							
Sex							
Female	**$23,000**	$18,000	$20,000	$20,000	$23,000	$30,000	$30,000
Male	**30,000**	27,000	25,000	30,000	28,000	35,000	26,100
Race/ethnicity[a]							
Asian, non-Hispanic	**27,000**	23,000	22,000	24,000	24,100	35,000	30,000
Black, non-Hispanic	**20,000**	20,000	19,000	18,000	22,000	29,000	24,000
Hispanic	**24,000**	19,000	21,600	22,500	24,000	29,100	37,000
White, non-Hispanic	**27,500**	25,000	25,000	25,000	27,000	33,000	30,000
Other, non-Hispanic	**22,000**	22,000	20,000	23,000	22,000	30,000	‡
Socioeconomic status (SES) quartile[b]							
Lowest quartile	**23,000**	22,000	21,000	22,000	23,000	30,000	37,000
Second quartile	**25,000**	25,000	22,000	23,000	26,000	30,000	30,000
Third quartile	**27,000**	24,000	24,000	25,000	26,000	32,800	30,000
Highest quartile	**29,000**	22,000	23,000	21,000	26,000	33,000	29,000
Disability status[c]							
No disability	**25,500**	24,500	22,000	24,000	25,000	32,000	30,000
Has disability	**21,000**	20,000	22,000	20,000	22,000	31,200	40,000
English learner status[d]							
Not fluent	**21,000**	20,000	15,000	19,000 !	24,000 !	35,000	31,000 !
Fluent	**25,000**	24,000	22,500	23,000	25,000	32,000	30,000
Don't know	**21,000**	34,000	21,000	20,000	‡	27,000 !	‡
School urbanicity							
Urban	**24,000**	25,000	21,000	21,000	23,000	29,000	26,400
Suburban	**27,000**	24,000	23,700	22,000	26,000	33,000	30,000
Rural	**26,000**	22,000	20,000	26,000	26,000	32,000	30,000

See notes at end of table.

Table C-4A. Median earnings of the ELS cohort, by level of educational attainment and selected student and school characteristics—continued

! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[b] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[c] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[d] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table C-4B. Median earnings of the ELS cohort, by level of educational attainment, access to CTE, and selected student and school characteristics

CTE access[a] and student and school characteristics	Median earnings (Total)	Educational attainment: High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
No access to CTE							
Sex							
Female	**$25,000**	$12,000	$21,000	$24,000	$23,000	$33,000	$30,000
Male	**35,000**	30,000	32,000	35,000	31,000	41,000	29,000 !
Race/ethnicity[b]							
Asian, non-Hispanic	**40,000**	#	30,000 !	‡	65,000 !	36,000	45,000 !
Black, non-Hispanic	**20,000**	‡	18,000	17,000 !	60,000 !	20,000	35,000
Hispanic	**25,000**	#	17,000 !	60,000 !	‡	40,000 !	—
White, non-Hispanic	**30,000**	22,000	27,200	25,000	29,000	40,000	30,000
Other, non-Hispanic	**22,000**	‡	40,000 !	25,000 !	‡	30,000	120,000 !
Socioeconomic status (SES) quartile[c]							
Lowest quartile	**26,000**	26,000	25,000	17,000	32,000	27,500 !	52,000 !
Second quartile	**28,000**	25,000	23,000	38,000	16,400	36,000	‡
Third quartile	**30,000**	13,000 !	30,000	25,000	30,000	35,000	38,000
Highest quartile	**30,000**	‡	30,000	14,000	38,000	38,000	30,000
Disability status[d]							
No disability	**30,000**	22,000	28,000	25,000	28,800	35,500	30,000
Has disability	**25,000**	48,000	25,000 !	17,000 !	30,000 !	‡	—
English learner status[e]							
Not fluent	**32,000** !	#	32,000 !	# !	65,000 !	‡	45,000 !
Fluent	**30,000**	22,000	27,200	25,000	28,800	35,000	30,000
Don't know	**‡**	#	‡	#	900 !	#	—
School urbanicity							
Urban	**25,000**	30,000 !	18,000	25,000	60,000	25,000	37,500 !
Suburban	**30,000**	22,000	28,000	21,000	28,800	35,500	30,000
Rural	**32,000**	‡	25,000	45,000 !	29,000	42,000	114,800 !
Access to CTE							
Sex							
Female	**23,000**	18,000	20,000	20,000	23,000	30,000	30,000
Male	**29,000**	26,000	25,000	30,000	30,000	34,000	26,100
Race/ethnicity[b]							
Asian, non-Hispanic	**26,000**	22,000	21,000	20,000 !	20,000	35,000	28,000
Black, non-Hispanic	**20,000**	20,000	18,200	19,000	25,000	26,000	18,000
Hispanic	**23,000**	19,000	22,000	22,000	23,000	29,000	35,000
White, non-Hispanic	**28,000**	25,000	25,000	25,000	26,000	32,000	30,000
Other, non-Hispanic	**22,000**	22,000	20,000	23,000	20,000	31,000	‡

See notes at end of table.

Table C-4B. Median earnings of the ELS cohort, by level of educational attainment, access to CTE, and selected student and school characteristics—continued

CTE access[a] and student and school characteristics	**Median earnings (Total)**	Educational attainment: High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
Socioeconomic status (SES) quartile[c]							
Lowest quartile	**22,000**	22,000	22,000	22,000	20,000	29,100	37,000
Second quartile	**25,000**	25,000	21,000	24,000	27,000	29,000	30,000
Third quartile	**27,000**	25,000	25,000	25,000	25,000	32,000	28,500
Highest quartile	**30,000**	24,000	23,000	25,000	25,000	33,400	30,000
Disability status[d]							
No disability	**25,000**	25,000	22,900	24,000	25,000	32,000	30,000
Has disability	**21,000**	20,000	22,000	20,000	24,000 !	31,200	40,000
English learner status[e]							
Not fluent	**21,000**	20,000 !	16,000	20,000 !	‡	35,000	31,000 !
Fluent	**25,000**	24,000	23,000	23,000	25,000	32,000	30,000
Don't know	**20,000**	21,000	22,000	20,000	‡	45,000	‡
School urbanicity							
Urban	**24,000**	25,000	21,600	21,000	23,000	29,000	28,500
Suburban	**26,000**	24,000	23,000	22,000	26,000	33,000	30,000
Rural	**26,000**	23,700	22,000	25,000	25,200	31,500	30,000

—Not available.
Rounds to zero.
! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] Respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on-site or off-site.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[d] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[e] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table C-4C. Median earnings of the ELS cohort, by level of educational attainment, CTE participation level, and selected student and school characteristics

CTE participation level[a] and student and school characteristics	Median earnings (Total)	Educational attainment: High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
CTE nonparticipants							
Sex							
Female	**$24,000**	$11,000	$22,000	$20,000	$24,900	$30,000	$25,000
Male	**27,000**	25,000	27,000	22,000	20,000	32,000	30,000
Race/ethnicity[b]							
Asian, non-Hispanic	**30,000**	23,000 !	15,000	34,300 !	‡	38,000	32,000 !
Black, non-Hispanic	**22,000**	27,000	20,000 !	14,500	‡	24,000	28,000
Hispanic	**24,000**	15,000 !	21,300	22,500 !	24,000	25,000	44,000
White, non-Hispanic	**25,000**	16,000	23,400	22,000	24,000	31,700	25,000
Other, non-Hispanic	**27,000** !	27,000 !	25,000	23,000 !	78,000	30,000	‡
Socioeconomic status (SES) quartile[c]							
Lowest quartile	**25,000**	20,000	23,000	18,000	24,000	32,000	28,300
Second quartile	**24,000**	15,000 !	22,000	20,000	22,000	32,000	43,400 !
Third quartile	**26,000**	22,000	23,000	22,000	24,900 !	29,000	30,000
Highest quartile	**26,100**	‡	23,000	21,000	24,000	31,000	21,500
Disability status[d]							
No disability	**25,000**	22,000	23,000	22,000	24,000	30,000	25,000
Has disability	**18,000**	‡	‡	14,500 !	24,000 !	35,000	—
English learner status[e]							
Not fluent	**16,000** !	‡	30,000	4,000 !	65,000 !	35,000 !	‡
Fluent	**25,000**	22,000	23,000	22,000	24,000	30,000	26,100
Don't know	**14,500**	30,000	‡	14,500 !	1,000 !	45,000 !	22,000 !
School urbanicity							
Urban	**24,000**	21,000	22,000	22,000	20,000	29,000	40,000
Suburban	**25,000**	25,000	23,000	20,000	24,000	32,000	28,000
Rural	**26,000**	22,000	25,000	29,000	25,000	31,000	25,000
CTE samplers							
Sex							
Female	**24,000**	18,000	20,000	20,000	24,100	30,000	35,000
Male	**28,000**	24,000	25,000	28,000	27,000	33,000	24,000
Race/ethnicity[b]							
Asian, non-Hispanic	**27,000**	18,000	27,000	24,000	24,100	31,100	38,000
Black, non-Hispanic	**20,000**	20,000	18,200	19,000	23,000	32,000	24,700
Hispanic	**24,000**	16,000	23,000	22,000	24,000	30,000	37,000
White, non-Hispanic	**27,000**	23,000	25,000	23,000	27,000	32,800	30,000
Other, non-Hispanic	**20,000**	22,000	20,000	25,000	15,000	30,000	20,000 !

See notes at end of table.

Table C-4C. Median earnings of the ELS cohort, by level of educational attainment, CTE participation level, and selected student and school characteristics—continued

CTE participation level[a] and student and school characteristics	**Median earnings (Total)**	Educational attainment: High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
Socioeconomic status (SES) quartile[c]							
Lowest quartile	**23,000**	22,000	20,000	22,000	24,000	32,300	41,900
Second quartile	**24,000**	22,000	20,000	16,000	25,000	30,000	30,000
Third quartile	**27,000**	24,000	25,000	25,000	27,000	33,000	31,000
Highest quartile	**29,000**	14,000 !	25,000	20,000	25,000	33,000	30,000
Disability status[d]							
No disability	**25,000**	22,000	23,000	22,000	25,000	32,000	30,000
Has disability	**20,000**	22,000	22,000	16,000	22,000 !	22,000	64,000
English learner status[e]							
Not fluent	**27,000**	‡	15,000 !	25,000	25,000 !	27,000	31,000 !
Fluent	**25,000**	22,000	22,900	21,000	25,000	32,000	30,000
Don't know	**22,000**	‡	‡	22,000 !	17,400 !	26,000 !	12,000 !
School urbanicity							
Urban	**22,500**	25,000	20,000	20,000	22,000	29,000	30,000
Suburban	**27,000**	21,000	25,000	20,000	26,000	33,000	30,000
Rural	**25,000**	20,000	19,000	25,000	25,200	32,300	35,000
CTE explorers							
Sex							
Female	**21,000**	19,000	20,000	20,000	21,000	28,000	30,300
Male	**30,000**	30,000	25,000	28,000	29,000	34,000	25,000
Race/ethnicity[b]							
Asian, non-Hispanic	**25,000**	33,000 !	19,500	‡	20,000	35,000	‡
Black, non-Hispanic	**20,000**	21,000 !	18,000	15,000 !	26,000	27,000	‡
Hispanic	**21,000**	27,000	20,000	20,000	24,000	28,000	‡
White, non-Hispanic	**28,000**	30,000	24,000	25,000	28,000	32,000	32,600
Other, non-Hispanic	**25,000**	25,000	18,000	24,000 !	20,000 !	34,000	50,000 !
Socioeconomic status (SES) quartile[c]							
Lowest quartile	**22,000**	25,000	20,000	24,000	20,000	23,000	20,000 !
Second quartile	**25,000**	28,000	23,700	18,000	26,000	32,000	25,000
Third quartile	**28,000**	28,000	22,000	30,000	25,000	35,000	30,300
Highest quartile	**28,000**	32,000	21,000	22,000	28,000	32,000	32,600
Disability status[d]							
No disability	**25,000**	28,000	21,000	25,000	25,000	32,000	30,000
Has disability	**25,000**	28,000	25,000	13,000 !	‡	‡	‡

See notes at end of table.

Table C-4C. Median earnings of the ELS cohort, by level of educational attainment, CTE participation level, and selected student and school characteristics—continued

CTE participation level[a] and student and school characteristics	Median earnings (Total)	Educational attainment: High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
English learner status[e]							
Not fluent	**15,000** !	21,000	‡	‡	‡	35,000	—
Fluent	**25,000**	28,000	22,000	24,000	26,000	32,000	30,000
Don't know	**26,800**	45,000 !	30,000 !	30,000 !	‡	‡	—
School urbanicity							
Urban	**25,000**	25,000	22,000	25,000	25,000	26,500	20,000
Suburban	**26,000**	28,000	21,000	22,000	26,000	33,000	30,000
Rural	**26,000**	28,000	23,000	25,000	23,200	31,000	30,300
CTE concentrators							
Sex							
Female	**22,000**	19,000	18,000	20,000	21,000	30,000	29,000
Male	**30,000**	29,800	26,000	36,000	32,000	38,000	20,100
Race/ethnicity[b]							
Asian, non-Hispanic	**25,800**	40,000 !	24,000	24,000 !	‡	32,000	37,000
Black, non-Hispanic	**18,000**	16,000	18,000	20,000	14,000	26,000	‡
Hispanic	**25,000**	28,800	24,000	30,000	25,000	29,000	‡
White, non-Hispanic	**30,000**	26,000	25,000	35,000	30,000	36,000	28,000
Other, non-Hispanic	**20,000**	20,000	20,000	‡	30,000	22,000	40,000 !
Socioeconomic status (SES) quartile[c]							
Lowest quartile	**23,000**	23,000	22,400	20,000 !	24,000	30,000	36,500
Second quartile	**29,000**	29,800	20,000	35,000	38,000	28,000	33,000
Third quartile	**27,000**	25,000	25,000	30,000	23,000	32,000	20,000
Highest quartile	**34,000**	14,000 !	20,000	35,000	36,000	40,000	26,000
Disability status[d]							
No disability	**28,000**	27,000	24,000	30,000	27,000	35,000	28,000
Has disability	**20,000**	19,000	17,000	33,000	14,000 !	42,000	50,000 !
English learner status[e]							
Not fluent	**30,000** !	‡	44,000 !	‡	45,000 !	#	66,000 !
Fluent	**27,200**	25,000	23,000	30,000	26,000	35,000	28,000
Don't know	**22,000**	8,000 !	21,000 !	‡	40,000 !	#	‡
School urbanicity							
Urban	**25,000**	24,000	22,000	25,000	23,000	30,000	21,000
Suburban	**28,000**	25,000	25,000	30,000	25,000	35,000	30,000
Rural	**29,800**	24,500	20,000	37,000	32,000	33,000	30,000

See notes at end of table.

Table C-4C. Median earnings of the ELS cohort, by level of educational attainment, CTE participation level, and selected student and school characteristics—continued

—Not available.
! Interpret data with caution. Standard error is 5 percentage points or greater.
‡ Reporting standards not met.
[a] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
[c] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in ELS:2002 are divided into quartiles based on weighted distributions of the variables.
[d] Respondents are defined as having a disability if they had an Individualized Education Plan (IEP) and/or if they received test accommodations. Disabilities include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbances, multiple disabilities, hearing impairment, orthopedic impairment, other health impairment, visual impairment, autism, deaf/blindness, and other disabilities.
[e] Respondents are coded as "Don't Know" if they were nonnative English speakers whose fluency was unknown. Respondents who were partially fluent were counted as not being fluent, while native English speakers were counted as being fluent.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

APPENDIX D. STANDARD ERROR TABLES

Table D-1. Standard errors for table 1: Percentage of CTE concentrators and explorers in the ELS and HSLS cohorts, by number of CTE credits and field of study

CTE concentrators/explorers[a]	ELS cohort	HSLS cohort
CTE concentrators		
All CTE concentrators	†	†
Percentage of CTE concentrators with more than 3 CTE credits	0.68	0.90
Percentage of CTE concentrators with a single CTE concentration	0.74	0.93
Percentage of CTE concentrators with multiple CTE concentrations	0.74	0.93
Percentage of CTE concentrators who are also CTE explorers	1.66	2.26
CTE explorers		
All CTE explorers	†	†
Percentage of CTE explorers with more than 3 CTE credits	1.35	1.51
Percentage of CTE explorers with 2 or more credits in a single CTE field	1.36	1.79
Percentage of CTE explorers with 2 or more credits in multiple CTE fields	0.92	1.30
Percentage of CTE explorers with 2 or more credits in any CTE field	1.32	1.81

† Not applicable.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table D-2. Standard errors for table 2: Percentage distribution and mean credits of students in the ELS cohort who had earned at least one CTE credit and were CTE concentrators, by CTE participation level and CTE field of study

	Earned at least one CTE credit		CTE concentrators		
CTE participation level and CTE field of study	Percent	Mean credits	Percent	Mean credits	No courses in CTE or CTE field of study
All students	**1.00**	**0.04**	**0.74**	**0.10**	**0.90**
CTE field of study					
Agriculture, food, and natural resources	0.51	0.03	0.31	0.14	0.68
Architecture and construction	0.63	0.02	0.28	0.26	0.73
Arts, A/V technology, and communication	0.76	0.02	0.23	0.09	0.84
Business management and administration	0.87	0.01	0.23	0.09	0.94
Education and training	0.13	0.05	†	0.94	0.14
Finance	0.46	0.02	0.04	0.56	0.46
Government and public administration	†	†	†	†	†
Health science	0.34	0.03	0.17	0.24	0.42
Hospitality and tourism	0.40	0.03	0.10	0.36	0.44
Human services	0.43	0.03	0.13	0.25	0.48
Information technology	1.28	0.01	0.23	0.10	1.34
Law, public safety, corrections, and security	0.28	0.03	0.04	0.73	0.29
Manufacturing	0.42	0.04	0.14	0.34	0.46
Marketing	0.41	0.03	0.17	0.12	0.45
Science, technology, engineering, and mathematics	0.24	0.06	†	0.96	0.24
Transportation	0.37	0.04	0.17	0.18	0.44

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table D-3. Standard errors for table 3: Percentage distribution and mean credits of students in the HSLS cohort who had earned at least one CTE credit and were CTE concentrators, by CTE participation level and CTE field of study

	Earned at least one CTE credit		CTE concentrators		
CTE participation level and CTE field of study	Percent	Mean credits	Percent	Mean credits	No courses in CTE or CTE field of study
All students	**1.25**	**0.05**	**1.04**	**0.11**	**0.96**
CTE field of study					
Agriculture, food, and natural resources	0.71	0.04	0.33	0.13	0.91
Architecture and construction	0.60	0.03	0.23	0.16	0.66
Arts, A/V technology, and communication	0.70	0.02	0.24	0.11	0.72
Business management and administration	0.91	0.01	0.26	0.10	0.99
Education and training	0.34	0.05	0.15	0.45	0.35
Finance	0.46	0.03	0.09	0.29	0.46
Government and public administration	†	0.32	†	†	0.03
Health science	1.00	0.04	0.39	0.18	1.09
Hospitality and tourism	0.52	0.03	0.18	0.23	0.59
Human services	0.30	0.04	0.15	0.27	0.37
Information technology	1.22	0.02	0.19	0.13	1.27
Law, public safety, corrections, and security	0.43	0.04	0.08	0.33	0.44
Manufacturing	0.51	0.04	0.11	0.33	0.54
Marketing	0.55	0.02	0.14	0.20	0.59
Science, technology, engineering, and mathematics	0.56	0.02	0.15	0.12	0.62
Transportation	0.39	0.04	0.19	0.19	0.44

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table D-4. Standard errors for table 4: Percentage distribution of students in the ELS and HSLS cohorts by selected student and school characteristics

Student and school characteristics	ELS cohort Total	Student and school characteristics	HSLS cohort Total
Sex		Sex	
Female	**0.66**	Female	**0.77**
Male	**0.66**	Male	**0.77**
Race/ethnicity		Race/ethnicity	
Asian, non-Hispanic	**0.28**	Asian, non-Hispanic	**0.44**
Black, non-Hispanic	**0.68**	Black, non-Hispanic	**0.85**
Hispanic	**0.78**	Hispanic	**0.99**
White, non-Hispanic	**1.02**	White, non-Hispanic	**1.19**
Other, non-Hispanic	**0.37**	Other, non-Hispanic	**0.47**
Socioeconomic status (SES) quartile		Socioeconomic status (SES) quartile	
Lowest quartile	**0.71**	Lowest quartile	**0.97**
Second quartile	**0.60**	Second quartile	**0.75**
Third quartile	**0.58**	Third quartile	**0.72**
Highest quartile	**0.79**	Highest quartile	**0.92**
Disability status		Disability status	
No disability	**0.40**	No disability	**0.48**
Has disability	**0.40**	Has disability	**0.48**
English learner status		English learner status	
Not fluent	**0.19**	Currently ELL	**0.37**
Fluent	**0.25**	Not currently ELL	**0.41**
Don't know	**0.17**	Don't know	**0.19**
School urbanicity		School urbanicity	
Urban	**1.01**	Urban	**0.60**
Suburban	**1.04**	Suburban	**0.55**
Rural	**0.80**	Rural	**0.43**

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table D-5. Standard errors for table 5: Percentage distribution of ELS cohort students' access to CTE and CTE participation level, by selected student and school characteristics

	CTE access		CTE participation level			
Student and school characteristics	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Total	**1.33**	**1.33**	**0.90**	**0.93**	**0.82**	**0.74**
Sex						
Female	1.44	1.44	1.19	1.17	0.95	0.79
Male	1.32	1.32	0.89	1.08	0.98	0.98
Race/ethnicity						
Asian, non-Hispanic	4.17	4.17	2.12	2.46	1.61	1.37
Black, non-Hispanic	2.65	2.65	1.57	2.00	1.56	1.71
Hispanic	1.00	1.00	1.82	1.95	1.71	1.08
White, non-Hispanic	1.61	1.61	1.11	1.10	1.06	0.98
Other, non-Hispanic	2.26	2.26	1.64	2.67	1.95	2.35
Socioeconomic status (SES) quartile						
Lowest quartile	1.18	1.18	1.16	1.41	1.17	1.14
Second quartile	1.30	1.30	0.98	1.33	1.22	1.18
Third quartile	1.52	1.52	1.14	1.49	1.24	1.13
Highest quartile	2.16	2.16	1.68	1.48	1.25	0.94
Disability status						
No disability	1.34	1.34	0.93	0.95	0.86	0.72
Has disability	1.82	1.82	1.80	2.41	1.71	2.12
English learner status						
Not fluent	2.03	2.03	4.59	4.95	3.65	2.59
Fluent	1.35	1.35	0.90	0.95	0.83	0.76
Don't know	†	1.57	3.70	4.25	3.98	3.13
School urbanicity						
Urban	1.68	1.68	1.73	1.98	1.60	1.26
Suburban	2.22	2.22	1.26	1.13	1.14	1.09
Rural	2.16	2.16	1.60	1.87	1.74	1.76

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table D-6. Standard errors for table 6: Percentage distribution of HSLS cohort students' access to CTE and CTE participation level, by selected student and school characteristics

	CTE access		CTE participation level			
Student and school characteristics	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Total	**1.02**	**1.02**	**0.96**	**1.14**	**0.79**	**1.04**
Sex						
Female	1.28	1.28	1.29	1.46	1.00	1.33
Male	0.89	0.89	1.13	1.27	0.99	1.21
Race/ethnicity						
Asian, non-Hispanic	†	4.54	4.82	4.24	2.90	4.08
Black, non-Hispanic	2.47	2.47	2.32	3.25	2.18	2.39
Hispanic	1.64	1.64	1.72	2.82	1.66	2.28
White, non-Hispanic	0.82	0.82	1.02	0.93	0.91	0.95
Other, non-Hispanic	†	1.08	2.29	2.14	2.48	1.44
Socioeconomic status (SES) quartile						
Lowest quartile	1.41	1.41	1.49	2.40	1.32	1.89
Second quartile	1.05	1.05	1.55	2.00	1.48	1.19
Third quartile	1.23	1.23	1.27	1.54	1.28	1.57
Highest quartile	1.44	1.44	1.35	1.28	0.97	1.19
Disability status						
No disability	1.06	1.06	1.03	1.17	0.81	0.95
Has disability	1.07	1.07	1.77	2.87	1.89	3.51
English learner status						
Currently ELL	†	3.85	5.30	5.76	2.80	3.81
Not currently ELL	0.99	0.99	1.01	1.08	0.86	1.02
Don't know	3.46	3.46	4.14	6.37	4.99	4.46
School urbanicity						
Urban	2.61	2.61	2.49	3.09	1.83	2.89
Suburban	1.33	1.33	1.00	1.13	1.01	1.05
Rural	†	0.86	2.24	2.09	1.56	2.10

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table D-7A. Standard errors for table 10A: Percentage of the ELS cohort who had participated in CTE, by CTE field of study and selected student and school characteristics

		CTE fields of study						
Student and school characteristics	**Total**	Agriculture, food, and natural resources	Architecture and Construction	Arts, A/V technology, and communication	Business management and administration	Education and training	Finance	Health science
Sex								
Female	**0.66**	2.47	1.41	1.53	1.26	5.17	2.10	2.66
Male	**0.66**	2.47	1.41	1.53	1.26	5.17	2.10	2.66
Race/ethnicity								
Asian, non-Hispanic	**0.28**	0.34	0.53	0.37	0.39	2.43	0.70	0.62
Black, non-Hispanic	**0.68**	1.57	1.18	1.32	1.32	3.57	1.57	2.32
Hispanic	**0.78**	1.68	1.26	1.31	1.35	5.60	1.40	2.63
White, non-Hispanic	**1.02**	2.45	2.05	1.86	1.91	6.79	2.21	3.01
Other, non-Hispanic	**0.37**	1.35	0.85	0.58	0.56	1.49	0.82	1.19
Socioeconomic status (SES) quartile								
Lowest quartile	**0.71**	1.88	1.40	1.14	1.17	4.78	1.75	2.39
Second quartile	**0.60**	1.59	1.55	1.11	1.14	5.30	2.28	1.97
Third quartile	**0.58**	1.88	1.55	1.05	1.24	4.74	2.39	2.15
Highest quartile	**0.79**	1.46	1.15	1.27	1.12	3.90	1.76	2.00
Disability status								
No disability	**0.40**	1.49	0.91	0.71	0.58	2.69	0.76	1.36
Has disability	**0.40**	1.49	0.91	0.71	0.58	2.69	0.76	1.36
English learner status								
Not fluent	**0.19**	0.33	0.37	0.21	0.22	†	0.30	†
Fluent	**0.25**	0.46	0.60	0.31	0.36	2.47	0.55	0.51
Don't know	**0.17**	0.44	0.48	0.21	0.30	†	†	0.41

See notes at end of table.

Table D-7A. Standard errors for table 10A: Percentage of the ELS cohort who had participated in CTE, by CTE field of study and selected student and school characteristics—continued

		CTE fields of study						
Student and school characteristics	**Total**	Agriculture, food, and natural resources	Architecture and Construction	Arts, A/V technology, and communication	Business management and administration	Education and training	Finance	Health science
School urbanicity								
Urban	**1.01**	1.73	2.09	1.79	1.78	5.85	2.58	3.75
Suburban	**1.04**	4.08	2.62	1.93	2.22	6.61	3.46	3.88
Rural	**0.80**	4.15	2.23	1.71	2.08	†	3.10	3.00
CTE participation level								
Samplers	**0.93**	2.41	1.71	1.67	1.79	6.62	2.49	2.65
Explorers	**0.82**	2.08	1.92	1.49	1.70	5.05	2.32	2.91
Concentrators	**0.74**	2.47	1.94	1.40	1.39	4.34	2.21	3.00

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table D-7B. Standard errors for table 10B: Percentage of the ELS cohort who had participated in CTE, by CTE field of study and selected student and school characteristics

	CTE fields of study							
Student and school characteristics	Hospitality and tourism	Human services	Information technology	Law, public safety, corrections, and security	Manufacturing	Marketing	Science, technology, engineering, and mathematics	Transportation
Sex								
Female	**3.07**	2.18	1.17	4.09	1.81	2.58	4.52	1.49
Male	**3.07**	2.18	1.17	4.09	1.81	2.58	4.52	1.49
Race/ethnicity								
Asian, non-Hispanic	**1.08**	0.35	0.35	0.39	0.53	0.68	0.79	0.61
Black, non-Hispanic	**2.08**	2.23	1.16	3.27	1.97	2.21	3.20	1.46
Hispanic	**3.44**	2.52	1.37	4.24	1.83	1.96	4.38	2.56
White, non-Hispanic	**†**	†	1.66	†	†	2.98	†	3.01
Other, non-Hispanic	**1.47**	0.82	0.52	2.18	1.18	1.49	3.05	1.31
Socioeconomic status (SES) quartile								
Lowest quartile	**2.74**	2.65	1.04	3.03	2.35	2.33	4.56	2.56
Second quartile	**2.05**	2.00	0.93	3.80	2.03	2.17	4.06	2.30
Third quartile	**2.32**	2.17	0.92	2.81	2.25	2.27	4.28	2.29
Highest quartile	**2.14**	1.79	0.86	3.15	1.88	2.23	4.91	1.83
Disability status								
No disability	**2.03**	1.51	0.56	1.44	1.79	1.00	3.08	1.74
Has disability	**2.03**	1.51	0.56	1.44	1.79	1.00	3.08	1.74
English learner status								
Not fluent	**0.92**	1.17	0.25	0.07	0.72	0.58	1.22	0.80
Fluent	**†**	†	0.31	1.29	†	†	†	1.27
Don't know	**0.48**	0.88	0.26	1.28	0.61	0.60	1.22	0.88

See notes at end of table.

Table D-7B. Standard errors for table 10B: Percentage of the ELS cohort who had participated in CTE, by CTE field of study and selected student and school characteristics—continued

	CTE fields of study							
Student and school characteristics	Hospitality and tourism	Human services	Information technology	Law, public safety, corrections, and security	Manufacturing	Marketing	Science, technology, engineering, and mathematics	Transportation
School urbanicity								
Urban	**4.68**	3.18	1.71	5.04	3.93	3.48	5.91	2.56
Suburban	**4.60**	3.93	2.04	5.76	4.35	4.08	6.88	3.87
Rural	**3.93**	2.97	1.81	5.33	3.30	3.01	8.36	3.62
CTE participation level								
Samplers	**3.18**	2.78	1.55	4.52	2.15	2.79	5.38	2.36
Explorers	**3.19**	3.04	1.19	4.54	3.50	2.65	5.60	3.00
Concentrators	**2.31**	2.42	1.14	3.78	3.34	2.90	5.27	2.67

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table D-8A. Standard errors for table 11A: Percentage of the HSLS cohort who had participated in CTE, by CTE field of study and selected student and school characteristics

		CTE fields of study						
Student and school characteristics	**Total**	Agriculture, food, and natural resources	Architecture and Construction	Arts, A/V technology, and communication	Business management and administration	Education and training	Finance	Health science
Sex								
Female	**0.77**	3.35	1.70	1.90	1.50	2.75	3.31	2.28
Male	**0.77**	3.35	1.70	1.90	1.50	2.75	3.31	2.28
Race/ethnicity								
Asian, non-Hispanic	**0.44**	0.30	0.71	0.63	0.60	†	1.04	1.46
Black, non-Hispanic	**0.85**	2.04	1.14	1.31	1.71	2.99	2.56	2.66
Hispanic	**0.99**	2.71	1.83	2.09	2.04	5.99	3.39	3.46
White, non-Hispanic	**1.19**	3.15	2.21	2.19	2.04	5.02	3.60	3.69
Other, non-Hispanic	**0.47**	1.38	1.14	0.95	1.04	3.45	3.05	1.43
Socioeconomic status (SES) quartile								
Lowest quartile	**0.97**	2.19	1.65	1.80	1.61	4.45	2.82	2.13
Second quartile	**0.75**	2.32	1.99	1.59	1.46	4.35	3.13	2.75
Third quartile	**0.72**	2.53	1.92	1.62	1.37	5.49	3.57	2.69
Highest quartile	**0.92**	1.45	1.72	1.61	1.41	3.44	2.91	2.52
Disability status								
No disability	**0.48**	1.61	1.32	0.97	0.89	2.75	1.64	0.78
Has disability	**0.48**	1.61	1.32	0.97	0.89	2.75	1.64	0.78
English learner status								
Currently ELL	**0.29**	0.62	0.42	0.61	0.37	†	0.57	0.54
Not currently ELL	**0.82**	2.55	1.94	1.70	1.53	4.16	2.59	2.52
Don't know	**0.77**	2.46	1.88	1.76	1.47	4.18	2.60	2.63

See notes at end of table.

Table D-8A. Standard errors for table 11A: Percentage of the HSLS cohort who had participated in CTE, by CTE field of study and selected student and school characteristics—continued

		CTE fields of study						
Student and school characteristics	**Total**	Agriculture, food, and natural resources	Architecture and Construction	Arts, A/V technology, and communication	Business management and administration	Education and training	Finance	Health science
School urbanicity								
Urban	**0.60**	2.62	2.91	2.20	2.37	5.38	4.03	6.36
Suburban	**0.55**	†	3.04	2.11	2.49	5.75	4.48	4.88
Rural	**0.43**	4.25	2.95	1.78	2.29	4.26	3.49	3.50
CTE participation level								
Samplers	**1.14**	3.30	2.04	2.15	2.60	4.93	3.35	5.59
Explorers	**0.79**	2.47	2.62	1.97	2.20	5.27	3.70	2.85
Concentrators	**1.04**	2.74	2.47	2.16	2.01	6.07	3.04	4.12

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table D-8b. Standard errors for table 11B: Percentage of the HSLS cohort who had participated in CTE, by CTE field of study and selected student and school characteristics

	CTE fields of study							
Student and school characteristics	Hospitality and tourism	Human services	Information technology	Law, public safety, corrections, and security	Manufacturing	Marketing	Science, technology, engineering, and mathematics	Transportation
Sex								
Female	**2.47**	2.26	1.44	4.76	1.93	3.08	2.21	1.79
Male	**2.47**	2.26	1.44	4.76	1.93	3.08	2.21	1.79
Race/ethnicity								
Asian, non-Hispanic	**0.82**	0.41	0.46	†	†	1.01	0.56	1.63
Black, non-Hispanic	**2.14**	3.96	1.72	4.86	1.34	2.73	2.10	2.53
Hispanic	**3.03**	3.61	1.64	3.65	3.89	2.94	2.24	3.55
White, non-Hispanic	**2.86**	3.74	2.10	4.69	4.61	3.75	2.81	4.13
Other, non-Hispanic	**1.07**	1.63	0.85	2.51	1.50	3.81	1.33	2.84
Socioeconomic status (SES) quartile								
Lowest quartile	**2.68**	3.70	1.45	3.69	3.12	3.26	2.31	3.25
Second quartile	**2.85**	3.43	1.33	3.82	4.25	2.53	2.23	3.29
Third quartile	**2.72**	3.04	1.17	2.67	4.06	3.27	2.02	2.55
Highest quartile	**2.15**	2.22	1.40	3.63	3.31	3.03	2.45	1.90
Disability status								
No disability	**1.88**	1.65	0.69	1.84	2.26	1.09	1.78	2.30
Has disability	**1.88**	1.65	0.69	1.84	2.26	1.09	1.78	2.30
English learner status								
Currently ELL	**0.71**	2.09	0.47	1.64	0.54	†	0.53	0.74
Not currently ELL	**3.00**	3.35	1.32	2.89	2.43	2.83	1.91	3.05
Don't know	**2.85**	3.29	1.28	2.84	2.34	2.65	1.82	2.93

See notes at end of table.

Table D-8b. Standard errors for table 11B: Percentage of the HSLS cohort who had participated in CTE, by CTE field of study and selected student and school characteristics—continued

	CTE fields of study							
Student and school characteristics	Hospitality and tourism	Human services	Information technology	Law, public safety, corrections, and security	Manufacturing	Marketing	Science, technology, engineering, and mathematics	Transportation
School urbanicity								
Urban	**3.72**	3.99	2.25	7.01	5.61	6.26	3.23	4.73
Suburban	**4.13**	4.23	2.29	6.09	5.73	5.97	3.83	4.80
Rural	**4.11**	3.57	2.17	3.89	5.10	3.85	3.29	3.19
CTE participation level								
Samplers	**2.87**	2.98	2.01	3.92	2.93	2.88	3.04	3.45
Explorers	**2.90**	3.40	1.42	4.22	3.97	3.49	2.48	4.01
Concentrators	**2.99**	3.30	1.66	4.42	4.13	2.92	2.83	4.08

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table D-9. Standard errors for table 14: Percentage of ELS cohort students who were academic concentrators, by access to CTE, CTE participation level, and selected student and school characteristics

		CTE access		CTE participation level			
Student and school characteristics	**Total**	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Sex							
Female	**1.09**	4.69	1.19	2.47	1.38	1.54	2.20
Male	**0.97**	5.56	0.95	3.08	1.41	1.61	1.52
Race/ethnicity							
Asian, non-Hispanic	**2.79**	7.15	2.79	4.99	3.03	4.64	4.96
Black, non-Hispanic	**1.60**	3.47	2.01	3.88	2.19	2.89	3.71
Hispanic	**1.32**	8.50	1.54	2.77	1.92	2.23	3.13
White, non-Hispanic	**1.18**	5.51	1.18	2.91	1.54	1.50	1.69
Other, non-Hispanic	**2.44**	10.72	2.54	7.16	3.60	5.31	4.16
Socioeconomic status (SES) quartile							
Lowest quartile	**0.93**	6.55	0.98	3.38	1.45	1.55	1.88
Second quartile	**1.08**	3.84	1.23	2.92	1.85	1.87	1.74
Third quartile	**1.32**	6.49	1.39	3.18	1.87	2.28	2.66
Highest quartile	**1.72**	6.20	1.80	3.77	2.12	2.81	3.86
Disability status							
No disability	**0.93**	4.63	0.96	2.39	1.13	1.29	1.57
Has disability	**1.12**	†	1.25	4.40	1.35	2.36	1.89
English learner status							
Not fluent	**2.72**	†	3.05	7.10	4.89	†	†
Fluent	**0.88**	4.52	0.91	2.26	1.11	1.27	1.46
Don't know	**3.17**	†	3.79	6.43	5.83	†	†
School urbanicity							
Urban	**1.88**	7.72	2.12	3.43	2.55	3.35	3.30
Suburban	**1.28**	5.54	1.30	3.56	1.48	1.78	1.90
Rural	**1.64**	8.70	1.69	3.60	2.37	2.03	2.61

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table D-10. Standard errors for table 15. Percentage of HSLS cohort students who were academic concentrators, by access to CTE, CTE participation level, and selected student and school characteristics

		CTE access		CTE participation level			
Student and school characteristics	**Total**	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Sex							
Female	**1.32**	8.14	1.46	2.85	1.97	2.86	2.53
Male	**1.15**	5.96	1.18	2.35	1.90	2.43	2.16
Race/ethnicity							
Asian, non-Hispanic	**4.25**	18.93	4.89	8.20	4.97	9.95	12.48
Black, non-Hispanic	**2.70**	12.41	2.92	5.31	3.85	6.81	5.09
Hispanic	**2.15**	8.96	2.31	3.28	3.61	5.99	4.72
White, non-Hispanic	**1.17**	9.22	1.31	2.32	1.55	2.49	1.94
Other, non-Hispanic	**2.71**	16.65	2.97	5.51	3.42	4.05	5.64
Socioeconomic status (SES) quartile							
Lowest quartile	**1.67**	8.31	1.70	3.43	2.47	3.94	3.61
Second quartile	**1.51**	8.03	1.66	3.26	2.48	3.64	2.91
Third quartile	**1.43**	7.09	1.52	3.57	2.36	2.87	2.47
Highest quartile	**1.50**	13.84	1.65	3.00	2.27	3.09	3.53
Disability status							
No disability	**1.10**	6.74	1.19	2.02	1.64	2.32	1.97
Has disability	**1.68**	15.25	1.64	3.36	3.12	3.53	3.02
English learner status							
Currently ELL	**4.70**	20.59	4.43	9.90	8.78	11.02	10.68
Not currently ELL	**1.11**	†	1.19	2.20	1.68	2.20	2.05
Don't know	**5.53**	25.57	6.55	7.92	8.43	15.49	12.23
School urbanicity							
Urban	**2.44**	14.37	2.49	3.67	3.21	6.35	5.14
Suburban	**1.54**	4.10	1.64	2.60	2.20	2.65	2.15
Rural	**2.28**	9.84	2.42	3.31	2.63	4.13	3.83

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table D-11. Standard errors for table 17: Percentage of ELS cohort students who had graduated on time, by access to CTE, CTE participation level, and selected student and school characteristics

		CTE access		CTE participation level			
Student and school characteristics	**Total**	No CTE Access	Has CTE Access	Non-Participants	Samplers	Explorers	Concentrators
Sex							
Female	**0.48**	1.71	0.48	1.06	0.72	0.82	0.73
Male	**0.58**	1.46	0.65	2.03	0.96	1.12	0.89
Race/ethnicity							
Asian, non-Hispanic	**1.04**	5.29	1.09	2.66	1.38	1.12	1.08
Black, non-Hispanic	**1.39**	5.59	1.62	4.37	1.98	2.21	2.08
Hispanic	**1.18**	3.36	1.36	2.85	1.64	2.25	2.59
White, non-Hispanic	**0.34**	1.12	0.37	0.76	0.54	0.63	0.61
Other, non-Hispanic	**1.88**	4.47	2.12	4.88	2.77	4.31	1.99
Socioeconomic status (SES) quartile							
Lowest quartile	**0.95**	3.89	1.09	2.70	1.46	1.52	1.34
Second quartile	**0.67**	2.53	0.70	2.26	1.06	1.37	1.06
Third quartile	**0.52**	1.14	0.60	1.56	0.90	1.09	0.99
Highest quartile	**0.46**	1.15	0.51	0.77	0.83	1.04	1.23
Disability status							
No disability	**0.42**	1.16	0.47	1.02	0.63	0.72	0.62
Has disability	**1.62**	5.91	1.74	4.99	2.66	3.04	2.39
English learner status							
Not fluent	**4.70**	2.15	5.55	10.15	6.22	10.38	1.36
Fluent	**0.41**	1.17	0.44	1.03	0.63	0.71	0.62
Don't know	**3.74**	26.47	4.21	8.02	6.41	7.13	7.18
School urbanicity							
Urban	**1.24**	10.14	1.41	2.60	1.56	2.11	1.61
Suburban	**0.47**	1.15	0.52	1.12	0.76	0.93	0.79
Rural	**0.68**	13.42	0.74	1.47	1.04	1.31	1.07

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table D-12. Standard errors for table 18: Percentage of HSLS cohort students who had graduated on time, by access to CTE, CTE participation level, and selected student and school characteristics

		CTE access		CTE participation level			
Student and school characteristics	**Total**	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Sex							
Female	**0.74**	3.92	0.74	1.67	1.15	1.10	0.85
Male	**0.72**	2.57	0.75	2.08	1.18	0.99	0.85
Race/ethnicity							
Asian, non-Hispanic	**2.23**	†	2.73	2.70	3.84	6.55	4.96
Black, non-Hispanic	**1.75**	5.13	1.93	4.41	2.63	2.53	2.36
Hispanic	**1.27**	4.97	1.33	3.50	2.50	1.87	1.44
White, non-Hispanic	**0.42**	1.61	0.46	1.07	0.70	0.75	0.66
Other, non-Hispanic	**1.91**	8.65	1.81	3.56	3.24	3.11	2.24
Socioeconomic status (SES) quartile							
Lowest quartile	**1.28**	4.90	1.35	3.04	2.61	2.12	1.90
Second quartile	**0.84**	2.37	0.77	2.17	1.61	1.13	1.05
Third quartile	**0.76**	3.43	0.84	1.92	1.35	1.60	0.78
Highest quartile	**0.36**	3.57	0.38	1.02	0.45	0.70	0.81
Disability status							
No disability	**0.57**	2.27	0.56	1.34	0.94	0.73	0.59
Has disability	**1.41**	11.38	1.54	3.65	2.53	2.92	2.29
English learner status							
Currently ELL	**3.45**	6.92	3.89	11.46	2.29	1.76	6.16
Not currently ELL	**0.49**	2.73	0.53	1.27	0.92	0.91	0.66
Don't know	**4.04**	14.42	4.64	9.89	7.16	4.13	5.21
School urbanicity							
Urban	**1.39**	4.92	1.41	2.15	2.19	1.98	1.42
Suburban	**0.66**	4.29	0.73	2.08	1.21	0.92	1.08
Rural	**0.78**	36.11	0.79	1.84	1.17	1.33	0.79

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table D-13. Standard errors for table 20: Percentage of the ELS cohort who had ever enrolled in postsecondary education, by access to CTE, CTE participation level, and selected student and school characteristics

		CTE access		CTE participation level			
Student and school characteristics	**Total**	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Sex							
Female	**0.86**	2.37	0.92	1.46	1.25	1.64	2.14
Male	**1.04**	2.58	1.20	2.84	1.52	1.89	2.18
Race/ethnicity							
Asian, non-Hispanic	**1.48**	3.27	1.92	3.12	2.10	3.04	5.00
Black, non-Hispanic	**1.73**	4.81	2.03	5.15	2.85	3.23	4.23
Hispanic	**1.98**	8.10	2.16	4.05	2.73	4.95	4.18
White, non-Hispanic	**0.78**	1.96	0.84	1.37	1.14	1.50	1.97
Other, non-Hispanic	**3.45**	11.56	3.72	7.70	4.63	7.77	6.86
Socioeconomic status (SES) quartile							
Lowest quartile	**1.77**	6.03	1.94	4.21	2.67	3.18	3.06
Second quartile	**1.30**	4.68	1.43	3.16	2.15	2.52	2.83
Third quartile	**1.08**	3.17	1.24	2.47	1.67	2.11	2.51
Highest quartile	**0.78**	1.54	0.83	1.56	1.01	1.63	2.83
Disability status							
No disability	**0.67**	1.68	0.73	1.37	0.99	1.32	1.58
Has disability	**3.05**	10.88	3.42	8.67	4.54	6.46	5.63
English learner status							
Not fluent	**5.95**	28.87	6.37	12.11	8.51	14.15	18.18
Fluent	**0.67**	1.67	0.75	1.37	0.99	1.30	1.57
Don't know	**5.65**	33.07	6.41	11.21	9.34	12.97	11.98
School urbanicity							
Urban	**1.39**	5.12	1.50	3.38	2.27	3.35	2.91
Suburban	**0.97**	1.82	1.15	1.61	1.27	1.64	2.31
Rural	**1.27**	11.92	1.36	2.41	1.91	2.82	2.90

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table D-14. Standard errors for table 22: Percentage of the HSLS cohort who had ever enrolled in postsecondary education immediately after high school, by access to CTE, CTE participation level, and selected student and school characteristics

		CTE access		CTE participation level			
Student and school characteristics	**Total**	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Sex							
Female	**0.91**	3.37	0.92	1.82	1.43	2.20	1.96
Male	**1.08**	5.43	1.20	2.80	1.61	2.13	2.37
Race/ethnicity							
Asian, non-Hispanic	**1.89**	9.02	2.33	1.36	2.57	4.91	6.11
Black, non-Hispanic	**2.33**	7.79	2.82	5.32	3.70	4.17	4.86
Hispanic	**2.14**	7.63	2.36	4.91	2.33	4.89	4.99
White, non-Hispanic	**0.81**	5.23	0.88	1.41	1.18	1.92	1.74
Other, non-Hispanic	**2.10**	12.79	2.07	4.37	3.80	4.06	4.93
Socioeconomic status (SES) quartile							
Lowest quartile	**1.81**	9.65	2.06	4.32	3.07	4.05	4.52
Second quartile	**1.40**	7.32	1.53	3.75	2.47	2.89	3.12
Third quartile	**1.29**	4.71	1.33	2.33	1.85	2.48	2.74
Highest quartile	**0.67**	2.56	0.79	2.06	0.96	1.45	1.74
Disability status							
No disability	**0.80**	3.31	0.87	1.75	1.16	1.53	1.80
Has disability	**2.60**	14.65	2.90	5.00	4.26	5.17	7.47
English learner status							
Currently ELL	**3.87**	18.42	4.48	10.34	5.17	8.39	9.57
Not currently ELL	**0.75**	4.70	0.83	1.61	1.18	1.62	1.90
Don't know	**7.15**	†	7.90	17.85	12.56	5.80	14.81
School urbanicity							
Urban	**1.91**	6.70	2.12	3.60	2.42	3.61	3.70
Suburban	**0.97**	3.82	1.02	1.90	1.49	1.97	2.16
Rural	**1.31**	28.58	1.40	3.75	1.58	2.92	2.98

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table D-15. Standard errors for table 24: Percentage of students in the ELS cohort who achieved selected educational outcomes, by CTE participation level and CTE field of study

CTE participation and CTE field of study	Academic concentration	On-time high school graduation	Ever enrolled in postecondary education
All CTE participants	**0.81**	**0.41**	**0.75**
CTE concentrators by CTE field of study			
Agriculture, food, and natural resources	3.16	1.96	5.12
Architecture and construction	2.63	1.40	4.02
Arts, A/V technology, and communication	4.21	1.16	3.71
Business management and administration	3.26	1.65	3.74
Education and training	†	31.29	43.30
Finance	†	5.81	19.55
Government and public administration	†	†	†
Health science	4.96	2.17	5.12
Hospitality and tourism	†	4.12	9.67
Human services	3.03	2.40	6.09
Information technology	3.75	1.69	2.75
Law, public safety, corrections, and security	†	22.94	23.35
Manufacturing	2.55	3.17	8.13
Marketing	5.46	1.22	4.93
Science, technology, engineering, and mathematics	†	14.00	25.51
Transportation	†	2.69	6.27

† Not applicable.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table D-16. Standard errors for table 25: Percentage of students in the HSLS cohort who achieved selected educational outcomes, by CTE participation level and CTE field of study

CTE participation and CTE field of study	Academic concentration	On-time high school graduation	Enrolled in postsecondary institution immediately following high school
All CTE participants	**1.08**	**0.56**	**0.79**
CTE concentrators by CTE field of study			
Agriculture, food, and natural resources	3.70	0.99	4.11
Architecture and construction	3.64	2.02	4.69
Arts, A/V technology, and communication	5.19	1.69	3.19
Business management and administration	5.33	1.09	3.20
Education and training	†	2.09	4.62
Finance	23.69	†	1.39
Government and public administration	†	†	†
Health science	5.33	0.99	3.29
Hospitality and tourism	6.93	5.18	6.41
Human services	5.19	1.99	8.11
Information technology	5.50	2.70	3.93
Law, public safety, corrections, and security	†	4.94	10.22
Manufacturing	4.54	2.96	7.97
Marketing	9.33	†	9.04
Science, technology, engineering, and mathematics	8.65	1.48	6.10
Transportation	6.76	1.61	6.11

† Not applicable.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table D-17. Standard errors for table B-2: Percentage distribution of ELS cohort students' access to CTE and CTE participation level, by selected student and school characteristics

Student and school characteristics	Total	CTE access		CTE participation level			
		No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Sex							
Female	**0.66**	2.27	0.66	1.71	1.01	1.32	1.38
Male	**0.66**	2.27	0.66	1.71	1.01	1.32	1.38
Race/ethnicity							
Asian, non-Hispanic	**0.28**	2.14	0.32	0.62	0.44	0.31	0.34
Black, non-Hispanic	**0.68**	3.74	0.77	1.28	0.97	1.11	1.24
Hispanic	**0.78**	1.58	1.04	1.61	1.05	1.35	1.07
White, non-Hispanic	**1.02**	4.49	1.33	2.17	1.40	1.72	1.66
Other, non-Hispanic	**0.37**	1.13	0.40	0.52	0.53	0.56	0.72
Socioeconomic status (SES) quartile[d]							
Lowest quartile	**0.71**	2.46	0.85	1.42	1.46	1.23	2.07
Second quartile	**0.60**	2.14	0.64	0.96	0.83	0.98	0.98
Third quartile	**0.58**	1.55	0.68	1.24	1.20	1.10	1.05
Highest quartile	**0.79**	3.55	0.91	1.26	1.20	1.34	1.06
Disability status							
No disability	**0.40**	1.26	0.40	0.86	0.58	0.61	0.84
Has disability	**0.40**	1.26	0.40	0.86	0.58	0.61	0.84
English learner status							
Not fluent	**0.19**	0.35	0.21	0.51	0.24	0.34	0.26
Fluent	**0.25**	0.42	0.31	0.69	0.33	0.46	0.42
Don't know	**0.17**	0.30	0.21	0.44	0.24	0.33	0.33
School urbanicity							
Urban	**1.01**	4.95	1.44	2.64	1.42	1.66	1.89
Suburban	**1.04**	7.09	1.54	2.87	1.46	1.94	2.27
Rural	**0.80**	5.74	1.26	2.13	1.13	1.75	1.87

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table D-18. Standard errors for table B-3: Percentage distribution of HSLS cohort students' access to CTE and CTE participation level, by selected student and school characteristics

		CTE access		CTE participation level			
Student and school characteristics	**Total**	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Sex							
Female	**0.77**	5.28	0.84	1.71	1.21	1.87	2.23
Male	**0.77**	5.28	0.84	1.71	1.21	1.87	2.23
Race/ethnicity							
Asian, non-Hispanic	**0.44**	4.30	0.49	1.23	0.50	0.57	0.86
Black, non-Hispanic	**0.85**	5.82	0.91	1.34	1.33	1.46	1.57
Hispanic	**0.99**	5.82	1.08	1.70	1.48	1.87	2.22
White, non-Hispanic	**1.19**	7.28	1.36	2.13	1.91	1.97	2.69
Other, non-Hispanic	**0.47**	2.07	0.53	0.90	0.66	1.25	0.73
Socioeconomic status (SES) quartile							
Lowest quartile	**0.97**	5.71	1.08	2.08	1.27	1.49	1.76
Second quartile	**0.75**	4.37	0.82	1.37	1.31	1.49	1.46
Third quartile	**0.72**	4.46	0.80	1.13	1.30	1.47	1.55
Highest quartile	**0.92**	6.80	0.94	1.30	1.23	1.37	1.73
Disability status							
No disability	**0.48**	2.49	0.53	0.93	0.79	0.90	1.77
Has disability	**0.48**	2.49	0.53	0.93	0.79	0.90	1.77
English learner status							
Currently ELL	**0.37**	2.78	0.42	0.80	0.61	0.46	0.68
Not currently ELL	**0.41**	3.88	0.45	0.86	0.74	0.60	0.78
Don't know	**0.19**	†	0.21	0.33	0.38	0.41	0.40
School urbanicity							
Urban	**0.60**	13.34	1.33	2.83	1.97	2.20	3.46
Suburban	**0.55**	12.95	1.07	2.51	1.62	1.99	2.75
Rural	**0.43**	†	0.88	2.39	1.30	1.79	2.50

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table D-19A. Standard errors for table B-4A: Percentage of students in the ELS cohort who had concentrated in CTE, by CTE field of study and selected student and school characteristics

			CTE fields of study					
Student and school characteristics	**Total**	All CTE concentrators	Agriculture, food, and natural resources	Architecture and Construction	Arts, A/V technology, and communication	Business management and administration	Education and training	Finance
Sex								
Female	**0.66**	1.38	5.38	2.24	4.14	4.33	31.23	25.34
Male	**0.66**	1.38	5.38	2.24	4.14	4.33	†	†
Race/ethnicity								
Asian, non-Hispanic	**0.28**	0.34	†	0.97	0.83	0.43	†	†
Black, non-Hispanic	**0.68**	1.24	1.90	2.33	1.85	3.68	†	†
Hispanic	**0.78**	1.07	1.58	2.07	3.18	2.36	†	†
White, non-Hispanic	**1.02**	1.66	3.11	3.52	3.79	4.39	40.68	†
Other, non-Hispanic	**0.37**	0.72	1.90	1.49	1.54	1.75	†	†
Socioeconomic status (SES) quartile								
Lowest quartile	**0.71**	1.26	3.06	3.02	3.03	3.74	†	†
Second quartile	**0.60**	1.20	3.43	3.57	3.26	3.98	†	†
Third quartile	**0.58**	1.34	3.10	3.17	3.74	3.51	†	†
Highest quartile	**0.79**	1.06	2.06	2.70	3.71	2.90	†	†
Disability status								
No disability	**0.40**	0.84	2.55	2.42	2.18	2.02	31.29	#
Has disability	**0.40**	0.84	2.55	2.42	2.18	2.02	†	†
English learner status								
Not fluent	**0.19**	0.26	†	†	†	†	†	†
Fluent	**0.25**	0.42	0.90	1.40	0.23	1.21	31.29	19.47
Don't know	**0.17**	0.33	0.77	1.10	†	†	†	†

See notes at end of table.

Table D-19A. Standard errors for table B-4A: Percentage of students in the ELS cohort who had concentrated in CTE, by CTE field of study and selected student and school characteristics—continued

			CTE fields of study					
Student and school characteristics	**Total**	All CTE concentrators	Agriculture, food, and natural resources	Architecture and Construction	Arts, A/V technology, and communication	Business management and administration	Education and training	Finance
School urbanicity								
Urban	**1.01**	1.89	0.86	3.20	4.53	5.13	†	†
Suburban	**1.04**	2.27	6.13	4.70	4.49	5.85	†	†
Rural	**0.80**	1.87	6.25	4.20	3.54	4.90	†	†

† Not applicable.
# Rounds to zero.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table D-19B. Standard errors for table B-4B: Percentage of students in the ELS cohort who had concentrated in CTE, by CTE field of study and selected student and school characteristics

	CTE fields of study								
Student and school characteristics	Health science	Hospitality and tourism	Human services	Information technology	Law, public safety, corrections and security	Manufacturing	Marketing	Science, technology, engineering, and mathematics	Transportation
Sex									
Female	4.40	8.98	2.62	3.25	†	3.21	5.25	†	†
Male	4.40	8.98	†	3.25	23.82	3.21	5.25	19.90	1.91
Race/ethnicity									
Asian, non-Hispanic	1.17	†	†	1.31	†	†	0.89	†	†
Black, non-Hispanic	5.02	5.81	5.35	3.43	†	†	4.38	†	2.31
Hispanic	6.05	6.34	3.68	2.33	†	2.43	4.68	†	3.54
White, non-Hispanic	5.60	7.94	6.07	4.66	19.76	5.45	6.13	30.52	4.47
Other, non-Hispanic	2.36	6.47	1.53	1.51	†	†	3.43	†	2.79
Socioeconomic status (SES) quartile									
Lowest quartile	3.85	6.13	5.58	2.87	†	5.77	5.25	†	4.63
Second quartile	3.99	8.10	4.80	2.97	†	4.95	4.56	†	4.23
Third quartile	5.09	6.77	5.01	2.79	†	6.03	3.84	†	3.91
Highest quartile	3.73	7.55	3.34	3.20	†	4.78	5.48	†	2.32
Disability status									
No disability	1.68	8.19	3.62	1.97	15.08	5.52	1.51	19.82	4.05
Has disability	1.68	8.19	3.62	1.97	†	5.52	†	†	4.05
English learner status									
Not fluent	†	†	†	†	†	†	†	†	†
Fluent	0.95	2.60	2.41	0.54	7.48	0.07	2.03	14.00	1.73
Don't know	†	†	†	†	†	†	†	†	†

See notes at end of table.

Table D-19B. Standard errors for table B-4B: Percentage of students in the ELS cohort who had concentrated in CTE, by CTE field of study and selected student and school characteristics—continued

	CTE fields of study								
Student and school characteristics	Health science	Hospitality and tourism	Human services	Information technology	Law, public safety, corrections and security	Manufacturing	Marketing	Science, technology, engineering, and mathematics	Transportation
School urbanicity									
Urban	7.22	9.78	5.99	4.27	†	5.72	6.12	†	4.33
Suburban	6.93	8.48	6.43	4.56	16.69	7.57	7.57	†	5.40
Rural	4.76	7.26	4.07	3.96	†	7.53	5.12	23.81	4.49

† Not applicable.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table D-20A. Standard errors for table B-6A: Percentage of students in the HSLS cohort who had concentrated in CTE, by CTE field of study and selected student and school characteristics

			CTE fields of study					
Student and school characteristics	**Total**	All CTE concentrators	Agriculture, food, and natural resources	Architecture and construction	Arts, A/V technology, and communication	Business management and administration	Education and training	Finance
Sex								
Female	**0.77**	2.23	5.72	2.35	6.61	6.96	2.34	18.45
Male	**0.77**	2.23	5.72	2.35	6.61	6.96	†	18.45
Race/ethnicity								
Asian, non-Hispanic	**0.44**	0.86	†	†	0.96	2.04	†	†
Black, non-Hispanic	**0.85**	1.57	†	2.82	1.63	4.25	6.54	†
Hispanic	**0.99**	2.22	4.89	2.67	7.46	5.89	†	†
White, non-Hispanic	**1.19**	2.69	5.05	4.27	7.25	5.58	7.85	17.72
Other, non-Hispanic	**0.47**	0.73	1.18	2.21	2.25	2.24	†	†
Socioeconomic status (SES) quartile								
Lowest quartile	**0.97**	1.76	4.41	4.01	8.18	4.75	†	†
Second quartile	**0.75**	1.46	4.09	4.35	4.15	4.34	10.60	14.82
Third quartile	**0.72**	1.55	4.72	4.04	4.81	5.48	19.20	†
Highest quartile	**0.92**	1.73	3.10	2.78	4.44	4.58	†	15.44
Disability status								
No disability	**0.48**	1.77	2.76	3.45	6.44	5.89	6.94	†
Has disability	**0.48**	1.77	2.76	3.45	6.44	5.89	†	†
English learner status								
Currently ELL	**0.37**	0.68	1.43	†	†	†	†	†
Not currently ELL	**0.41**	0.78	1.66	1.68	3.88	0.92	†	†
Don't know	**0.19**	0.40	†	†	†	†	†	†
School urbanicity								
Urban	**0.60**	3.46	†	5.57	7.05	6.07	8.25	†
Suburban	**0.55**	2.75	5.85	6.34	5.55	7.22	11.38	21.91
Rural	**0.43**	2.50	6.23	5.57	5.43	7.92	11.73	†

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table D-20B. Standard errors for table B-6B: Percentage of students in the HSLS cohort who had concentrated in CTE, by CTE field of study and selected student and school characteristics

	CTE fields of study								
Student and school characteristics	Health science	Hospitality and tourism	Human services	Information technology	Law, public safety, corrections and security	Manufacturing	Marketing	Science, technology, engineering, and mathematics	Transportation
Sex									
Female	3.50	8.16	2.84	4.42	8.58	†	9.98	5.03	2.84
Male	3.50	8.16	†	4.42	8.58	4.02	9.98	5.03	2.84
Race/ethnicity									
Asian, non-Hispanic	†	†	†	2.44	†	†	†	1.45	†
Black, non-Hispanic	2.96	5.77	†	2.30	12.43	†	†	†	7.03
Hispanic	5.66	8.65	7.54	3.86	6.25	7.32	†	†	5.54
White, non-Hispanic	5.29	6.72	9.65	4.63	12.06	7.30	10.21	9.70	7.23
Other, non-Hispanic	2.20	3.14	†	2.59	†	2.23	†	2.42	3.57
Socioeconomic status (SES) quartile									
Lowest quartile	4.22	7.99	7.95	3.57	8.31	6.45	12.31	6.35	6.20
Second quartile	2.81	7.51	5.61	4.84	10.42	7.79	6.96	8.04	5.58
Third quartile	3.34	7.35	8.64	4.13	†	7.11	5.85	3.74	4.14
Highest quartile	4.86	4.45	3.18	4.00	†	4.66	8.76	8.34	2.17
Disability status									
No disability	1.09	4.10	4.00	3.06	6.11	5.22	3.52	8.08	4.62
Has disability	1.09	4.10	†	3.06	†	†	†	†	4.62
English learner status									
Currently ELL	†	†	†	†	†	†	†	†	†
Not currently ELL	2.02	3.48	6.32	2.40	6.63	#	7.34	1.32	3.10
Don't know	†	†	†	†	†	†	†	†	†
School urbanicity									
Urban	7.20	8.26	11.13	5.99	10.04	7.60	†	9.09	8.13
Suburban	6.08	8.42	10.44	5.32	13.07	9.19	13.47	7.14	7.79
Rural	4.21	7.06	5.00	4.61	†	8.66	10.55	4.70	4.11

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table D-21A. Standard errors for table C-1A: Percentage distribution of the educational attainment level of ELS cohort students, by selected student and school characteristics

Student and school characteristics	High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
All students						
Sex						
Female	0.56	0.94	0.60	0.66	0.97	0.56
Male	0.84	0.99	0.60	0.60	1.13	0.41
Race/ethnicity						
Asian, non-Hispanic	0.99	2.05	0.99	1.07	2.43	1.25
Black, non-Hispanic	1.13	1.76	1.34	1.17	1.36	0.87
Hispanic	1.45	1.86	1.05	1.13	1.62	0.72
White, non-Hispanic	0.58	0.74	0.50	0.61	0.92	0.47
Other, non-Hispanic	2.43	3.34	1.65	1.98	2.60	1.56
Socioeconomic status (SES) quartile						
Lowest quartile	1.32	1.39	0.92	0.91	1.13	0.44
Second quartile	0.94	1.20	0.88	0.81	1.13	0.59
Third quartile	0.78	1.33	0.76	0.99	1.39	0.74
Highest quartile	0.41	1.39	0.73	0.67	1.50	0.94
Disability status						
No disability	0.47	0.68	0.43	0.48	0.78	0.37
Has disability	2.42	2.51	2.12	1.65	1.80	0.78
English learner status						
Not fluent	4.78	4.71	3.74	2.49	3.24	1.53
Fluent	0.47	0.66	0.41	0.46	0.75	0.36
Don't know	3.89	5.79	4.23	3.09	2.40	†
School urbanicity						
Urban	1.02	1.64	0.91	0.88	1.65	0.78
Suburban	0.62	0.82	0.62	0.62	1.09	0.51
Rural	1.03	1.46	0.81	1.06	1.47	0.69

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table D-21B. Standard errors for table C-1B: Percentage distribution of the educational attainment level of ELS cohort students, by access to CTE and selected student and school characteristics

CTE access and student and school characteristics	High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
No access to CTE						
Sex						
Female	1.92	2.97	2.09	2.51	2.77	2.67
Male	2.23	3.64	2.43	1.96	5.01	2.19
Race/ethnicity						
Asian, non-Hispanic	†	8.43	†	†	9.48	6.04
Black, non-Hispanic	†	11.54	4.21	†	9.38	6.31
Hispanic	†	12.49	6.69	†	11.59	†
White, non-Hispanic	1.86	2.81	1.88	1.92	3.85	2.71
Other, non-Hispanic	†	†	†	†	11.16	†
Socioeconomic status (SES) quartile						
Lowest quartile	5.24	7.94	†	3.63	6.04	†
Second quartile	3.81	4.43	3.50	3.54	5.23	2.07
Third quartile	2.24	5.54	3.83	2.70	4.51	3.67
Highest quartile	†	3.36	2.32	2.07	5.34	3.85
Disability status						
No disability	1.29	2.78	1.60	1.47	3.07	2.22
Has disability	10.34	8.11	9.09	†	†	†
English learner status						
Not fluent	†	†	†	†	†	†
Fluent	1.39	2.66	1.67	1.58	2.96	2.07
Don't know	†	†	†	†	†	†
School urbanicity						
Urban	†	12.93	†	†	12.23	†
Suburban	1.61	2.78	2.12	1.97	3.35	2.33
Rural	5.03	5.00	5.69	4.62	8.10	†
Access to CTE						
Sex						
Female	0.60	1.04	0.64	0.75	1.11	0.61
Male	0.94	1.06	0.69	0.65	1.22	0.45
Race/ethnicity						
Asian, non-Hispanic	1.37	2.34	1.12	1.39	2.58	1.44
Black, non-Hispanic	1.33	2.05	1.69	1.23	1.62	0.98
Hispanic	1.62	1.86	1.19	1.22	1.70	0.80
White, non-Hispanic	0.62	0.90	0.53	0.70	1.01	0.50
Other, non-Hispanic	2.78	3.72	1.89	2.07	2.54	1.81

See notes at end of table.

Table D-21B. Standard errors for table C-1B: Percentage distribution of the educational attainment level of ELS cohort students, by access to CTE and selected student and school characteristics—continued

CTE access and student and school characteristics	High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
Socioeconomic status (SES) quartile						
Lowest quartile	1.43	1.42	1.11	1.03	1.20	0.53
Second quartile	1.07	1.38	0.99	0.91	1.31	0.68
Third quartile	0.91	1.58	0.82	1.08	1.66	0.79
Highest quartile	0.48	1.56	0.83	0.77	1.70	1.07
Disability status						
No disability	0.51	0.73	0.48	0.53	0.86	0.39
Has disability	2.84	2.84	2.32	1.46	1.94	0.97
English learner status						
Not fluent	5.41	4.90	4.53	†	3.93	†
Fluent	0.54	0.72	0.44	0.52	0.84	0.39
Don't know	4.09	6.34	4.95	3.52	2.99	†
School urbanicity						
Urban	1.09	1.71	1.08	0.88	1.86	0.93
Suburban	0.73	0.95	0.64	0.70	1.21	0.54
Rural	1.14	1.70	0.88	1.14	1.59	0.75

† Not applicable.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table D-21C. Standard errors for table C-1C: Percentage distribution of the educational attainment level of ELS cohort students, by CTE participation level and selected student and school characteristics

CTE participation level and student and school characteristics	High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
CTE nonparticipants						
Sex						
Female	0.93	2.06	1.20	1.08	2.12	1.55
Male	2.03	2.70	1.35	1.33	2.95	1.63
Race/ethnicity						
Asian, non-Hispanic	2.10	3.49	1.37	1.53	4.38	4.10
Black, non-Hispanic	3.64	4.82	2.84	2.50	4.58	3.48
Hispanic	3.21	4.32	2.30	2.49	3.39	2.06
White, non-Hispanic	0.92	1.94	1.15	0.96	2.32	1.55
Other, non-Hispanic	†	6.50	†	5.24	8.24	7.17
Socioeconomic status (SES) quartile						
Lowest quartile	4.01	4.62	2.39	2.64	3.40	2.61
Second quartile	2.09	3.62	2.48	2.14	3.03	1.78
Third quartile	1.54	3.22	1.73	1.22	3.24	2.68
Highest quartile	†	2.67	1.06	1.15	3.40	2.12
Disability status						
No disability	0.93	1.64	0.91	0.89	1.98	1.26
Has disability	6.34	7.34	5.39	†	6.96	†
English learner status						
Not fluent	9.53	†	10.79	†	6.47	†
Fluent	0.92	1.61	0.85	0.88	2.01	1.25
Don't know	9.26	10.74	10.13	†	†	†
School urbanicity						
Urban	2.32	3.11	1.75	2.03	3.98	1.31
Suburban	1.10	2.10	1.35	0.90	2.64	1.81
Rural	1.62	3.90	1.41	1.69	3.52	3.10
CTE samplers						
Sex						
Female	0.84	1.37	1.06	0.89	1.40	0.80
Male	1.15	1.62	0.99	0.93	1.71	0.83
Race/ethnicity						
Asian, non-Hispanic	1.37	2.67	1.57	1.63	3.67	1.94
Black, non-Hispanic	1.83	2.91	2.28	1.82	2.32	1.26
Hispanic	1.69	2.85	1.78	1.36	2.30	1.21
White, non-Hispanic	0.86	1.35	0.76	0.86	1.53	0.90
Other, non-Hispanic	3.93	4.78	3.10	3.24	3.86	2.32

See notes at end of table.

Table D-21C. Standard errors for table C-1C: Percentage distribution of the educational attainment level of ELS cohort students, by CTE participation level and selected student and school characteristics—continued

CTE participation level and student and school characteristics	High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
Socioeconomic status (SES) quartile						
Lowest quartile	1.67	2.31	1.64	1.27	1.90	0.66
Second quartile	1.44	1.94	1.26	1.28	1.91	0.95
Third quartile	1.34	2.17	1.37	1.41	2.07	0.97
Highest quartile	0.50	1.91	1.11	1.04	2.18	1.67
Disability status						
No disability	0.68	1.08	0.69	0.67	1.13	0.60
Has disability	3.99	3.98	3.44	2.91	2.67	†
English learner status						
Not fluent	5.80	7.35	4.74	2.12	5.99	†
Fluent	0.68	1.03	0.69	0.64	1.09	0.59
Don't know	8.52	8.90	6.99	5.01	5.80	†
School urbanicity						
Urban	1.54	2.24	1.50	1.09	2.24	1.15
Suburban	0.90	1.37	0.91	0.96	1.58	0.81
Rural	1.39	2.33	1.35	1.19	2.04	1.17
CTE explorers						
Sex						
Female	1.24	2.25	1.29	1.55	1.96	1.02
Male	1.48	2.01	1.22	1.27	1.72	0.97
Race/ethnicity						
Asian, non-Hispanic	†	4.58	2.15	2.88	4.87	3.42
Black, non-Hispanic	2.50	3.97	2.81	3.05	2.77	1.60
Hispanic	3.36	3.94	2.85	2.83	3.07	†
White, non-Hispanic	1.16	1.67	0.92	1.33	1.58	0.91
Other, non-Hispanic	6.12	6.33	3.07	4.62	5.56	†
Socioeconomic status (SES) quartile						
Lowest quartile	2.33	2.90	1.98	2.16	1.95	0.68
Second quartile	1.90	2.24	1.86	1.91	2.27	0.86
Third quartile	1.48	2.78	1.25	2.42	2.37	1.25
Highest quartile	1.28	3.05	1.70	1.80	3.10	2.12
Disability status						
No disability	0.91	1.41	0.86	1.10	1.34	0.68
Has disability	5.50	5.72	5.14	3.63	3.54	†
English learner status						
Not fluent	13.35	10.50	†	†	†	†
Fluent	0.92	1.41	0.83	1.05	1.30	0.70
Don't know	8.43	12.18	†	†	†	†

See notes at end of table.

Table D-21C. Standard errors for table C-1C: Percentage distribution of the educational attainment level of ELS cohort students, by CTE participation level and selected student and school characteristics—continued

CTE participation level and student and school characteristics	High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
School urbanicity						
Urban	2.37	3.18	2.13	2.21	2.73	1.36
Suburban	1.22	1.89	1.14	1.35	1.91	0.98
Rural	2.15	2.79	1.60	2.57	2.44	1.31
CTE concentrators						
Sex						
Female	1.47	2.03	1.60	1.36	2.43	1.32
Male	1.88	2.01	1.28	1.34	1.88	0.59
Race/ethnicity						
Asian, non-Hispanic	3.87	5.68	4.51	2.53	6.75	3.76
Black, non-Hispanic	2.71	4.52	3.65	2.07	3.56	1.50
Hispanic	2.65	4.76	3.10	3.67	3.89	†
White, non-Hispanic	1.54	1.58	1.23	1.21	1.85	0.86
Other, non-Hispanic	6.56	7.77	2.58	†	4.87	†
Socioeconomic status (SES) quartile						
Lowest quartile	2.80	2.92	1.97	1.76	2.30	0.70
Second quartile	2.36	2.70	2.19	1.73	2.17	1.14
Third quartile	2.09	2.82	1.73	2.14	3.23	1.44
Highest quartile	1.75	3.00	2.39	2.15	3.51	2.35
Disability status						
No disability	1.24	1.57	1.08	0.96	1.60	0.68
Has disability	4.62	4.39	3.48	3.27	2.20	†
English learner status						
Not fluent	16.87	†	18.76	†	†	†
Fluent	1.26	1.58	0.99	0.98	1.53	0.65
Don't know	†	9.13	†	†	†	†
School urbanicity						
Urban	1.85	4.24	2.55	1.97	3.44	1.66
Suburban	1.88	2.05	1.59	1.48	2.03	0.89
Rural	2.34	2.45	1.49	1.45	2.43	1.20

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table D-22. Standard errors for table C-2: Percentage of the ELS cohort who had ever earned a postsecondary credential, by access to CTE, CTE participation level, and selected student and school characteristics

		CTE access		CTE participation level			
Student and school characteristics	**Total**	No CTE access	Has CTE access	Non-participants	Samplers	Explorers	Concentrators
Sex							
Female	**1.00**	3.12	1.06	2.03	1.47	2.17	2.46
Male	**1.04**	3.72	1.17	2.98	1.69	2.03	2.07
Race/ethnicity							
Asian, non-Hispanic	**2.26**	8.43	2.53	3.95	2.96	4.78	5.99
Black, non-Hispanic	**1.85**	12.03	2.23	5.39	3.04	4.01	4.87
Hispanic	**1.83**	12.70	2.03	4.01	2.93	4.25	4.69
White, non-Hispanic	**0.87**	3.15	0.99	2.03	1.51	1.84	1.93
Other, non-Hispanic	**3.36**	13.57	3.52	8.02	4.91	6.43	7.85
Socioeconomic status (SES) quartile							
Lowest quartile	**1.51**	6.02	1.69	4.69	2.52	3.16	3.06
Second quartile	**1.46**	5.56	1.62	3.58	2.17	2.67	2.93
Third quartile	**1.43**	5.20	1.69	3.33	2.24	2.73	3.47
Highest quartile	**1.37**	3.36	1.58	2.70	1.89	2.82	3.10
Disability status							
No disability	**0.75**	3.03	0.82	1.76	1.22	1.47	1.74
Has disability	**2.71**	11.56	2.91	7.43	4.33	6.52	4.58
English learner status							
Not fluent	**4.75**	28.87	5.87	11.74	6.84	9.87	17.68
Fluent	**0.73**	2.87	0.78	1.76	1.17	1.43	1.71
Don't know	**5.71**	†	6.83	10.51	10.41	12.21	8.71
School urbanicity							
Urban	**1.60**	14.21	1.77	3.60	2.27	3.34	4.24
Suburban	**1.02**	2.85	1.15	2.34	1.58	2.11	2.20
Rural	**1.58**	10.67	1.79	4.23	2.33	2.76	3.02

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table D-23A. Standard errors for table C-3A: Percentage distribution of the labor market outcomes of ELS cohort students, by selected student and school characteristics

Student and school characteristics	Ever held a job	Employment status, June 2013: Working full time	Working part time	Unemployed	Out of labor force
All students					
Sex					
Female	#	0.01	0.01	0.01	0.01
Male	#	0.01	0.01	0.01	#
Race/ethnicity					
Asian, non-Hispanic	0.02	0.02	0.01	0.01	0.01
Black, non-Hispanic	0.01	0.02	0.02	0.01	0.01
Hispanic	0.01	0.02	0.01	0.01	0.01
White, non-Hispanic	#	0.01	0.01	#	#
Other, non-Hispanic	0.02	0.03	0.03	0.02	0.02
Socioeconomic status (SES) quartile					
Lowest quartile	0.01	0.01	0.01	0.01	0.01
Second quartile	0.01	0.01	0.01	0.01	0.01
Third quartile	0.01	0.01	0.01	0.01	0.01
Highest quartile	0.01	0.01	0.01	0.01	0.01
Disability status					
No disability	#	0.01	#	#	#
Has disability	0.02	0.03	0.02	0.02	0.01
English learner status					
Not fluent	0.05	0.05	0.04	0.04	0.03
Fluent	#	0.01	#	0.01	#
Don't know	0.03	0.05	0.04	0.04	0.02
School urbanicity					
Urban	0.01	0.01	0.01	0.01	0.01
Suburban	#	0.01	0.01	0.01	#
Rural	0.01	0.01	0.01	0.01	0.01

† Not applicable.
# Rounds to zero.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table D-23B. Standard errors for table C-3B: Percentage distribution of the labor market outcomes of ELS cohort students, by access to CTE and selected student and school characteristics

CTE access and student and school characteristics	Ever held a job	Employment status, June 2013: Working full time	Working part time	Unemployed	Out of labor force
No access to CTE					
Sex					
Female	1.58	2.82	2.32	1.71	1.41
Male	1.82	2.85	1.87	1.88	1.45
Race/ethnicity					
Asian, non-Hispanic	8.90	9.18	4.58	5.91	3.85
Black, non-Hispanic	6.16	5.69	5.13	3.11	†
Hispanic	†	14.66	†	†	†
White, non-Hispanic	0.96	2.52	2.09	1.20	1.57
Other, non-Hispanic	7.16	12.25	9.81	†	†
Socioeconomic status (SES) quartile					
Lowest quartile	2.95	6.42	4.96	2.65	†
Second quartile	1.84	4.42	3.33	2.55	1.95
Third quartile	1.61	4.10	3.33	2.68	1.59
Highest quartile	2.82	3.28	2.14	1.53	2.33
Disability status					
No disability	1.44	2.38	1.64	1.13	1.12
Has disability	7.31	13.50	7.21	†	†
English learner status					
Not fluent	14.07	16.75	†	†	†
Fluent	1.33	2.28	1.53	1.40	1.24
Don't know	33.07	†	†	†	†
School urbanicity					
Urban	8.99	12.06	4.80	†	†
Suburban	1.45	2.78	1.91	1.73	1.52
Rural	13.75	12.15	6.31	†	†
Access to CTE					
Sex					
Female	0.54	1.07	0.77	0.76	0.59
Male	0.57	1.02	0.69	0.72	0.41
Race/ethnicity					
Asian, non-Hispanic	1.75	2.01	1.65	1.64	1.49
Black, non-Hispanic	1.43	2.54	1.82	1.99	0.79
Hispanic	1.57	2.03	1.38	1.58	1.09
White, non-Hispanic	0.39	0.84	0.60	0.53	0.44
Other, non-Hispanic	1.83	3.62	2.62	2.70	2.14

See notes at end of table.

Table D-23B. Standard errors for table C-3B: Percentage distribution of the labor market outcomes of ELS cohort students, by access to CTE and selected student and school characteristics—continued

CTE access and student and school characteristics	Ever held a job	Employment status, June 2013: Working full time	Working part time	Unemployed	Out of labor force
Socioeconomic status (SES) quartile					
Lowest quartile	1.01	1.49	1.08	1.08	0.87
Second quartile	0.86	1.37	1.03	1.00	0.63
Third quartile	0.64	1.38	0.97	0.87	0.72
Highest quartile	0.68	1.22	1.00	0.84	0.68
Disability status					
No disability	0.42	0.78	0.52	0.55	0.36
Has disability	1.79	2.92	2.23	2.18	1.51
English learner status					
Not fluent	4.96	5.67	4.93	3.91	†
Fluent	0.39	0.76	0.49	0.56	0.36
Don't know	3.54	5.74	5.04	4.37	2.13
School urbanicity					
Urban	1.12	1.69	1.25	1.36	0.78
Suburban	0.52	1.11	0.69	0.73	0.48
Rural	0.59	1.42	0.86	0.82	0.74

† Not applicable.
# Rounds to zero.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table D-23C. Standard errors for table C-3C: Percentage distribution of the labor market outcomes of ELS cohort students, by CTE participation level and selected student and school characteristics

CTE participation level and student and school characteristics	Ever held a job	Employment status, June 2013: Working full time	Working part time	Unemployed	Out of labor force
CTE nonparticipants					
Sex					
Female	1.09	2.19	1.55	1.26	1.27
Male	1.43	2.65	1.78	2.19	1.08
Race/ethnicity					
Asian, non-Hispanic	3.68	4.39	2.88	3.05	2.87
Black, non-Hispanic	2.72	5.18	3.93	4.17	†
Hispanic	2.60	4.69	3.18	3.57	2.43
White, non-Hispanic	0.88	2.08	1.44	1.16	1.19
Other, non-Hispanic	6.39	9.26	6.63	6.33	7.81
Socioeconomic status (SES) quartile					
Lowest quartile	2.66	4.64	2.42	3.20	2.90
Second quartile	2.27	3.21	2.53	2.29	1.21
Third quartile	1.53	3.11	2.66	1.84	1.33
Highest quartile	1.44	2.72	1.58	1.94	1.61
Disability status					
No disability	0.85	1.75	1.11	1.13	0.93
Has disability	6.13	7.19	5.45	6.10	3.95
English learner status					
Not fluent	12.59	12.31	9.92	†	†
Fluent	0.78	1.73	1.11	1.09	0.96
Don't know	10.85	11.59	†	12.08	9.19
School urbanicity					
Urban	1.53	3.38	1.98	2.23	2.11
Suburban	1.35	2.59	1.67	1.75	1.26
Rural	1.04	2.72	1.47	2.01	1.68
CTE samplers					
Sex					
Female	0.64	1.23	1.05	0.89	0.79
Male	0.94	†	1.11	0.92	0.63
Race/ethnicity					
Asian, non-Hispanic	2.72	2.85	2.09	1.90	1.88
Black, non-Hispanic	1.52	2.93	2.28	2.06	1.05
Hispanic	1.83	2.50	1.84	1.79	1.24
White, non-Hispanic	0.57	1.23	0.92	0.71	0.73
Other, non-Hispanic	3.45	4.89	4.30	3.83	3.09

See notes at end of table.

Table D-23C. Standard errors for table C-3C: Percentage distribution of the labor market outcomes of ELS cohort students, by CTE participation level and selected student and school characteristics—continued

CTE participation level and student and school characteristics	Ever held a job	Employment status, June 2013: Working full time	Working part time	Unemployed	Out of labor force
Socioeconomic status (SES) quartile					
Lowest quartile	1.42	2.18	1.67	1.57	1.09
Second quartile	1.26	2.16	1.64	1.24	1.07
Third quartile	0.85	2.11	1.29	1.27	0.95
Highest quartile	0.89	1.74	1.46	1.02	0.98
Disability status					
No disability	0.53	0.96	0.72	0.66	0.55
Has disability	3.30	4.51	2.97	3.32	2.11
English learner status					
Not fluent	6.98	7.06	5.34	4.64	†
Fluent	0.52	0.96	0.72	0.65	0.53
Don't know	3.47	9.41	5.84	7.53	†
School urbanicity					
Urban	1.13	2.06	1.52	1.53	1.18
Suburban	0.75	1.40	1.01	0.88	0.73
Rural	0.87	2.09	1.51	1.20	1.36
CTE explorers					
Sex					
Female	1.27	2.03	1.51	1.33	1.28
Male	0.91	2.00	1.43	1.21	0.78
Race/ethnicity					
Asian, non-Hispanic	4.47	5.21	3.89	3.85	2.43
Black, non-Hispanic	2.15	4.00	3.37	3.28	1.48
Hispanic	3.91	3.78	3.04	3.13	2.03
White, non-Hispanic	0.75	1.67	1.19	0.83	0.94
Other, non-Hispanic	1.20	5.57	4.08	3.97	†
Socioeconomic status (SES) quartile					
Lowest quartile	1.98	2.95	2.25	1.88	1.71
Second quartile	1.17	2.41	1.77	1.80	1.06
Third quartile	1.30	2.96	2.43	1.73	1.28
Highest quartile	1.56	2.80	1.75	1.75	1.34
Disability status					
No disability	0.84	1.47	1.10	0.90	0.75
Has disability	3.32	5.60	4.93	3.57	2.43
English learner status					
Not fluent	15.69	11.64	9.17	10.14	†
Fluent	0.67	1.47	1.07	0.89	0.75
Don't know	6.39	12.63	12.45	†	†

See notes at end of table.

Table D-23C. Standard errors for table C-3C: Percentage distribution of the labor market outcomes of ELS cohort students, by CTE participation level and selected student and school characteristics—continued

CTE participation level and student and school characteristics	Ever held a job	Employment status, June 2013: Working full time	Working part time	Unemployed	Out of labor force
School urbanicity					
Urban	3.09	3.17	2.79	2.59	1.68
Suburban	0.90	1.81	1.37	1.23	0.94
Rural	0.89	2.48	1.61	1.19	1.51
CTE concentrators					
Sex					
Female	1.33	2.28	1.69	1.52	1.32
Male	0.84	1.47	1.11	1.07	0.63
Race/ethnicity					
Asian, non-Hispanic	4.64	6.21	3.91	3.55	4.13
Black, non-Hispanic	2.93	3.91	3.33	3.04	1.54
Hispanic	3.17	4.63	3.11	2.95	2.58
White, non-Hispanic	0.76	1.68	1.13	1.02	0.78
Other, non-Hispanic	0.78	5.99	4.62	4.41	†
Socioeconomic status (SES) quartile					
Lowest quartile	1.63	2.56	2.02	1.59	1.33
Second quartile	1.52	2.47	1.54	2.11	1.26
Third quartile	1.42	2.72	2.23	1.57	1.24
Highest quartile	1.15	2.94	2.48	1.66	1.50
Disability status					
No disability	0.81	1.44	0.97	0.97	0.76
Has disability	2.74	4.42	3.90	3.49	†
English learner status					
Not fluent	#	16.62	†	†	†
Fluent	0.78	1.41	0.96	0.98	0.70
Don't know	6.10	10.71	†	†	†
School urbanicity					
Urban	2.29	3.42	2.41	2.34	1.60
Suburban	1.08	1.83	1.36	1.21	1.04
Rural	1.04	2.28	1.53	1.62	1.20

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table D-24A. Standard errors for table C-4A: Median earnings of the ELS cohort, by level of educational attainment and selected student and school characteristics

Student and school characteristics	**Median earnings (Total)**	Educational attainment: High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
All students							
Sex							
Female	**$360**	$1,030	$720	$960	$1,000	$620	$1,420
Male	**690**	1,030	830	1,390	1,690	1,800	2,260
Race/ethnicity							
Asian, non-Hispanic	**1,410**	3,770	2,880	3,990	2,660	1,950	5,950
Black, non-Hispanic	**930**	2,320	1,410	1,320	3,470	2,810	3,190
Hispanic	**650**	2,200	1,160	1,880	2,070	1,380	4,560
White, non-Hispanic	**540**	1,010	830	1,200	1,220	1,140	1,390
Other, non-Hispanic	**1,430**	2,600	1,740	4,190	4,240	2,800	†
Socioeconomic status (SES) quartile							
Lowest quartile	**670**	1,230	990	1,660	1,390	2,260	3,150
Second quartile	**940**	1,430	1,170	1,460	2,330	3,240	4,050
Third quartile	**620**	2,090	1,200	1,560	1,510	1,200	1,680
Highest quartile	**720**	3,450	1,070	2,100	1,910	1,100	1,900
Disability status							
No disability	**420**	920	570	870	900	920	1,260
Has disability	**1,220**	1,960	2,250	2,220	5,880	3,120	9,960
English learner status							
Not fluent	**2,110**	5,500	3,570	9,270	7,800	4,340	13,650
Fluent	**400**	830	570	870	950	910	1,290
Don't know	**3,020**	5,250	5,880	4,160	†	10,570	†
School urbanicity							
Urban	**640**	1,860	1,110	1,360	1,830	1,200	2,650
Suburban	**650**	1,070	750	1,320	1,270	1,510	1,790
Rural	**630**	1,480	1,040	1,770	2,120	1,470	2,260

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table D-24B. Standard errors for table C-4B: Median earnings of the ELS cohort, by level of educational attainment, access to CTE, and selected student and school characteristics

CTE access and student and school characteristics	**Median earnings (Total)**	Educational attainment: High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
No access to CTE							
Sex							
Female	**$1,210**	$2,720	$3,180	$2,710	$2,910	$2,510	$3,110
Male	**3,230**	5,200	2,720	6,270	3,390	6,120	8,730
Race/ethnicity							
Asian, non-Hispanic	**5,750**	†	10,050	†	32,500	7,340	22,190
Black, non-Hispanic	**3,030**	†	3,950	6,310	22,030	4,820	10,170
Hispanic	**5,600**	†	5,320	21,100	†	15,710	†
White, non-Hispanic	**1,790**	4,720	2,780	2,810	2,160	3,680	5,020
Other, non-Hispanic	**4,210**	†	12,480	10,030	†	5,260	60,000
Socioeconomic status (SES) quartile							
Lowest quartile	**3,510**	6,630	6,140	4,960	7,030	11,080	21,360
Second quartile	**2,030**	5,240	3,670	6,510	3,000	5,030	†
Third quartile	**3,340**	5,910	3,700	1,800	3,290	8,200	4,430
Highest quartile	**2,840**	†	2,980	3,620	9,270	4,110	7,550
Disability status							
No disability	**1,560**	4,040	2,030	3,110	2,360	3,320	3,870
Has disability	**4,110**	13,390	11,820	5,850	9,910	†	†
English learner status							
Not fluent	**12,600**	†	16,000	†	32,500	†	22,500
Fluent	**1,540**	3,810	2,100	2,960	2,600	3,140	3,900
Don't know	**†**	†	†	†	450	†	†
School urbanicity							
Urban	**4,670**	14,540	5,190	7,350	15,750	7,140	15,540
Suburban	**1,830**	3,750	2,660	2,990	2,740	3,650	3,930
Rural	**6,150**	†	5,880	14,370	4,990	10,300	56,190
Access to CTE							
Sex							
Female	**420**	1,170	860	1,120	1,120	730	1,590
Male	**800**	1,160	970	1,620	2,040	2,060	2,510
Race/ethnicity							
Asian, non-Hispanic	**1,890**	5,150	3,630	6,130	2,480	2,490	7,090
Black, non-Hispanic	**1,260**	3,020	1,880	1,630	4,830	4,050	3,500
Hispanic	**740**	2,400	1,380	2,090	2,460	1,650	5,190
White, non-Hispanic	**610**	1,090	960	1,430	1,520	1,310	1,470
Other, non-Hispanic	**1,580**	2,650	1,810	5,100	3,140	3,230	†

See notes at end of table.

Table D-24B. Standard errors for table C-4B: Median earnings of the ELS cohort, by level of educational attainment, access to CTE, and selected student and school characteristics—continued

CTE access and student and school characteristics	**Median earnings (Total)**	Educational attainment					
		High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
Socioeconomic status (SES) quartile							
Lowest quartile	**750**	1,360	1,010	1,910	1,740	2,760	3,280
Second quartile	**1,150**	1,480	1,450	1,740	2,860	3,920	4,760
Third quartile	**670**	2,540	1,410	1,910	1,850	1,110	2,170
Highest quartile	**810**	3,510	1,330	2,490	2,250	1,280	1,960
Disability status							
No disability	**490**	1,020	680	1,050	1,070	1,050	1,410
Has disability	**1,440**	2,050	2,500	2,540	9,990	4,120	9,960
English learner status							
Not fluent	**2,820**	6,120	4,340	9,490	†	5,000	15,320
Fluent	**470**	910	690	1,050	1,180	1,050	1,410
Don't know	**2,530**	6,040	3,200	4,090	†	11,510	†
School urbanicity							
Urban	**760**	2,220	1,360	1,470	2,160	1,370	3,000
Suburban	**790**	1,130	910	1,650	1,610	1,840	2,040
Rural	**690**	1,530	1,080	1,850	2,520	1,580	2,270

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

Table D-24C. Standard errors for table C-4C: Median earnings of the ELS cohort, by level of educational attainment, CTE participation level, and selected student and school characteristics

CTE participation level and student and school characteristics	**Median earnings (Total)**	Educational attainment: High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
CTE nonparticipants							
Sex							
Female	**$1,040**	$2,890	$2,380	$2,650	$3,430	$1,370	$3,490
Male	**1,600**	3,420	1,740	4,510	4,830	3,460	4,480
Race/ethnicity							
Asian, non-Hispanic	**2,920**	9,960	3,580	13,290	†	4,230	12,560
Black, non-Hispanic	**3,500**	6,260	8,420	3,060	†	5,000	8,140
Hispanic	**1,380**	6,370	2,500	7,260	4,220	2,780	8,220
White, non-Hispanic	**1,140**	3,080	1,470	2,720	3,110	2,010	2,590
Other, non-Hispanic	**8,910**	9,070	5,140	11,500	23,100	5,670	†
Socioeconomic status (SES) quartile							
Lowest quartile	**1,720**	4,010	3,370	2,960	6,500	3,680	6,210
Second quartile	**1,790**	6,390	1,520	4,560	4,570	2,740	17,880
Third quartile	**1,900**	3,080	4,330	4,980	12,080	2,180	3,730
Highest quartile	**1,790**	†	1,920	3,610	2,870	2,900	3,250
Disability status							
No disability	**980**	2,860	1,630	2,280	2,790	1,670	2,960
Has disability	**2,830**	†	†	4,490	9,920	9,580	†
English learner status							
Not fluent	**4,960**	†	6,150	1,670	32,500	11,970	†
Fluent	**970**	2,470	1,640	2,370	2,750	1,700	2,970
Don't know	**2,780**	5,340	†	7,120	380	22,500	11,000
School urbanicity							
Urban	**1,950**	4,100	4,570	5,080	5,990	2,830	6,860
Suburban	**1,400**	7,490	1,540	2,380	4,200	2,760	4,090
Rural	**1,410**	3,970	2,520	8,690	3,360	2,100	4,570
CTE samplers							
Sex							
Female	**520**	1,490	860	1,110	1,360	930	1,810
Male	**1,330**	2,020	1,310	2,170	2,920	3,790	3,330
Race/ethnicity							
Asian, non-Hispanic	**2,340**	4,410	5,320	4,440	4,010	3,050	10,470
Black, non-Hispanic	**1,480**	4,110	1,650	1,400	5,690	5,160	4,240
Hispanic	**1,000**	2,380	1,690	2,910	2,290	2,060	6,070
White, non-Hispanic	**1,020**	1,970	1,240	1,520	1,940	2,380	1,800
Other, non-Hispanic	**1,800**	6,490	3,190	5,530	3,990	4,330	9,920

See notes at end of table.

Table D-24C. Standard errors for table C-4C: Median earnings of the ELS cohort, by level of educational attainment, CTE participation level, and selected student and school characteristics—continued

CTE participation level and student and school characteristics	**Median earnings (Total)**	Educational attainment: High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
Socioeconomic status (SES) quartile							
Lowest quartile	**1,110**	1,670	1,640	1,490	1,860	4,260	5,810
Second quartile	**1,900**	1,950	1,660	1,870	3,040	7,330	5,210
Third quartile	**1,100**	4,360	1,680	2,330	1,860	2,380	2,040
Highest quartile	**940**	6,430	1,550	3,140	3,710	1,530	2,400
Disability status							
No disability	**750**	1,420	750	1,210	1,260	1,800	1,680
Has disability	**2,110**	3,780	3,860	2,370	10,000	2,830	18,730
English learner status							
Not fluent	**2,520**	†	4,660	4,440	9,760	6,670	12,730
Fluent	**700**	1,370	740	1,180	1,480	1,780	1,680
Don't know	**5,590**	†	†	7,400	5,310	11,350	6,000
School urbanicity							
Urban	**940**	3,030	1,500	1,790	2,450	1,560	3,520
Suburban	**1,090**	1,720	990	1,720	1,580	2,910	2,170
Rural	**1,150**	1,860	1,570	1,780	5,070	2,680	2,590
CTE explorers							
Sex							
Female	**690**	2,990	1,320	1,300	1,780	1,720	2,760
Male	**1,060**	2,180	1,860	2,820	2,720	1,590	5,920
Race/ethnicity							
Asian, non-Hispanic	**2,890**	16,500	3,220	†	4,860	3,130	†
Black, non-Hispanic	**1,690**	6,630	2,310	4,540	7,520	4,300	†
Hispanic	**1,260**	5,120	1,970	2,920	5,350	3,300	†
White, non-Hispanic	**810**	2,170	1,670	2,030	1,980	1,360	3,860
Other, non-Hispanic	**2,240**	5,390	3,510	11,020	8,360	6,490	20,670
Socioeconomic status (SES) quartile							
Lowest quartile	**1,030**	3,340	1,570	2,280	2,680	3,210	6,750
Second quartile	**1,300**	2,120	3,090	3,060	4,530	2,180	4,810
Third quartile	**1,120**	5,470	1,810	3,610	2,950	1,960	8,610
Highest quartile	**1,450**	8,780	2,620	4,040	4,210	2,050	5,420
Disability status							
No disability	**590**	1,880	1,170	1,640	1,590	1,180	3,270
Has disability	**2,970**	4,960	4,980	5,400	†	†	†

See notes at end of table.

Table D-24C. Standard errors for table C-4C: Median earnings of the ELS cohort, by level of educational attainment, CTE participation level, and selected student and school characteristics—continued

CTE participation level and student and school characteristics	**Median earnings (Total)**	Educational Attainment: High school credential only	Postsecondary attendance, no credential	Undergraduate certificate or diploma	Associate degree	Bachelor's degree	Advanced degree or certificate
English learner status							
Not fluent	**4,690**	5,900	†	†	†	10,260	†
Fluent	**620**	1,830	1,210	1,550	1,760	1,200	3,150
Don't know	**6,230**	15,850	9,830	12,260	†	†	†
School urbanicity							
Urban	**1,060**	2,990	1,500	3,030	4,810	3,060	5,870
Suburban	**950**	2,800	1,790	2,410	2,370	1,560	4,150
Rural	**1,010**	2,910	2,020	3,410	3,020	2,130	8,660
CTE concentrators							
Sex							
Female	**1,040**	1,800	1,380	4,220	2,040	1,760	3,320
Male	**1,020**	1,370	1,740	2,810	3,530	2,190	4,470
Race/ethnicity							
Asian, non-Hispanic	**2,850**	14,590	2,970	7,580	†	5,590	10,310
Black, non-Hispanic	**1,700**	3,800	2,270	3,720	3,600	4,900	†
Hispanic	**1,570**	4,310	2,880	5,500	3,680	3,290	†
White, non-Hispanic	**990**	1,430	1,820	3,430	3,140	1,610	2,760
Other, non-Hispanic	**2,260**	4,920	3,770	†	7,370	6,490	12,130
Socioeconomic status (SES) quartile							
Lowest quartile	**1,270**	2,160	1,770	6,710	2,970	2,890	5,640
Second quartile	**1,220**	2,440	2,030	3,100	6,000	2,970	6,270
Third quartile	**1,220**	2,890	2,540	3,700	3,390	2,030	4,360
Highest quartile	**1,980**	5,520	4,970	6,280	4,600	2,750	4,760
Disability status							
No disability	**790**	1,490	1,320	2,580	2,380	1,430	2,650
Has disability	**1,930**	2,920	3,830	3,440	4,650	10,090	19,120
English learner status							
Not fluent	**9,660**	†	18,010	†	19,110	†	33,000
Fluent	**770**	1,270	1,290	2,480	2,270	1,390	2,640
Don't know	**5,530**	4,000	8,570	†	15,620	†	†
School urbanicity							
Urban	**1,360**	2,270	2,350	4,380	3,440	2,680	6,160
Suburban	**1,190**	1,630	1,980	3,870	4,030	2,150	3,230
Rural	**1,110**	2,360	1,920	3,520	3,380	2,650	5,700

† Not applicable.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File.

APPENDIX E. ESTIMATES FOR FIGURES

Table E-1. Estimates for figure 1: Percentage of students in the ELS and HSLS cohorts, by level of access to and participation in CTE

CTE access[a] and CTE participation level[b]	ELS cohort	HSLS cohort
CTE access		
No CTE access	8.01	3.6
Has CTE access	92.0	96.4
CTE participation level		
Nonparticipants	16.5	20.8
Samplers	41.6	41.8
Explorers	23.5	19.6
Concentrators	18.3	17.9

[a] For the ELS cohort, respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on site or off site. For the HSLS cohort, respondents are defined as having access to CTE if the school counselor reported that career technical education was offered in their district or if students were allowed to take career clusters, pathways, or programs of study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program.

[b] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.

NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 update surveys and had transcript data for all four years of high school.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table E-2. Estimates for figure 2: Percentage of students in the ELS and HSLS cohorts who had earned at least one CTE credit and were CTE concentrators

CTE participation level[a]	ELS cohort	HSLS cohort
Earned at least one CTE credit	65.2	61.4
CTE concentrators	18.3	17.8

[a] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE concentrators earned three or more CTE credits in at least one CTE field. See Dalton et al. (2013) for more information on the definition of CTE participant status.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 Update surveys and had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table E-3. Estimates for figure 3: Percentage of students in the ELS and HSLS cohorts who had earned at least one CTE credit, by selected CTE field of study

CTE field of study[a]	ELS cohort	HSLS cohort
Information technology	34.2	27.7
Arts, A/V technology, and communication	18.2	15.7
Architecture and construction	12.3	8.8
Finance	7.1	5.4
Human services	4.9	3.5
Hospitality and tourism	4.4	6.7
Health science	3.9	7.7
STEM	1.6	6.5
Education and training	1.0	2.6

[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 Update surveys and had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table E-4. Estimates for figure 4: Percentage distribution of the race/ethnicity of students in the ELS and HSLS cohorts

Race/ethnicity[a]	ELS cohort	HSLS cohort
Asian, non-Hispanic	4.1	3.9
Black, non-Hispanic	14.0	12.9
Hispanic	15.9	22.4
White, non-Hispanic	60.9	51.9
Other, non-Hispanic	5.2	9.0

[a] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
NOTE: ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 Update surveys and had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table E-5. Estimates for figure 5: Among students in the ELS and HSLS cohorts, percentage who had or did not have access to CTE, by socioeconomic quartile

Access to CTE[a] by SES quartile[b]	ELS cohort	HSLS cohort
Has CTE access		
Lowest SES quartile	94.8	95.7
Highest SES quartile	89.7	96.1
No CTE access		
Lowest SES quartile	5.2	4.3
Highest SES quartile	10.3	3.9

[a] For the ELS cohort, respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on site or off site. For the HSLS cohort, respondents are defined as having access to CTE if the school counselor reported that career technical education was offered in their district or if students were allowed to take career clusters, pathways, or programs of study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program.
[b] Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in both ELS:2002 and HSLS:09 are divided into quartiles based on weighted distributions of the variables.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009; SES = socioeconomic status. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 Update surveys and had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table E-6. Estimates for figure 6: Among students in the ELS and HSLS cohorts, difference in the percentage of male students and female students by level of access to and participation in CTE

CTE access[a] and CTE participation level[b]	ELS cohort	HSLS cohort
CTE access		
No CTE access	-0.9	-0.8
Has CTE access	0.9	0.8
CTE participation level		
Nonparticipants	-7.3	-5.8
Samplers	-5.8	-1.2
Explorers	5.5	3.6
Concentrators	7.6	3.3

[a] For the ELS cohort, respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on site or off site. For the HSLS cohort, respondents are defined as having access to CTE if the school counselor reported that career technical education was offered in their district or if students were allowed to take career clusters, pathways, or programs of study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program.

[b] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.

NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 Update surveys and had transcript data for all four years of high school.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table E-7. Estimates for figure 7: Among students in the ELS and HSLS cohorts, percentage who were CTE concentrators, by race/ethnicity

Race/ethnicity[a]	ELS cohort	HSLS cohort
Asian, non-Hispanic	10.2	14.2
Black, non-Hispanic	18.0	15.5
Hispanic	13.0	14.9
White, non-Hispanic	20.1	20.6
Other, non-Hispanic	20.8	14.2

[a] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 Update surveys and had transcript data for all four years of high school. Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table E-8. Estimates for figure 8: Percentage distribution of the racial/ethnic composition of ELS and HSLS cohort students who participated in CTE, by selected CTE fields of study

CTE field of study[a] by race/ethnicity[b]	ELS cohort	HSLS cohort
All CTE participants		
Asian, non-Hispanic	4.1	3.9
Black, non-Hispanic	14.0	12.9
Hispanic	15.9	22.4
White, non-Hispanic	60.9	51.9
Other, non-Hispanic	5.2	9.0
Information technology		
Asian, non-Hispanic	4.2	3.2
Black, non-Hispanic	17.6	16.9
Hispanic	16.7	21.5
White, non-Hispanic	56.9	49.9
Other, non-Hispanic	4.6	8.5
Health science		
Asian, non-Hispanic	3.3	4.4
Black, non-Hispanic	22.2	18.6
Hispanic	14.2	23.3
White, non-Hispanic	55.5	43.6
Other, non-Hispanic	4.8	10.0
Business		
Asian, non-Hispanic	2.9	3.3
Black, non-Hispanic	16.9	16.6
Hispanic	13.2	19.9
White, non-Hispanic	62.6	52.2
Other, non-Hispanic	4.4	8.1

[a] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
[b] Black includes African American, Hispanic includes Latino, and Other includes American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and More than one race.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 Update surveys and had transcript data for all four years of high school. Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE participants earned at least one CTE credit. See Appendix A for more information on the definition of CTE participant status.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table E-9. Estimates for figure 9: Among ELS and HSLS cohort students who had earned at least one CTE credit, percentage who were academic concentrators, had graduated on time, and had enrolled in postsecondary education

Educational outcomes	ELS cohort	HSLS cohort
Academic concentration[a]	24.3	36.5
On-time high school graduation[b]	92.7	94.0
PSE enrollment	78.0	79.9

[a] A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
[b] ELS cohort respondents are counted as having graduated on time if they received a high school diploma between fall 2003 and summer 2004, and HSLS cohort respondents are counted as having graduated on time if they received a high school diploma between fall 2012 and summer 2013.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009; PSE = postsecondary education. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 Update surveys and had transcript data for all four years of high school.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table E-10. Estimates for figure 10: Among students in the ELS and HSLS cohorts who were from the lowest socioeconomic quartile, percentage who were academic concentrators, by access to CTE and CTE participation level

CTE access[a] and CTE participation level[b]	ELS cohort	HSLS cohort
CTE access		
No CTE access	18.5	26.8
Has CTE access	13.3	22.3
CTE participation level		
Nonparticipants	20.6	19.5
Samplers	13.6	22.9
Explorers	11.0	24.1
Concentrators	12.9	22.9

[a] For the ELS cohort, respondents are defined as having access to CTE if they attended a school for which the school administrator indicated that courses in any CTE field of study were offered either on site or off site. For the HSLS cohort, respondents are defined as having access to CTE if the school counselor reported that career technical education was offered in their district or if students were allowed to take career clusters, pathways, or programs of study offered at their school even if not enrolled in them. Students are also counted as having CTE access if their school offered vocational-technical courses that were not part of the formal program.

[b] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.

NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 Update surveys and had transcript data for all four years of high school. Socioeconomic status (SES) is a composite variable that combines measures of parents' education, parents' occupations, and family income. The values of the SES variable in both ELS:2002 and HSLS:09 are divided into quartiles based on weighted distributions of the variables. A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table E-11. Estimates for figure 11: Among Hispanic students in the ELS and HSLS cohorts, percentage who had graduated from high school on time, by CTE participation level

CTE participation level[a]	ELS cohort	HSLS cohort
Total	85.7	90.0
Nonparticipants	81.8	80.1
Samplers	85.8	92.3
Explorers	86.6	92.5
Concentrators	89.2	96.8

[a] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE nonparticipants earned less than one CTE credit. CTE samplers earned one to two CTE credits in one or more fields. CTE explorers earned three or more CTE credits but no three credits in any single CTE field. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.

NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. Hispanic includes Latino. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 Update surveys and had transcript data for all four years of high school. ELS cohort respondents are counted as having graduated on time if they received a high school diploma between fall 2003 and summer 2004, and HSLS cohort respondents are counted as having graduated on time if they received a high school diploma between fall 2012 and summer 2013.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

Table E-12. Estimates for figure 12: Among ELS and HSLS cohort students who had earned at least one CTE credit or who had concentrated in a CTE field, percentage who were academic concentrators, by selected CTE field

CTE participation level[a] by CTE field[b]	ELS cohort	HSLS cohort
Earned at least one CTE credit	24.3	36.5
CTE concentrators by CTE field of study		
Information technology	30.7	45.0
Business management and administration	18.0	41.4
Health science	22.8	51.9

[a] Respondents' level of CTE participation is coded based on students' course credits using course-level transcript data coded based on the School Courses for the Exchange of Data (SCED) taxonomy. CTE concentrators earned three or more CTE credits in at least one CTE field. See Appendix A for more information on the definition of CTE participant status.
[b] CTE fields of study are coded based on categories in the School Courses for the Exchange of Data (SCED) taxonomy (http://nces.ed.gov/forum/SCED.asp). Each course on respondents' high school transcripts was classified into these 16 CTE fields of study. These categories are not mutually exclusive; a course may be counted in two different CTE fields.
NOTE: CTE = career and technical education; ELS = Education Longitudinal Study of 2002; HSLS = High School Longitudinal Study of 2009. ELS:2002 followed a cohort of grade 10 students starting in 2002, with follow-up surveys in 2004, 2006, and 2012. High school transcript data were collected in the fall and winter after the 2004 first follow-up. The ELS cohort sample used here is composed of grade 10 public school students in 2002 who had transcript data for all four years of high school. HSLS:09 followed a cohort of grade 9 students starting in 2009, with a follow-up in 2011 and an update and high school transcript data collection in 2013. The HSLS cohort sample used here is composed of grade 9 public school students in 2009 who responded to the base-year and 2013 Update surveys and had transcript data for all four years of high school. A student is defined as an academic concentrator if he or she earned at least four credits in English; three credits in math with at least one higher than algebra II; three credits in science with at least one higher than biology (i.e., chemistry or physics); three credits in social studies, with at least one of those credits in U.S. or world history; and two credits in a single non-English (foreign) language.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002) Third Follow-up Restricted-use Data File; and High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcripts Restricted-use Data File.

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