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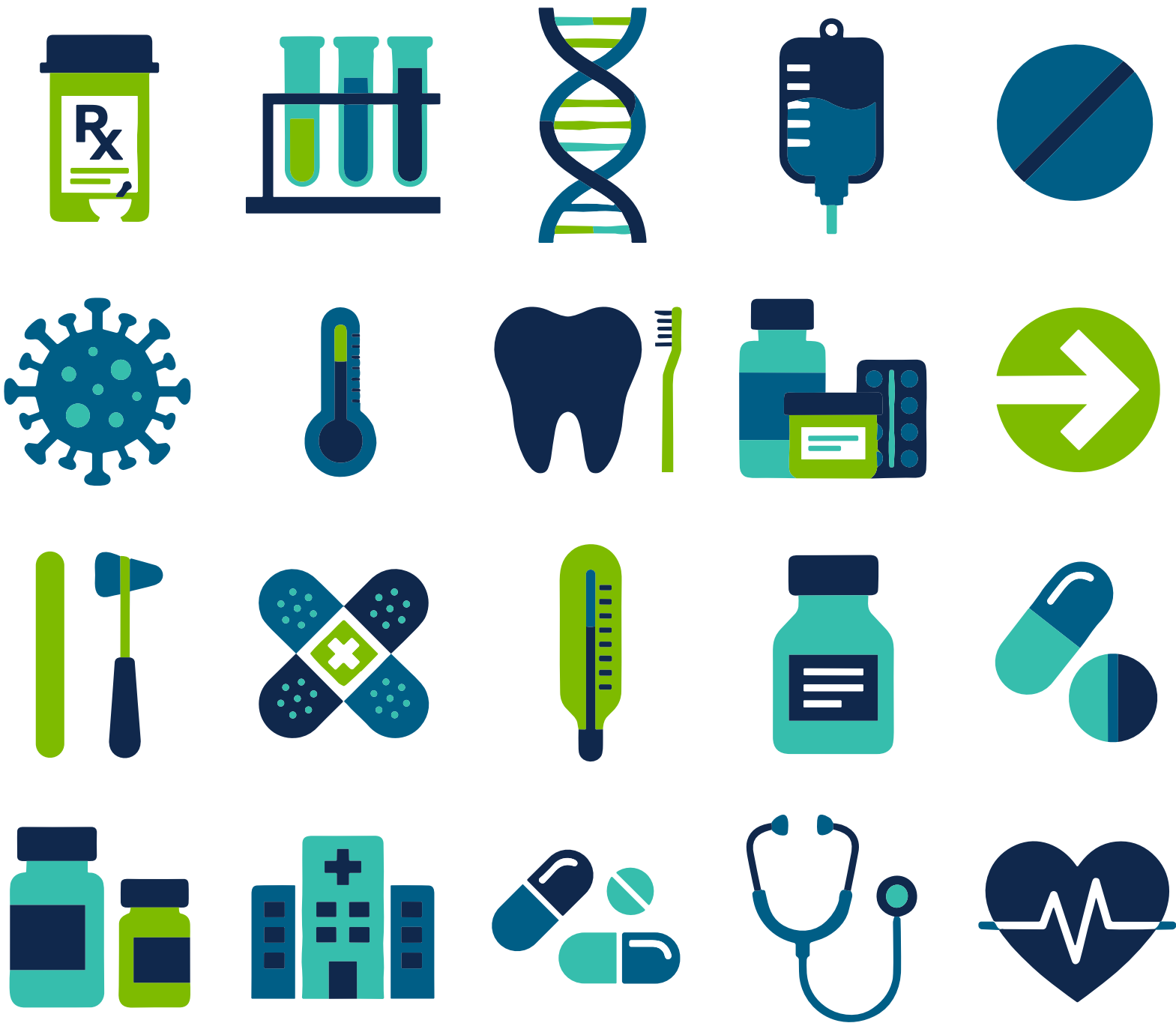
Oct 15, 2026
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The Effects of Health Sciences CTE Concentration

on Educational and Workforce Outcomes in Nebraska

*A special report by the Nebraska Department of Education & the
Nebraska Statewide Workforce & Educational Reporting System*





The Nebraska Statewide Workforce & Educational Reporting System, or NSWERS, is a one-of-a-kind research partnership among Nebraska's education and workforce systems designed to create a data-informed decision culture that supports pathways of learning and earning for the people of Nebraska. The NSWERS data system is the most comprehensive education-to-workforce longitudinal information source ever created in Nebraska.

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*These provisional results are based on certified NSWERS data as of August 31, 2026.
The provisional results in this report may change because of data resubmissions by NSWERS
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ABOUT NSWERS

The Nebraska Statewide Workforce & Educational Reporting System, or NSWERS, is an interlocal agency with member representatives from Nebraska's six Community Colleges, the Nebraska Department of Education, the Nebraska State College System, the University of Nebraska System, and in affiliation with the Nebraska Department of Labor. NSWERS enables seamless integration of data across educational and workforce systems, provides data literacy education, and promotes the use of this data to further evidence-based policy and practices across Nebraska's educational landscape.

SPECIAL REPORTS

NSWERS' Special Reports examine one topic across two or more education and/or workforce outcomes. In this case, the report examines the long-term educational and workforce outcomes of students who concentrated in Health Sciences CTE during high school across three outcomes; enrollment in a postsecondary institution, postsecondary degree attainment, and employment and annual wages.

ATTRIBUTION

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LETTER

Dear Nebraska Education, Workforce, and Community Partners,

Nebraska's ability to meet its future workforce needs often begins with creating meaningful opportunities for students to explore careers, develop skills, and build clear pathways from education into the workforce. One area for that impactful work is healthcare, where communities across our state continue to experience significant demand for qualified professionals.

Career and Technical Education (CTE) plays an important role in connecting students with these opportunities. Through Health Sciences CTE programs, Nebraska students can explore healthcare careers, develop technical and employability skills, and begin building pathways to postsecondary education, training, and employment. Yet understanding the value of these programs requires looking beyond what happens while students are in high school. We also need to understand where students go next.

This special report represents a collaboration between the Nebraska Department of Education (NDE) and the Nebraska Statewide Workforce & Educational Reporting System (NSWERS) to do just that. By connecting Nebraska's K-12, postsecondary, and workforce data, this study traces students' pathways beyond high school to examine the relationship between Health Sciences CTE concentration and subsequent educational and workforce outcomes. This statewide longitudinal perspective allows us to better understand whether students who concentrate in Health Sciences CTE continue along health-related pathways after graduation.

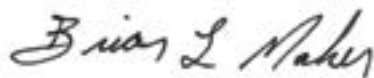
The findings point to a meaningful pattern. Health Sciences CTE concentration is more strongly associated with what students study and the industries in which they work than simply if they attended college or entered the workforce. Concentrators are substantially more likely to pursue health-related postsecondary education, earn health-related credentials, and work in Nebraska's healthcare industry. These findings demonstrate the potential role of secondary education in strengthening the connection between students' early career preparation and Nebraska's long-term workforce needs.

We are grateful to the educators, institutions, employers, policymakers, and partners whose work makes these opportunities possible. We hope this report provides useful evidence to inform conversations and decisions about how Nebraska can continue strengthening its education-to-workforce pipeline and preparing the next generation of healthcare professionals.

Sincerely,



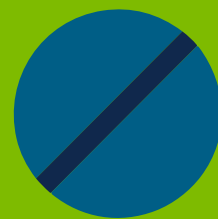
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INTRODUCTION



Healthcare Workforce Demand and Shortage



Healthcare is one of the largest and most consequential sectors of Nebraska's economy, employing more people than any other industry and serving as a crucial source of workforce demand across the state. Nebraska hospitals alone employ more than 55,800 individuals and contribute approximately \$20 billion to the state's economy (Nebraska Hospital Association, 2026). Yet the supply of qualified healthcare workers has not kept pace with workforce demand. The Nebraska Center for Nursing (2025) estimates a current nursing shortage of 6,693 full-time equivalents (FTEs), approximately 21.1% below desired statewide staffing levels. These workforce challenges are also reflected in the geographic availability of healthcare professionals across the state: of Nebraska's 93 counties, 14 lack a primary care physician and nine lack a registered nurse (Nebraska Hospital Association, 2024).

Nebraska's healthcare workforce challenges exist within a broader period of national growth and increasing demand for healthcare services and workers. In 2024, national health expenditures totaled \$5.3 trillion (about \$16,000 per person in the US), representing 18% of U.S. gross domestic product (Centers for Medicare and Medicaid Services, 2026). At the same time, the U.S. Bureau of Labor Statistics (2025) projects approximately 1.9 million job openings annually in healthcare occupations through 2034. The American Hospital Association's *2025 Health Care Workforce Scan* identifies an aging population, employee turnover and burnout, limited mentorship opportunities, and rising costs amid constrained budgets as contributing factors for the national healthcare worker shortage. Workforce retention presents an additional challenge, with approximately 18% of newly licensed registered nurses leaving the profession within their first year (American Hospital Association, 2025).

These workforce pressures may be particularly consequential in Nebraska because of the state's rural context. Approximately 68% of hospitals are classified as rural, nearly twice the national percentage of 35% (Nebraska Hospital Association & Nebraska Rural Health Association, 2024). Rural communities often face additional challenges recruiting and retaining healthcare professionals, compounding existing limitations in access to healthcare services (National Center for Health Workforce Analysis, 2024).

Addressing healthcare workforce shortages therefore requires attention not only to recruitment and retention of the existing workforce, but also to the development of a sustained pipeline of individuals who are aware of, prepared for, and able to transition into healthcare careers. Developing that pipeline begins well before individuals enter postsecondary education or the workforce. Secondary education can play an important role by providing students the opportunities to explore healthcare careers, develop relevant technical and employability skills, participate in work-based and applied learning experiences, and establish pathways into postsecondary education and training. In Nebraska, recent state investments in Career and Technical Education (CTE) reflect growing recognition of its potential to strengthen the state's workforce pipeline. These investments by the State's Legislature (Legislative Bill 261, 2025) have been supported by advocacy from the Nebraska Hospital Association, Nebraska Chamber of Commerce and Industry, employers, and other statewide partners seeking to expand opportunities for students to prepare for high-demand careers.

Health Sciences CTE in Nebraska



Career and Technical Education (CTE) provides an important connection between education and state and regional workforce needs by combining academic knowledge, technical skill development, career exploration, and applied learning. At the secondary level, CTE can provide students with early exposure to career opportunities while helping them develop the knowledge and skills necessary to make informed decisions about postsecondary education, training, and employment.

Programs of study are the primary delivery model for CTE in Nebraska. They include a sequence of courses which progress in specificity and rigor that create seamless transitions to postsecondary programs. They are updated regularly to align with Nebraska's workforce needs and economic development priorities. For workforce sectors such as healthcare that require varying levels of education, credentials, and specialized preparation, these experiences may provide an important early entry point into that talent pipeline.

Federal support for CTE is authorized through the Strengthening Career and Technical Education for the 21st Century Act (Perkins V), enacted in 2018. Perkins V continues the federal government's longstanding investment in CTE and emphasizes alignment between educational programs and state, regional, and local workforce needs. In Nebraska, the Nebraska Department of Education's (NDE) Office of Career, Technical, and Adult Education administers Nebraska CTE and supports secondary programs of study across multiple industry sectors, including Health Sciences.

Health Sciences CTE programs are designed to introduce students to the breadth of careers available in the healthcare sector and provide increasingly advanced learning experiences aligned with those careers. Through these programs, students may progress from introductory career exploration to more advanced coursework and applied experiences that build knowledge and skills relevant to continued education and employment in healthcare related fields.

Understanding the longer-term educational and workforce outcomes of students who participate in these programs is particularly important because Nebraska continues to face significant workforce needs in healthcare. Not all students, however, engage with these programs to the same extent. Some take only a course or two to explore potential career interests, while others complete a full program of study. To reflect these differences, students are classified into two levels of participation: participants and concentrators.

A participant is a student who takes at least one course within a program area (NDE, 2024). These students are often exploring different career interests and may enroll in courses across multiple programs. A concentrator, by contrast, is a student who completes at least two intermediate or capstone-level courses within a single program or within a single career cluster area. Concentrators have typically narrowed their focus and are pursuing a more defined career pathway.

The distinction between participation and concentration is important when evaluating the outcomes of CTE programs. While participation may reflect initial exposure to a career area, concentration represents sustained engagement in a sequence of increasingly advanced coursework within that area. Examining concentrators, therefore, provides an opportunity to assess whether deeper engagement in Health Sciences CTE is associated with students' subsequent educational and workforce trajectories. According to NDE, during the 2024-2025 academic year, only 52 of Nebraska's school districts (21%) offered at least one Health Sciences CTE program of study, serving 4,537 concentrators and 11,187 participants.

Many schools also provide students opportunities to participate in HOSA – Future Health Professionals, the Career and Technical Student Organization (CTSO) aligned with Health Sciences. CTSOs expand classroom learning through leadership development, competitive events, career exploration, and applied learning experiences. Although CTSO participation is not the primary focus of the current study, HOSA represents one component of the broader set of experiences through which Nebraska students may engage with healthcare careers during secondary education.

Longitudinal Evidence and Prior Research



Nebraska's capacity to examine the long-term outcomes of CTE participation has expanded significantly through the development of its statewide longitudinal data system. LB 1071, enacted in 2010, established a data-sharing partnership between NDE and Nebraska's public postsecondary institutions, creating the P-20 Data System (NDE, 2025a). In 2020, LB 1160 expanded this infrastructure by incorporating workforce data from the Nebraska Department of Labor and establishing the Nebraska Statewide Workforce and Educational Reporting System (NSWERS).

NSWERS connects K-12, postsecondary, and workforce information over time, allowing researchers to examine outcomes including high school graduation, college enrollment and completion, employment, industry placement, wages, and employment location. This connected data infrastructure makes it possible to examine whether students' secondary CTE experiences are associated with their subsequent educational and workforce trajectories.

Historically, evaluation of secondary CTE programs has often focused on measures available within the K-12 system, such as course enrollment, program completion, graduation, or credential attainment. While these measures provide important information about students' experiences during secondary education, they cannot independently determine whether students subsequently enroll in postsecondary education, complete degrees, enter industries related to their secondary coursework, or experience different employment and earning outcomes. The connection of education and workforce records through NSWERS creates an opportunity to extend evaluation beyond secondary program participation and examine the longer-term trajectories of Nebraska students.

Lindsay et al. (2024) conducted a systematic review spanning the previous two decades of research on the impact of CTE program participation on various student outcomes. Overall, they identified 28 studies that incorporated causal methods for evaluating long-term effects of secondary-level CTE programs. Results from their meta-analysis found that student participation in secondary CTE yielded statistically significant, positive impacts on the following student outcomes: high school achievement, likelihood of completing high school, employability skills, college readiness, enrollment in two-year colleges, and employment after high school. However, no significant findings were observed between secondary CTE participation and other student outcomes: student discipline, high school attendance, four-year college enrollment, college degree completion, and subsequent earnings. While Lindsay et al. (2024) provided positive support for CTE in general, they indicated a gap in the literature on program-specific outcomes, such as Health Sciences CTE.

Witzen (2018) used data from the Maryland Longitudinal Data System (MLDS) to examine the relationship between completing a secondary health-related CTE program and students' postsecondary enrollment, degree attainment, employment, and wages. Witzen (2018) found that students who completed a

Health Sciences CTE program were 7.8 percentage points more likely to enroll in college immediately after high school, 17.1 percentage points more likely to enroll in a health-related major (in the first year), and 6.4 percentage points more likely to complete a bachelor's degree in a health science field. Six years after graduation, Health Sciences CTE completers were also 19.7 percentage points more likely to be employed in a health science field and earned approximately \$1,926 more than comparable students who had not completed a Health Sciences CTE program, based on propensity-score matching.

While these findings suggest that secondary Health Sciences CTE may be associated with positive postsecondary and workforce outcomes, comparable longitudinal evidence has not yet been established for Nebraska students. Nebraska's unique educational, geographic, and workforce context underscores the need to examine these relationships within the state. Establishing Nebraska-specific evidence can help determine whether the patterns observed in prior research extend to Nebraska students and provide a clearer understanding of the relationship between Health Sciences CTE concentration and students' longer-term educational and workforce trajectories.

Current Study



Given Nebraska's healthcare workforce needs, the growing emphasis on developing sustainable talent pipelines, and the absence of Nebraska-specific longitudinal evidence regarding Health Sciences CTE outcomes, this study examines whether concentration in a secondary Health Sciences CTE program is associated with subsequent postsecondary and workforce outcomes. Using connected education and workforce records available through NSWERS, this study follows students beyond high school to examine whether Health Sciences CTE concentrators experience different patterns of postsecondary enrollment and degree attainment, employment in healthcare-related fields, and annual wages compared with otherwise similar students who did not concentrate in Health Sciences CTE.

Building on Witzen (2018), this study adapts a longitudinal and propensity-score matching approach to the Nebraska context. This approach allows for comparison of Health Sciences CTE concentrators with students who share similar observable characteristics, providing a more rigorous assessment of the relationship between Health Sciences CTE concentration and subsequent outcomes than descriptive comparisons alone.

This study also supports Priority 3 of the NDE Strategic Plan 2026-2030, *Equip Learners for the Workforce*, including outcomes focused on increasing postsecondary access and attainment and improving skill attainment for learners (NDE, 2025b). More broadly, the findings are intended to contribute evidence about the role secondary education may play in developing Nebraska's healthcare workforce pipeline and inform future decisions related to Health Sciences CTE program access, design, and investment.

The purpose of this study is to examine whether concentrating in a secondary Health Sciences CTE program is associated with differences in postsecondary education and workforce outcomes among Nebraska students.

Research Questions



RQ1:

How is Health Sciences CTE concentration associated with postsecondary enrollment among Nebraska secondary students?

RQ2:

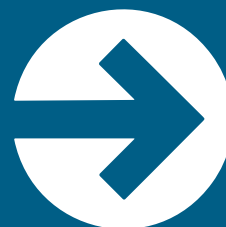
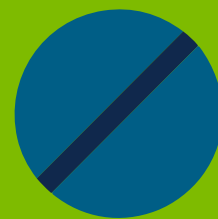
How is Health Sciences CTE concentration associated with postsecondary degree attainment, including attainment of health-related degrees?

RQ3:

How is Health Sciences CTE concentration associated with employment, employment in a health-related field, and annual wages?



KEY FINDINGS



Key Findings

The Effects of Health Sciences CTE Concentration on Educational and Workforce Outcomes in Nebraska special report compares the outcomes of Nebraska students who concentrated in Health Sciences Career and Technical Education (CTE) during high school with similar students who did not concentrate in Health Sciences CTE to examine differences in postsecondary enrollment, credential attainment, degree completion, healthcare employment, and earnings.

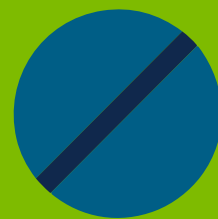
The findings show:



How to interpret these results: Reported differences estimate how outcomes for Health Sciences CTE concentrators compare with what would have been expected for those same students had they not become concentrators. Results were adjusted to account for measured differences between students, including demographic, academic, behavioral, and geographic characteristics. This makes the groups more comparable and helps distinguish differences associated with Health Sciences CTE concentration from other student differences. However, some of the adjusted differences may still be related to factors that could not be measured. **See insights.nswers.org for full results and technical details.**



METHODS



Data and Sample Selection



Data were obtained from NSWERS. To account for differences in contextual conditions (e.g., changes to CTE policies or systems) and improve matching quality, five cohorts were developed for high school students based on their high school graduation years, from 2014 (Cohort 1) through 2018 (Cohort 5; see Table 1). These cohorts were selected to allow up to six years of follow-up for postsecondary and workforce outcomes.

The overall sample size across these years included $N = 102,924$ individuals. Students were classified as Health Sciences CTE concentrators if they completed at least two intermediate- or capstone-level courses in Health Sciences. Students who did not meet this threshold were classified as non-concentrators. The sample sizes for Health Sciences CTE concentrators and non-concentrators are available in Table 1.

Outcomes



Education-related outcomes included the following: (a) postsecondary enrollment; (b) postsecondary enrollment in a health major; (c) postsecondary degree attainment; and (d) postsecondary health degree attainment. These outcomes were further divided into temporal distance from high school graduation (one or four years) and postsecondary institution type (two- or four-years). Importantly, two-year institution types capture institutions that provide credentials for programs that are two years *or less*. Enrollment outcomes were measured cumulatively within one- and four-year follow-up windows, such that any enrollment occurring during these periods was counted. This approach ensures that students who completed short-term programs or who enrolled but subsequently withdrew remain represented in the enrollment outcomes. In addition to the one- and four-year follow-up windows following high school graduation, enrollment in a health major, postsecondary degree attainment, and health-related degree attainment were also examined over a cumulative six-year follow-up period. Each education-related outcome was coded as binary and derived from postsecondary enrollment and academic award data from NSWERS's public postsecondary partners and National Student Clearinghouse records. Degree attainment outcomes were measured at the following levels: certificate, associate's

degree, bachelor's degree or higher, and any degree. When interpreting observed postsecondary rates at two- and four-year institutions, it is important to note that their sum does not equal the observed overall postsecondary enrollment rates as individuals can be enrolled in both two- and four-year institutions simultaneously within a given year (e.g., transfer or concurrently enrolled students).

Workforce-related outcomes pertain to the Nebraska workforce and include: (a) Nebraska employment; (b) Nebraska employment in the health industry; (c) annual wages for individuals working in Nebraska. All workforce outcomes were assessed in the sixth year after high school graduation. Employment outcomes were coded as a binary variable and measures whether an individual earned a wage in Nebraska that year. Annual wages were measured as the dollar amount paid by an employer before taxes or deductions (i.e., gross wages). All wages were inflation-adjusted to 2025 US dollars. Additional methodological details are provided in the Technical Appendix.

Creating Comparable Groups



In this study, the treatment condition is defined as concentrating in Health Sciences CTE, which is distinct from overall program participation. Students were not randomly assigned to Health Sciences CTE programs, rather, students chose to participate and concentrate in Health Sciences CTE programming. Those who chose to concentrate in Health Sciences CTE may have differed from other students in ways that also influence educational and workforce outcomes. To reduce confounding in the estimated associations between Health Sciences CTE concentration status on the study outcomes, this study used propensity score matching to identify non-concentrators who were similar to Health Sciences CTE concentrators in terms of observed student or school characteristics. Propensity scores represented each student's likelihood of becoming a Health Sciences CTE concentrator based on their observed characteristics. Students with similar propensity scores were expected to have similar characteristics before entering Health Sciences CTE programming.

Instead of one-to-one matching, optimal full matching was employed because it maximizes sample retention while maintaining balance between treatment and comparison groups. One-to-one matching may result in the loss of otherwise acceptable matches simply because a one-to-one pairing cannot be established. By retaining all suitable comparison students, optimal full matching generally improves the precision of modeled estimates (Hansen, 2004). The resulting matched sample is intended to improve comparability on observed baseline characteristics by reducing observed confounding from pre-existing differences among Health Sciences CTE concentrators and non-concentrators. Additional methodological details are provided in the Technical Appendix.

Matching Quality



Statistical diagnostics were used to confirm that Health Sciences CTE concentrators and comparison students were similar across characteristics. These diagnostics indicated whether the matching procedure

reduced pre-existing differences between the groups before the outcomes were analyzed. Additional methodological details are provided in the Technical Appendix.

Outcome Analysis



Following the matching process, statistical analyses were conducted to examine differences in educational and workforce outcomes between Health Sciences CTE concentrators and a comparison group. Two complementary analytic approaches were employed:

- ✦ Observed differences in outcomes (including unmatched samples): These estimates represent simple comparisons of observed outcome rates between Health Sciences CTE concentrators and non-concentrators. Because they do not account for any remaining differences between the groups, they should be interpreted as descriptive and may include the effects of other characteristics that differ between groups that affect the outcome. For example, fewer Health Sciences CTE concentrators are in Special Education compared to their non-concentrator peers, and this can create differences in educational and workforce outcomes that are determined by who is able to achieve Health Sciences CTE concentrator status rather than an impact of the program itself.

- ✦ Covariate-adjusted differences in outcomes (including matched samples only): These analyses calculate the differences in the study outcomes that Health Sciences CTE concentrators would experience compared to if they had not become a Health Sciences CTE concentrator. These numbers were adjusted to account for other differences that exist between those that did and did not concentrate in Health Sciences CTE. Adjustment helps separate the association with Health Sciences CTE concentration from associations with measured differences between concentrators and non-concentrators.

Additional methodological details, including model specifications and estimation procedures, are provided in the Technical Appendix.



RESULTS



Matching

Matching resulted in a matched sample size of 59,732 individuals, where $n = 5,937$ were Health Sciences CTE concentrators (see Table 1). There were 43,113 unmatched non-concentrator cases, which accounts for 44.5 percent of all students who did not concentrate in Health Sciences CTE within the cohort years of interest. Students who attended school districts that did not offer a Health Sciences CTE program of study could not be matched with a treatment case and

were excluded from the matched sample (see Figure 1). A total of 79 concentrators were not matched, which accounts for 1.3 percent of the Health Sciences CTE concentrators within the selected cohort years. Lastly, the observed covariate balance statistics indicated good balance across all covariates, with one slight exceedance for a single cohort-treatment interaction term. Details about the balance statistics are located in the Technical Appendix.

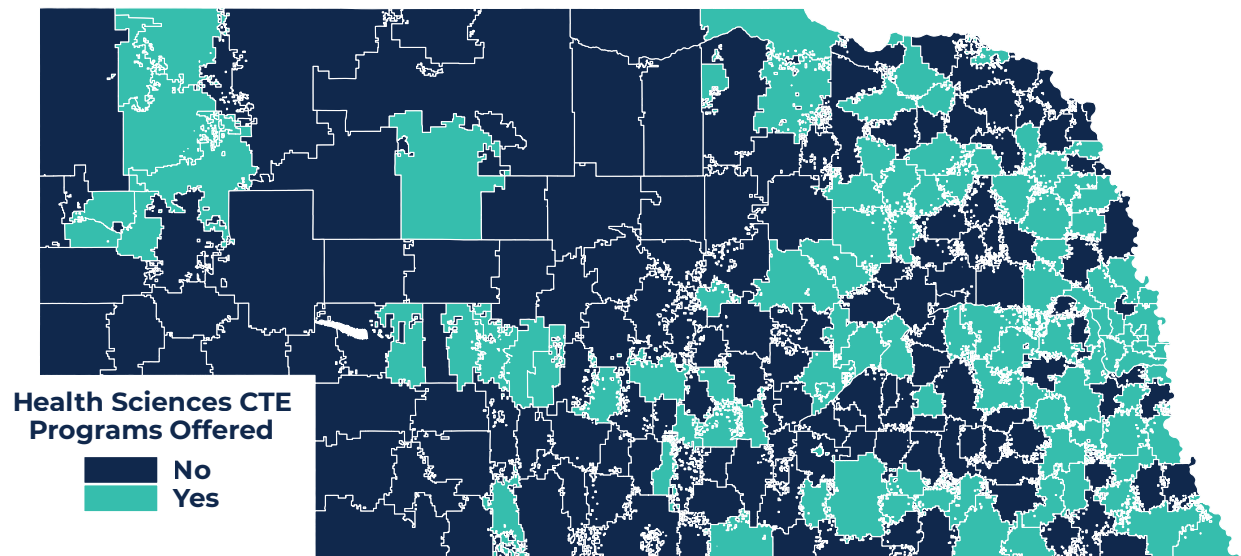
Table 1
Sample Sizes by Cohort Year

Cohort	Total N	Matched N	Matched Non-Concentrator N	Matched Concentrator N
2014	20,496	10,829	9,746	1,083
2015	20,164	11,148	10,087	1,061
2016	20,519	11,719	10,613	1,106
2017	20,501	12,238	11,059	1,179
2018	21,244	13,798	12,290	1,508
Overall	102,924	59,732	53,795	5,937

Figure 1

SMALLER, RURAL, AND WESTERN SCHOOL DISTRICTS FACE REDUCED ACCESS TO HEALTH SCIENCES CTE OPPORTUNITIES

Health Sciences CTE Concentration in Nebraska Public School Districts
(2014-2018 Graduation Years)



The demographic characteristics of the concentrator and non-concentrator cases are available in Table 2. Across matching covariates, the demographic features of the matched sample demonstrated stronger covariate balance than the unmatched sample. The largest differences between matched and unmatched samples were observed in non-Health Sciences CTE samples. Of matched non-Health Sciences CTE concentrators, 67.6 percent were female and 32.4 percent were male. Prior to matching, non-Health Sciences CTE concentrators, 48.6 percent were female and 51.4 percent were male. Likewise,

4.4 percent of non-Health Sciences CTE concentrators were black or African American in the unmatched sample while the matched sample displayed 10.3 percent of non-Health Sciences CTE concentrators as being black or African American. The unmatched sample displayed 12.9 percent of non-Health Sciences CTE students as receiving special education whereas 6.9 percent of the matched sample portray non-Health Sciences CTE concentrators as receiving special education. Overall, the columns pertaining to the matched sample depict successful balance on observed covariate characteristics.

Table 2**Demographic and Descriptive Statistics of Unmatched and Matched Samples**

Variable	Unmatched		Matched	
	Non-health concentrator	Health Sciences CTE Concentrator	Non-health concentrator	Health Sciences CTE Concentrator
Cohort				
1 (2014)	20.0%	18.2%	18.2%	18.2%
2 (2015)	19.7%	17.9%	17.9%	17.9%
3 (2016)	20.0%	18.7%	18.6%	18.6%
4 (2017)	19.9%	20.0%	19.9%	19.9%
5 (2018)	20.4%	25.2%	25.4%	25.4%
Female	48.6%	66.7%	67.6%	66.3%
Male	51.4%	33.3%	32.4%	33.7%
American Indian or Alaska Native	0.8%	0.3%	0.3%	0.3%
Asian	2.0%	2.6%	2.6%	2.6%
Black or African American	4.4%	11.7%	10.3%	11.7%
Hispanic	15.0%	17.0%	18.0%	17.1%
More than one race/ethnicity	9.4%	11.2%	11.3%	11.2%
Pacific Islander or Native Hawaiian	<0.1%	<0.1%	<0.1%	<0.1%
White	68.3%	57.1%	57.5%	57.0%
Chronic absence	15.9%	15.3%	15.7%	15.4%
Special education	12.9%	6.8%	6.9%	6.8%
ELL	3.0%	2.2%	2.4%	2.2%
High-ability learner	24.4%	23.4%	22.3%	23.5%
11th Grade Science Percentile (Mean; SD)	0.503 (0.269)	0.494 (0.257)	0.491 (0.264)	0.493 (0.257)
11th Grade Reading Percentile (Mean; SD)	0.498 (0.267)	0.513 (0.255)	0.514 (0.263)	0.513 (0.255)
11th Grade Writing Percentile (Mean; SD)	0.443 (0.260)	0.470 (0.250)	0.472 (0.261)	0.470 (0.250)
11th Grade Math Percentile (Mean; SD)	0.507 (0.269)	0.510 (0.263)	0.508 (0.269)	0.508 (0.263)
High-school GPA (Mean; SD)	2.95 (0.718)	3.06 (0.705)	3.06 (0.694)	3.06 (0.706)
ACT Score (binned)				
Missing	38.5%)	30.9%	33.0%	30.9%
<20	26.4%)	31.1%	29.0%	31.2%
≥20	35.1%)	38.0%	38.0%	38.0%
N	96,908	6,016	53,795	5,937

Notes. CTE = Career Technical Education; ELL = English-language learner; ACT = American College Testing; GPA = grade point average; N = sample size.

Interpreting Results

For binary outcomes, such as college enrollment, degree completion, or employment, results are reported as **percentage-point differences**. For wage outcomes, results are reported as **differences in average annual earnings**.

To help make the findings more understandable, some results are also expressed as the **estimated number of additional students** achieving an outcome. Complete estimates and statistical details are provided in the accompanying tables.

Observed Outcomes and Differences

The observed outcome measures for Health Sciences CTE concentrators and non-concentrators and their differences are provided for each outcome. Observed differences describe how education and workforce outcomes differed between Health Sciences CTE concentrators and non-concentrators. These comparisons are purely descriptive and should not be interpreted as evidence that Health Sciences CTE concentration caused the differences.

Example (binary outcome): A difference of 10 percentage points means that Health Sciences CTE concentrators had an observed outcome rate that was 10 percentage points higher than that of non-concentrators.

Example (wage outcome): A difference of \$1,000 means that Health Sciences CTE concentrators earned, on average, \$1,000 more per year than non-concentrators.

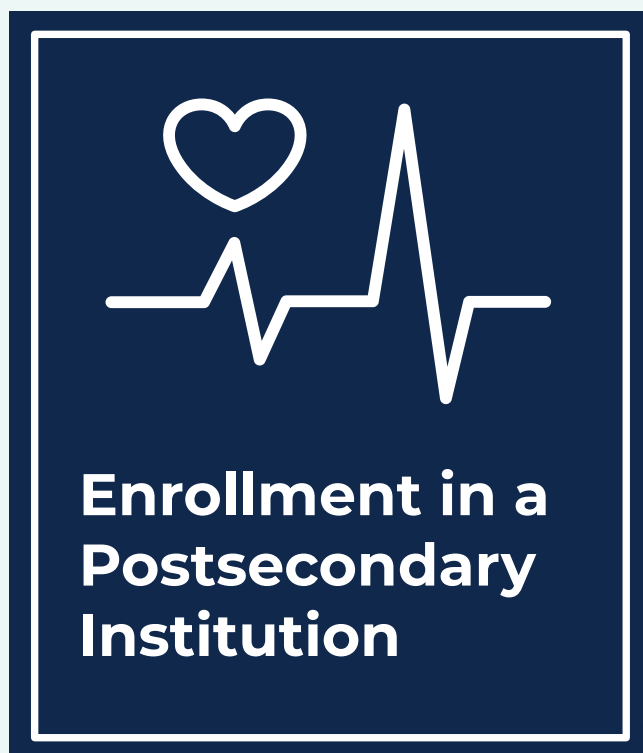
Adjusted Differences

Adjusted differences estimate the outcomes associated with Health Sciences CTE concentration after accounting for differences in student characteristics. These estimates are best interpreted as the average difference between students who concentrated in Health Sciences CTE and a statistical comparison group representing what might have happened had those same students not concentrated in Health Sciences CTE. Because adjustment can account only for characteristics available in the data, adjusted differences may still reflect unmeasured differences between students who did and did not become concentrators.

Example (binary outcome): A difference of 10 percentage points means that Health Sciences CTE concentrators were estimated to be 10 percentage points more likely to achieve the outcome than they would have been had they not concentrated in Health Sciences CTE.

Example (wage outcome): A difference of \$1,000 means that Health Sciences CTE concentrators were estimated to earn \$1,000 more per year than they would have earned had they not concentrated in Health Sciences CTE.

Charts display each adjusted difference along with its 95% confidence interval, which reflects the uncertainty around the estimate. If the confidence interval includes zero, the adjusted difference is **not statistically significant**, meaning the adjusted difference is compatible with no adjusted difference in outcomes. In each section, the overall observed rate or dollar amount for each outcome reflects the full study population (including unmatched samples). These values are provided as a descriptive benchmark to help contextualize the magnitude of adjusted differences; this rate is not the comparison rate used to estimate the adjusted difference. The complete table of overall observed outcome descriptive statistics is provided in the Technical Appendix.



Observed Outcomes and Differences

Health Sciences CTE concentrators consistently showed greater postsecondary enrollment across institution type and time from high school graduation. Figures 2a-d depict the observed differences and overall enrollment rates. Observed differences in enrollment rates between concentrators and non-concentrators were greater when examining enrollment one year after high school graduation compared to four years after high school graduation. These higher rates of observed enrollments among concentrators were primarily driven by increased enrollment at four-year rather than two-year institutions.

Adjusted Differences



Health Sciences CTE concentration was generally associated with a smaller increase in enrollment across all postsecondary enrollment outcomes after adjustment for student characteristics when compared to the observed differences (Tables 3-4, Figure 2b). At one year after high school graduation Health Sciences CTE concentration was associated with a 5.0 percentage point increase in enrollment at any postsecondary institution. This represents an additional 297 enrollees (95% CI [226, 362]). Similar increases were observed four years after high school graduation (4.6 percentage point increase; 273 additional enrollees, 95% CI [220, 332]). Relative to the overall observed rate at one year (69.1%) and four years after high school graduation (76.6%), these increases are modest in magnitude.

However, these differences were not equally distributed between enrollments at two- and four-year postsecondary institutions; the adjusted difference associated with Health Sciences CTE concentration was 1.9 percentage points greater for two-year and 4.3 percentage points greater for four-year institutions. These increases reflect an additional 113 enrollees (95% CI [30, 196]) in two-year institutions and 255 enrollees (95% CI [178, 332]) in four-year institutions across all cohort years. When examined four years after high school graduation, estimated enrollment increases were 5.5 and 4.1 percentage points for two- and four-year institutions, respectively, which correspond to an increase in 327 (95% CI [232, 416]) and 243 (95% CI [172, 321]) additional enrollees.

Table 3**Postsecondary enrollment one year after high school graduation**

Outcome	Concentrator	Non-concentrator	Observed Difference	Adjusted Difference	Estimated Aggregate Outcome
Any Postsecondary	79.3%	68.5%	+10.8 pp	+5.0 pp [3.8, 6.1]	+297 [226, 362]
Two-Year Postsecondary	29.6%	29.5%	+0.1 pp	+1.9 pp [0.5, 3.3]	+113 [30, 196]
Four-Year Postsecondary	54.3%	42.1%	+12.2 pp	+4.3 pp [3.0, 5.6]	+255 [178, 332]

Table 4**Postsecondary enrollment four years after high school graduation**

Outcome	Concentrator	Non-concentrator	Observed Difference	Adjusted Difference	Estimated Aggregate Outcome
Any Postsecondary	85.9%	76.0%	+9.9 pp	+4.6 pp [3.7, 5.6]	+273 [220, 332]
Two-Year Postsecondary	50.9%	45.6%	+5.3 pp	+5.5 pp [3.9, 7.0]	+327 [232, 416]
Four-Year Postsecondary	61.7%	49.3%	+12.3 pp	+4.1 pp [2.9, 5.4]	+243 [172, 321]

pp = percentage points; brackets show 95% confidence intervals. Aggregate estimates are derived from model estimates and represent the estimated number of additional students achieving the outcome.

Figure 2a

HEALTH SCIENCES CTE CONCENTRATORS HAD HIGHER RATES OF POSTSECONDARY ENROLLMENT ONE YEAR AFTER HIGH SCHOOL

Postsecondary Enrollment Rates (One Year Post High School Graduation)
By Health Sciences CTE Concentration

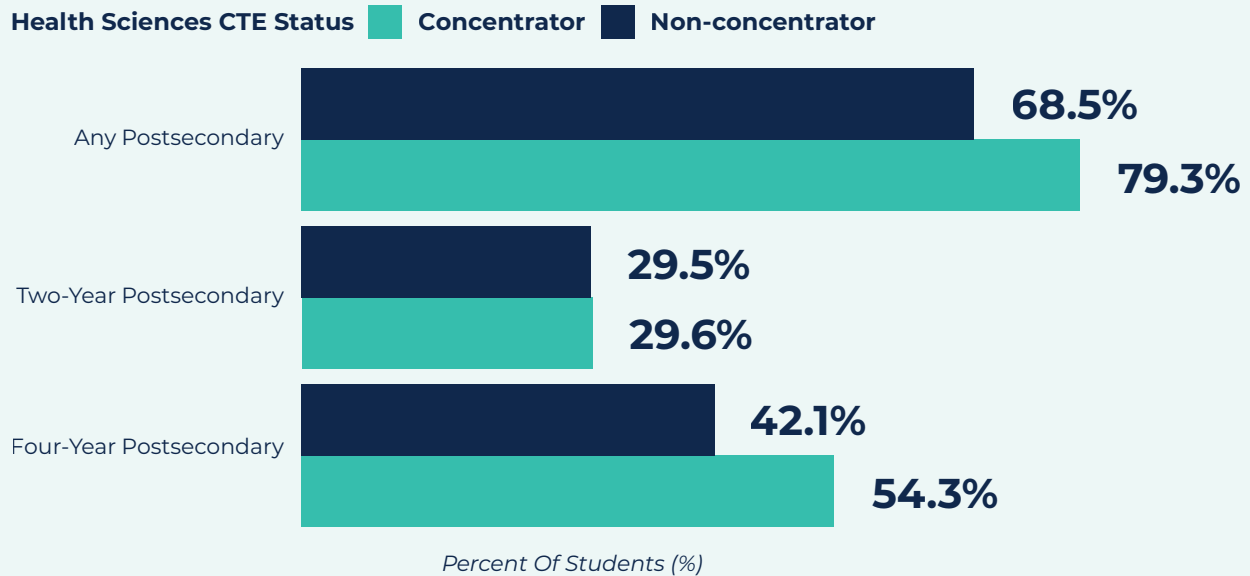


Figure 2b

HEALTH SCIENCES CTE CONCENTRATORS HAD HIGHER RATES OF POSTSECONDARY ENROLLMENT FOUR YEARS AFTER HIGH SCHOOL

Postsecondary Enrollment Rates (Four Years Post High School Graduation)
By Health Sciences CTE Concentration

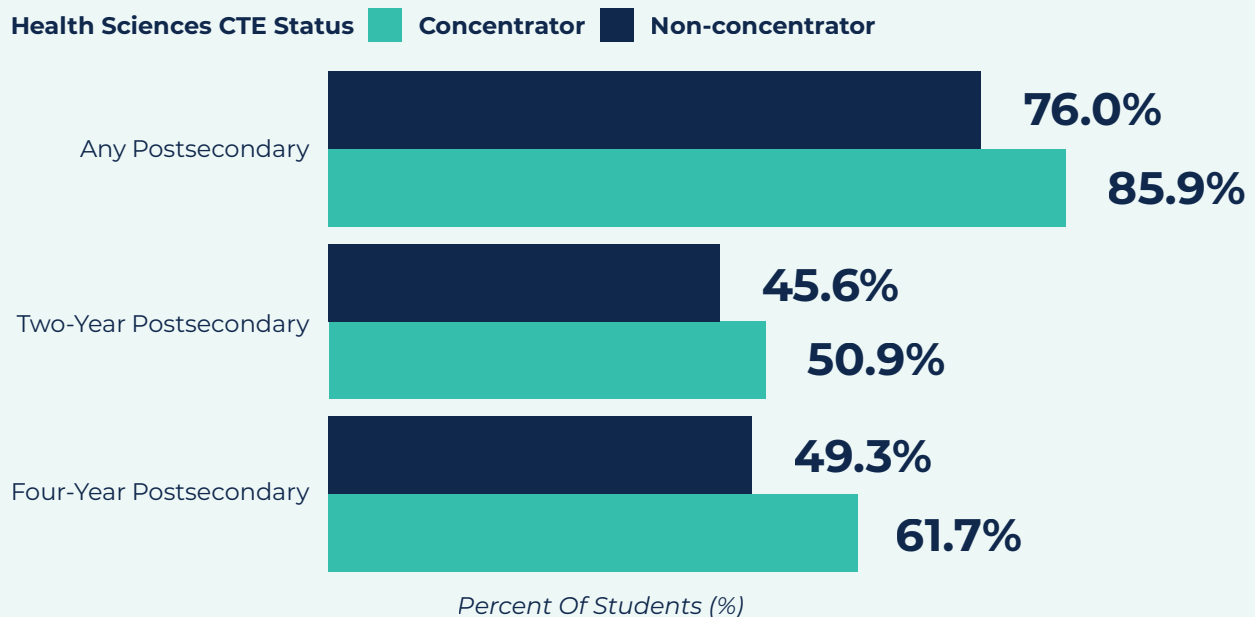
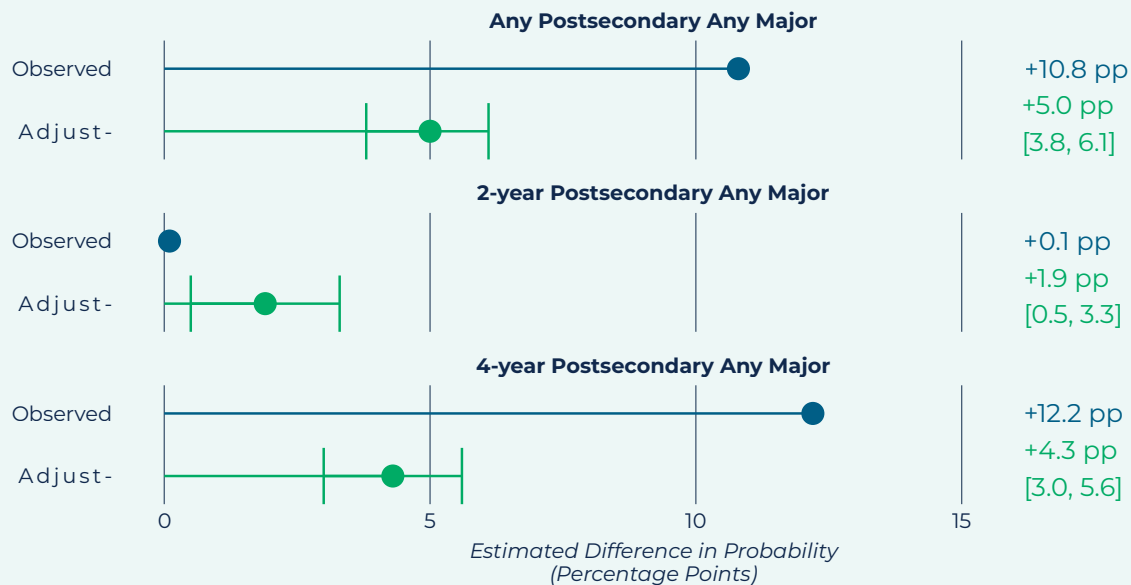


Figure 2c

HEALTH SCIENCES CTE CONCENTRATION WAS ASSOCIATED WITH HIGHER POSTSECONDARY ENROLLMENT ONE YEAR AFTER HIGH SCHOOL

Observed and Adjusted Differences in Postsecondary Enrollment
(One Year Post High School Graduation)

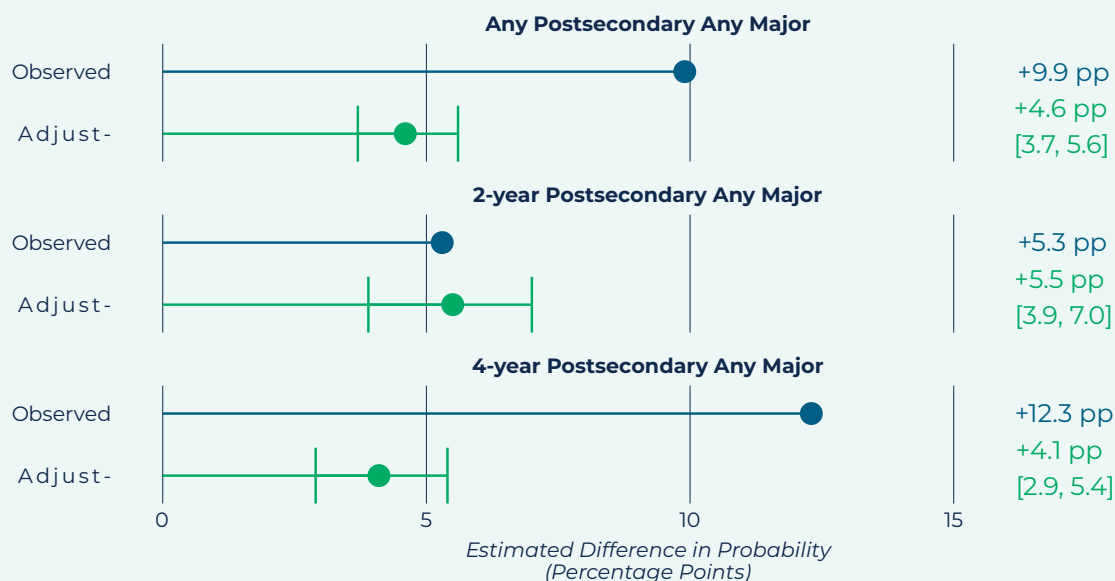


Notes: Observed differences compared concentrators to non-concentrators.
Adjusted differences estimate outcomes for Health Sciences CTE concentrators compared with their expected outcomes had they not concentrated.
For adjusted differences, confidence intervals that include zero indicate a nonsignificant association.

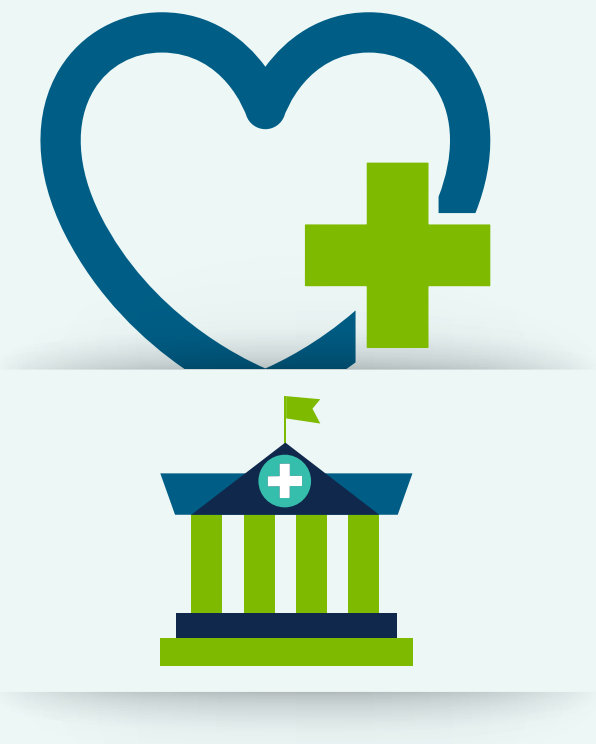
Figure 2d

HEALTH SCIENCES CTE CONCENTRATION WAS ASSOCIATED WITH HIGHER POSTSECONDARY ENROLLMENT FOUR YEARS AFTER HIGH SCHOOL

Observed and Adjusted Differences in Postsecondary Enrollment
(Four Years Post High School Graduation)



Notes: Observed differences compared concentrators to non-concentrators.
Adjusted differences estimate outcomes for Health Sciences CTE concentrators compared with their expected outcomes had they not concentrated.
For adjusted differences, confidence intervals that include zero indicate a nonsignificant association.



Observed Outcomes and Differences

Health Sciences CTE concentrators showed much greater rates of health major enrollment during their postsecondary education than their non-concentrator peers, which was exhibited over institution type and time from high school graduation (see Tables 5 and 6 and Figures 3a and 3b). Figures 3c and 3d illustrate the observed and adjusted differences in health major enrollment rates. Observed differences were larger within four years than within one year of high school graduation. Further, four-year institutions showed greater gaps in health major enrollment between Health Sciences CTE concentrators and non-concentrators than two-year institutions.

Adjusted Differences



Health Sciences CTE concentration was associated with a moderate increase in health major enrollment, with the strongest increase observed for four-year institutions and smallest increases demonstrated at two-year institutions. These findings are available in Tables 5 and 6 and visualized in Figures 3c and 3d. When examined one year after high school graduation, Health Sciences CTE concentration was associated with an 11.4 percentage point increase in health major enrollment at any type of postsecondary institution, or an additional 677 enrollees (95% CI [617, 736]) across all cohort years. This enrollment increase is meaningful given the overall observed rate of health major enrollment for any postsecondary institution at the one-year follow-up period was 5.9 percent. Within the one-year window after high school graduation, Health Sciences CTE concentration was associated with a 3.0 percentage point increase at two-year postsecondary institutions and an 8.5 percentage point increase at four-year postsecondary institutions. This is associated with an increase of 178 enrollees (95% CI [142, 214]) at two-year institutions and 505 enrollees (95% CI [451, 552]) at four-year institutions across all cohort years.

When examined four years after high school graduation, Health Sciences CTE concentration was associated with a 16.3 percentage point increase in health major enrollment at any type of postsecondary institution, or 968 additional enrollees (95% CI [896, 1,039]) across all cohort years. This enrollment increase is moderate given the overall observed rate of health major enrollment for any postsecondary institution at the four-year follow-up period was 9.6 percent. Lastly, in the four-year window after high school graduation, Health Sciences CTE concentration was associated with a 6.3 percentage point increase at two-year postsecondary institutions and an 11.7 percentage point increase at four-year postsecondary institutions. This is associated with an increase of 374 enrollees (95% CI [321, 422]) at two-year institutions and 695 enrollees (95% CI [635, 754]) at four-year institutions across all cohort years. The increase in enrollment at four-year postsecondary institutions during the four-year follow-up period is particularly meaningful given that the overall observed rate of this outcome is 5.6 percent.

These findings demonstrate that there is a strong association between Health Sciences CTE concentration status and enrollment in a health sciences major program, even after adjusting for observed student characteristics. However, this does not mean that all the adjusted differences can be attributed to Health Sciences CTE concentration status. This is because students who are interested in health careers may be both more likely to choose to become a Health Sciences CTE

concentrator as well as pursue health-related postsecondary education and employment. Because the available data do not measure prior career interests, the analyses cannot determine how much of the association with health-major enrollment, or other health-related outcomes like health sciences credential attainment and health-industry employment reflects Health Sciences CTE concentration itself versus pre-existing interest in a healthcare career.

Table 5

Postsecondary enrollment in a health program one year after high school graduation

Outcome	Concentrator	Non-concentrator	Observed Difference	Adjusted Difference	Estimated Aggregate Outcome
Any Postsecondary	16.9%	5.2%	+11.7 pp	+11.4 pp [10.4, 12.4]	+677 [617, 736]
Two-Year Postsecondary	5.2%	2.0%	+3.2 pp	+3.0 pp [2.4, 3.6]	+178 [142, 214]
Four-Year Postsecondary	11.9%	3.3%	+8.6 pp	+8.5 pp [7.6, 9.3]	+505 [451, 552]

Table 6

Postsecondary enrollment in a health program four years after high school graduation

Outcome	Concentrator	Non-concentrator	Observed Difference	Adjusted Difference	Estimated Aggregate Outcome
Any Postsecondary	25.7%	8.6%	+17.2 pp	+16.3 pp [15.1, 17.5]	+968 [896, 1,039]
Two-Year Postsecondary	11.2%	4.3%	+7.0 pp	+6.3 pp [5.4, 7.1]	+374 [321, 422]
Four-Year Postsecondary	16.8%	4.9%	+12.0 pp	+11.7 pp [10.7, 12.7]	+695 [635, 754]

pp = percentage points; brackets show 95% confidence intervals. Aggregate estimates are derived from model estimates and represent the estimated number of additional students achieving the outcome.

Figure 3a

HEALTH SCIENCES CTE CONCENTRATORS HAD HIGHER RATES OF HEALTH MAJOR ENROLLMENT ONE YEAR AFTER HIGH SCHOOL

Health Major Enrollment Rates (One Year Post High School Graduation)
By Health Sciences CTE Concentration

Health Sciences CTE Status ■ Concentrator ■ Non-concentrator

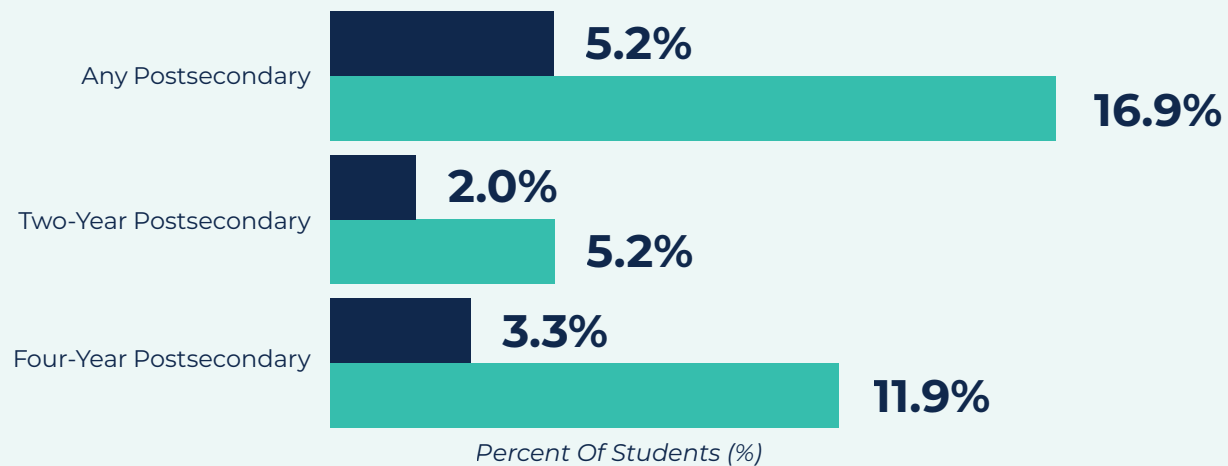


Figure 3b

HEALTH SCIENCES CTE CONCENTRATORS HAD HIGHER RATES OF HEALTH MAJOR ENROLLMENT FOUR YEARS AFTER HIGH SCHOOL

Health Major Enrollment Rates (Four Years Post High School Graduation)
By Health Sciences CTE Concentration

Health Sciences CTE Status ■ Concentrator ■ Non-concentrator

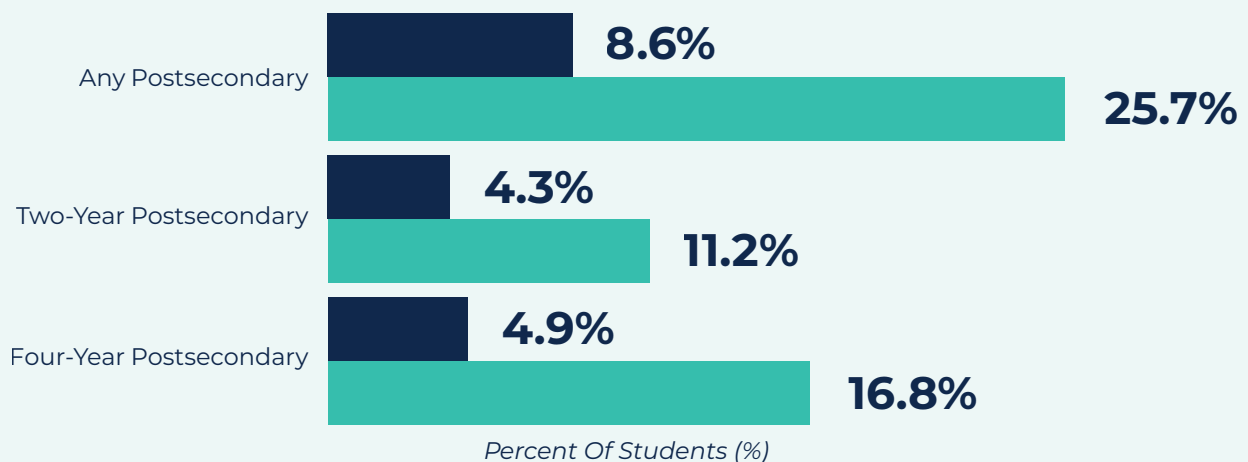
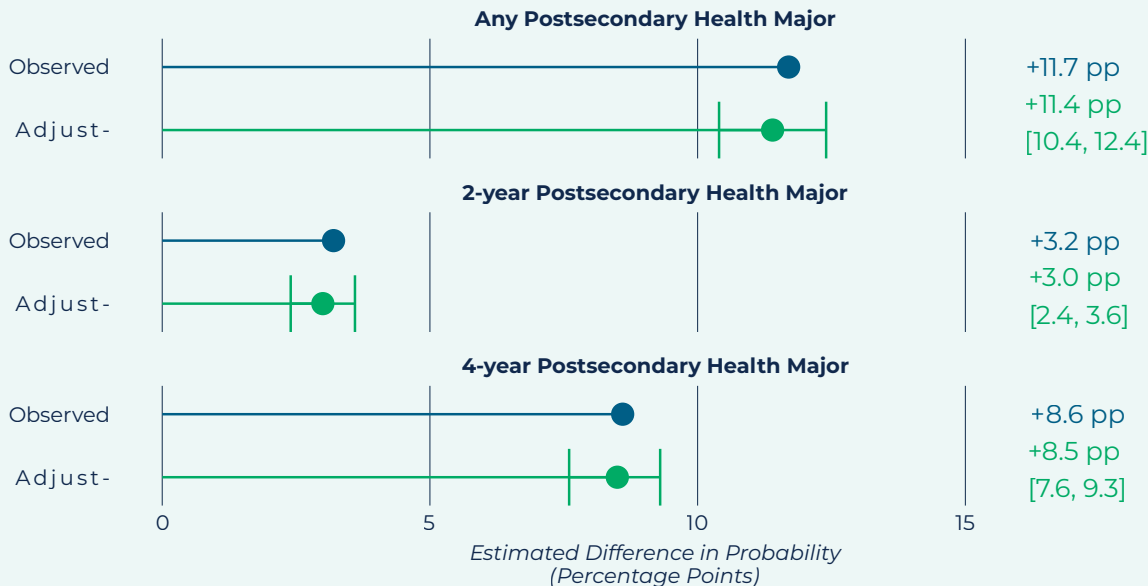


Figure 3c

HEALTH SCIENCES CTE CONCENTRATION WAS ASSOCIATED WITH HIGHER HEALTH MAJOR ENROLLMENT ONE YEAR AFTER HIGH SCHOOL

Observed and Adjusted Differences in Health Major Enrollment
(One Year Post High School Graduation)

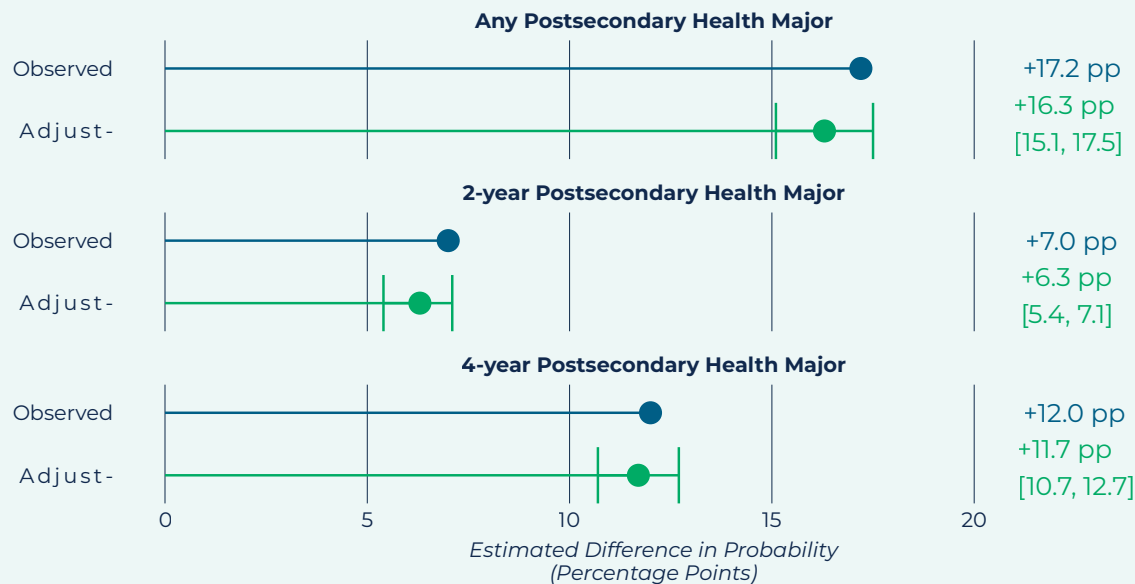


Notes: Observed differences compared concentrators to non-concentrators. Adjusted differences estimate outcomes for Health Sciences CTE concentrators compared with their expected outcomes had they not concentrated. For adjusted differences, confidence intervals that include zero indicate a nonsignificant association.

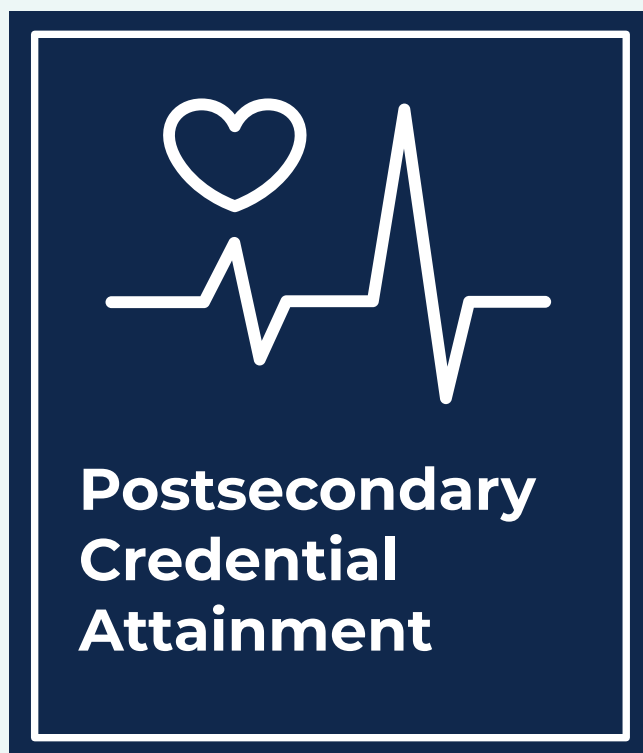
Figure 3d

HEALTH SCIENCES CTE CONCENTRATION WAS ASSOCIATED WITH HIGHER HEALTH MAJOR ENROLLMENT FOUR YEARS AFTER HIGH SCHOOL

Observed and Adjusted Differences in Health Major Enrollment
(Four Years Post High School Graduation)



Notes: Observed differences compared concentrators to non-concentrators. Adjusted differences estimate outcomes for Health Sciences CTE concentrators compared with their expected outcomes had they not concentrated. For adjusted differences, confidence intervals that include zero indicate a nonsignificant association.



Observed Outcomes and Differences

Health Sciences CTE concentrators were more likely to earn any postsecondary credential compared to their non-concentrator peers (Table 7 and Figure 4a). The rates of certificate and associate's degree attainment were similar. Health Sciences CTE concentrators were more likely to attain a bachelor's degree within 6 years after graduating high school than non-Health Sciences CTE concentrators; this difference is largely what drives the finding that Health Sciences CTE concentrators have higher overall rates of postsecondary credential attainment than their non-concentrator peers.

Adjusted Differences

Health Sciences CTE concentration was associated with a 3.4 percentage point increase in the rate of students earning any credential. This estimate corresponds to an additional 202 students (95% CI [125, 273]) that attained any credential. For the attainment of a bachelor's degree or higher, Health Sciences CTE concentration was associated with a 3.0 percentage point increase in the rate of students attaining this outcome. This estimate corresponds

to an additional 178 students attaining a bachelor's degree or higher (95% CI [107, 249]). The adjusted differences for certificate and associate's-degree attainment were not statistically significant. These findings are available in Table 7 and in Figure 4a. However, these increases were relatively small when compared to the overall observed rates. The adjusted differences were modest relative to the overall observed attainment rate of 41.3 percent.

Table 7

Postsecondary credential attainment within six years after high school graduation

Outcome	Concentrator	Non-concentrator	Observed Difference	Adjusted Difference	Estimated Aggregate Outcome
Any Credential	47.4%	41.0%	+6.4 pp	+3.4 pp [2.1, 4.6]	+202 [125, 273]
Certificate	3.4%	4.2%	-0.9 pp	+0.4 pp [-0.1, 0.9]	+24 [-6, 53]
Associate's Degree	9.7%	10.2%	-0.5 pp	+0.7 pp [-0.2, 1.7]	+42 [-12, 101]
Bachelor's Degree or Higher	38.4%	30.4%	+8.1 pp	+3.0 pp [1.8, 4.2]	+178 [107, 249]

pp = percentage points; brackets show 95% confidence intervals. Aggregate estimates are derived from model estimates and represent the estimated number of additional students achieving the outcome.

Figure 4a

OVERALL, HEALTH SCIENCES CTE CONCENTRATORS HAD HIGHER RATES OF POSTSECONDARY CREDENTIAL ATTAINMENT

Postsecondary Credential Attainment Rates By Health Sciences CTE Concentration

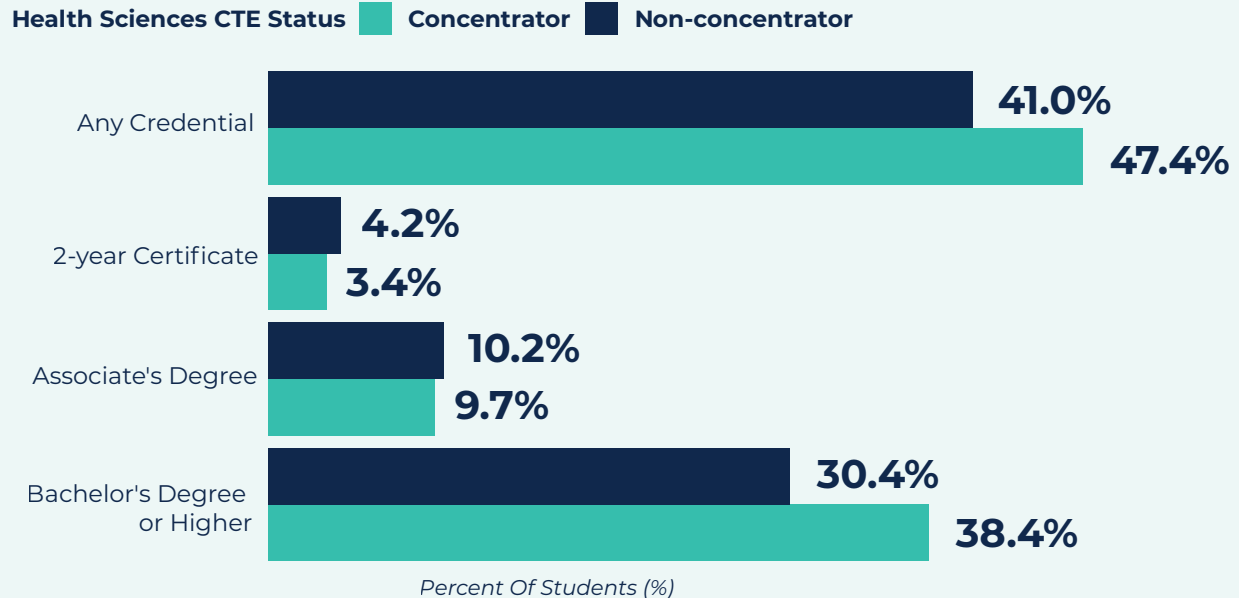
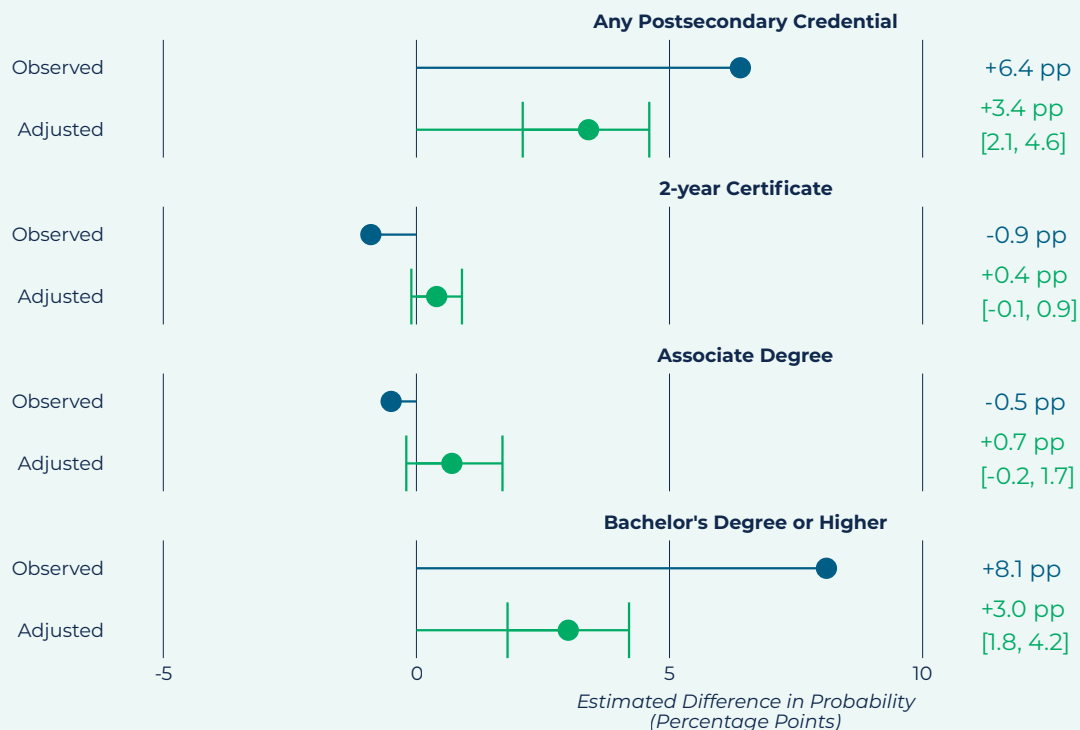


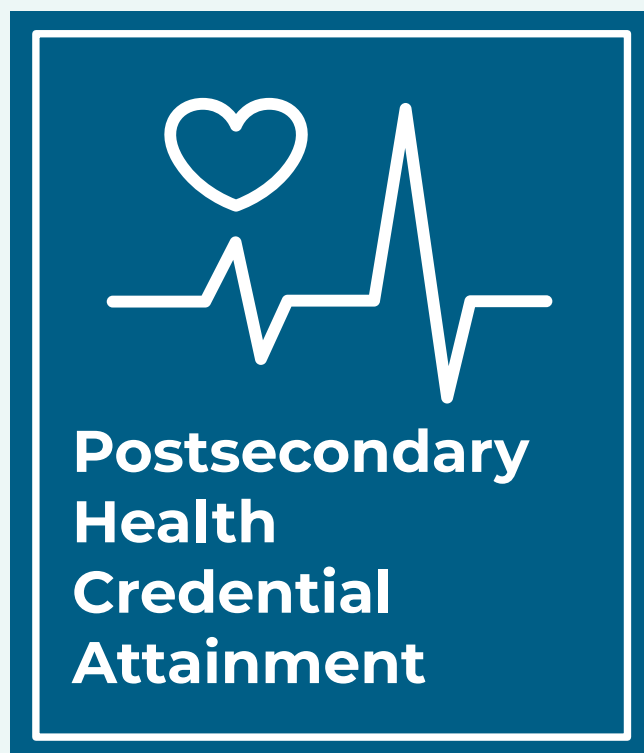
Figure 4b

HEALTH SCIENCES CTE CONCENTRATION WAS ASSOCIATED WITH HIGHER ATTAINMENT RATES OF ANY CREDENTIAL AND BACHELOR'S DEGREE OR HIGHER

Observed and Adjusted Differences in Postsecondary Credential Attainment



Notes: Observed differences compared concentrators to non-concentrators. Adjusted differences estimate outcomes for Health Sciences CTE concentrators compared with their expected outcomes had they not concentrated. For adjusted differences, confidence intervals that include zero indicate a nonsignificant association.



Observed Outcomes and Differences

Observed differences in health credential attainment suggest that Health Sciences CTE concentrators have greater rates of health credential attainment than non-concentrator peers, particularly for any health credential or a bachelor's degree (Table 8 and Figure 5a). Depending on the type of credential, Health Sciences CTE concentrators had two to four times the probability of attaining a health degree across cohorts compared to their non-concentrator peers. Very small absolute differences between groups exist for certificate and associate's degree, though Health Sciences CTE concentrators consistently showed greater rates of degree attainment across outcomes.

Adjusted Differences

Health Sciences CTE concentration was associated with an increase in the rate of attaining a health credential among Health Sciences CTE concentrators within the six-year period following high school graduation. These postsecondary award increases were especially large for any credential or bachelor's degree, whereas smaller increases were found for health certificate and associate's degree attainment (see Table 8 and Figures 5a and 5b). Health Sciences CTE concentration was associated with a 10.1 percentage point increase in the rate of obtaining any credential in a health field relative to their expected attainment in the absence of Health Sciences CTE concentration (overall observed rate of 4.8 percent). This estimate corresponds to an additional 600 students attaining any health-related credential (95% CI [546, 653]). For health-related certificate attainment, Health Sciences CTE concentration was associated with a 1.3 percentage point increase in the attainment rate. This estimate corresponds to an additional 77 students earning a

health-related certificate (95% CI [53, 101]). For health-related associate's degree attainment, concentration was associated with a 2.8 percentage point increase in the attainment rate, corresponding to an additional 166 students earning a health-related associate's degree (95% CI [131, 196]). Likewise, concentration was associated with a 7.2 percentage point increase in the rate of attaining a health-related bachelor's degree or higher (overall observed rate of 3.1 percent). This estimate corresponds to an additional 427 students attaining this outcome (95% CI [386, 475]). With reference to these overall observed rates, these increases indicate that Health Sciences CTE concentration is associated with substantial increases in health degree completion rates, particularly for the attainment of bachelor's degrees or higher. As noted in the section on postsecondary enrollments in a health major, the magnitude of this health-specific association may partly reflect pre-existing interest in healthcare careers that could not be measured in the study.

Table 8

Postsecondary Health Sciences credential attainment within six years after high school graduation

Outcome	Concentrator	Non-concentrator	Observed Difference	Adjusted Difference	Estimated Aggregate Outcome
Any Health Credential	14.5%	4.2%	+10.3 pp	+10.1 pp [9.2, 11.0]	+600 [546, 653]
Health Certificate	2.1%	0.8%	+1.2 pp	+1.3 pp [0.9, 1.7]	+77 [53, 101]
Health Associate's Degree	4.0%	1.1%	+2.8 pp	+2.8 pp [2.2, 3.3]	+166 [131, 196]
Health Bachelor's Degree or Higher	10.1%	2.6%	+7.5 pp	+7.2 pp [6.5, 8.0]	+427 [386, 475]

pp = percentage points; brackets show 95% confidence intervals. Aggregate estimates are derived from model estimates and represent the estimated number of additional students achieving the outcome.

Figure 5a

HEALTH SCIENCES CTE CONCENTRATORS HAD HIGHER RATES OF HEALTH CREDENTIAL ATTAINMENT

Health Credential Attainment Rates By Health Sciences CTE Concentration

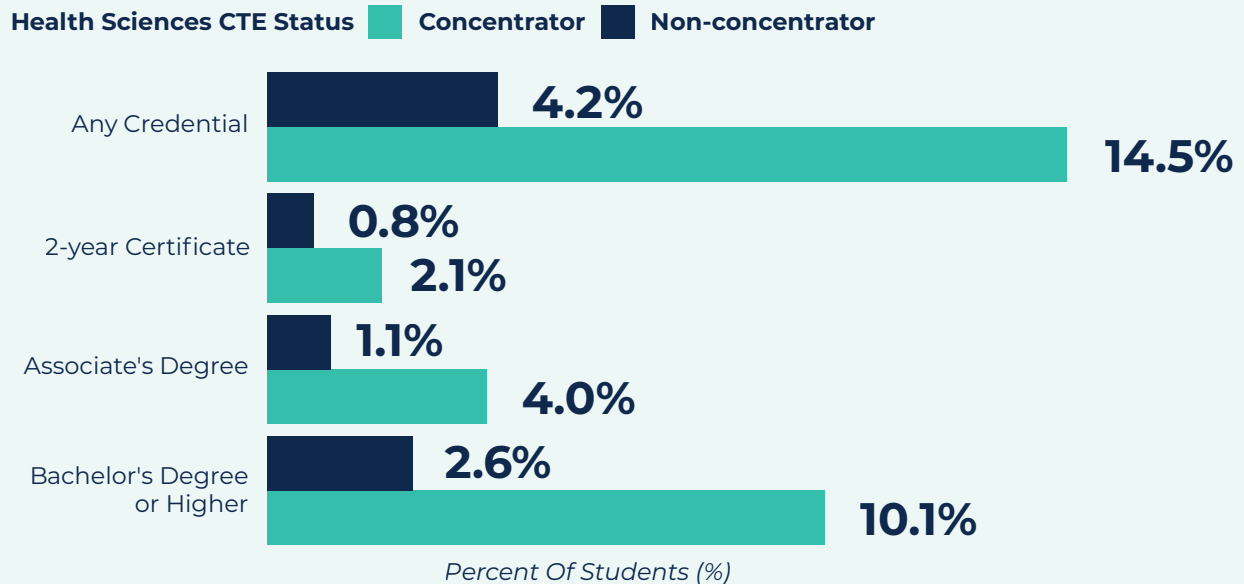
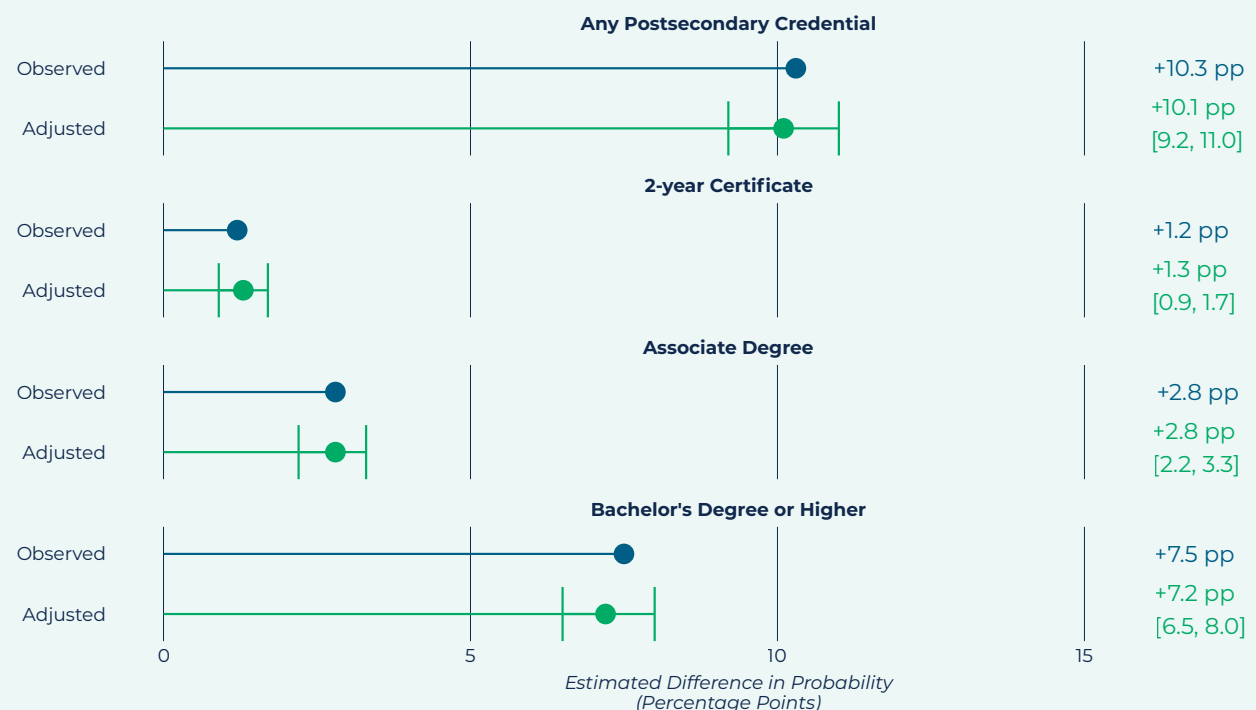


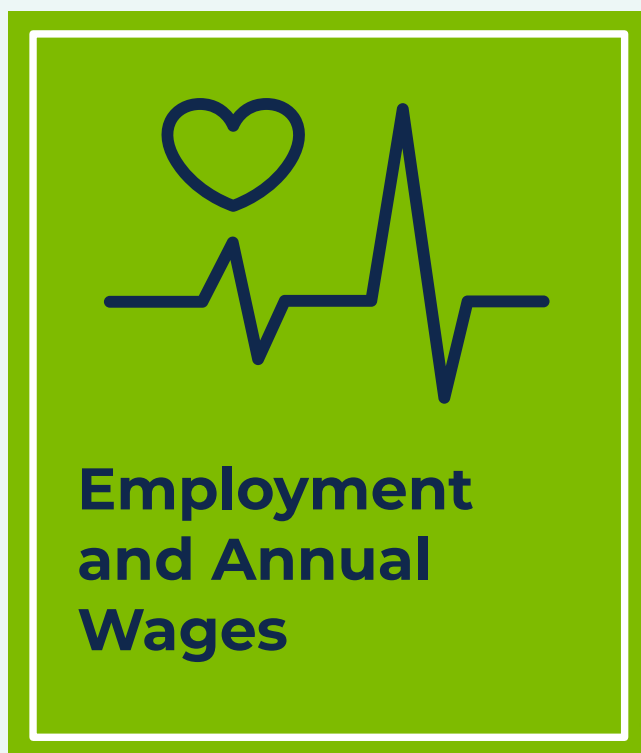
Figure 5b

HEALTH SCIENCES CTE CONCENTRATION WAS ASSOCIATED WITH HIGHER ATTAINMENT RATES ACROSS ALL TYPES OF HEALTH CREDENTIAL

Observed and Adjusted Differences in Postsecondary Health Credential Attainment



Notes: Observed differences compared concentrators to non-concentrators. Adjusted differences estimate outcomes for Health Sciences CTE concentrators compared with their expected outcomes had they not concentrated. For adjusted differences, confidence intervals that include zero indicate a nonsignificant association.



Observed Outcomes and Differences

Of the workforce outcomes, the binary outcome of employment in Nebraska did not demonstrate large observed differences between Health Sciences CTE concentrator groups, showing near equivalent employment rates, with slightly greater rates for those that were Health Sciences CTE concentrators. However, Health Sciences CTE concentrators exhibited a clear advantage in employment within the Nebraska health industry compared to their non-concentrator peers, where some cohorts showed a doubled employment rate. Health Sciences CTE concentrators also showed a minor increase in their general annual wage in the Nebraska workforce when compared to employees who were not Health Sciences CTE concentrators.

Adjusted Differences



Results for workforce outcomes are presented in Table 9 and Figures 6b and 6d, which show that Health Sciences CTE concentration was associated with increases across all workforce outcomes. Though the overall increase in the general employment rate in Nebraska was significant, the increase was small (1.8 percentage points) relative to the overall observed rate (67.7 percent), which corresponds to an estimated additional 107 workers in Nebraska (95% CI [18, 196]) across all cohort years. Among students who concentrated in Health Sciences CTE in high school, Health Sciences CTE concentration was associated with an 11.6 percentage point increase in their overall rate of employment in the Nebraska health industry, which corresponds to an estimated 689 additional workers in the health industry (95% CI [606, 766]) across all cohort years. The 11.6 percentage-point adjusted difference is substantial relative to the overall observed health-industry employment rate of 13.9%. This strong health-specific association should be interpreted in light of the same potential residual confounding described for health-related postsecondary outcomes.

With respect to wages, the overall observed annual wage was \$37,479.69 in this sample. Health Sciences CTE concentration was associated with an increase in annual wages of \$2,944 per concentrator working in Nebraska, corresponding to a total of approximately \$12.6 million in aggregate annual earnings in the sixth year post-high school graduation among Health Sciences CTE concentrators that worked in Nebraska.

The adjusted wage difference (\$2,944) was substantially larger than the observed difference (\$292), reflecting differences in the characteristics of concentrators and non-concentrators that are also associated with earnings. In particular, Health Sciences CTE concentrators were disproportionately female, and exploratory analyses suggested that the positive adjusted wage association was concentrated among females, while a negative observed difference among males was substantially reduced after adjustment. Because these gender-specific analyses were exploratory, the study did not formally test whether the wage association differed by gender.

Table 9**Nebraska workforce outcomes six years after high school graduation**

Outcome	Concentrator	Non-concentrator	Observed Difference	Adjusted Difference	Estimated Aggregate Outcome
Any Employment	72.10%	67.40%	+4.6 pp	+1.8 pp [0.3, 3.3]	+107 [18, 196]
Health Industry Employment	27.90%	13.10%	+14.8 pp	+11.6 pp [10.2, 12.9]	+689 [606, 766]
Annual Wages*	\$37,754	\$37,461	\$292	+\$2,944 [\$1,931, \$3,957]	+\$12,615,811 [\$8,274,035, \$16,957,588]

* The sample sizes for the Annual Wages outcome differ from other outcomes since only individuals with >\$0 observed wages are included in the sample. The sample sizes are 69,662 for the observed difference (65,327 non-concentrators and 4,335 concentrators) and 4,285 for the adjusted difference. See the Technical Appendix for more information.

pp = percentage points; brackets show 95% confidence intervals. Aggregate estimates are derived from model estimates and represent the estimated number of additional students achieving the outcome; wage aggregates represent estimated additional annual earnings in dollars.

Figure 6a**HEALTH SCIENCES CTE CONCENTRATORS HAD HIGHER RATES OF HEALTH INDUSTRY EMPLOYMENT**

Nebraska Employment Rates By Health Sciences CTE Concentration

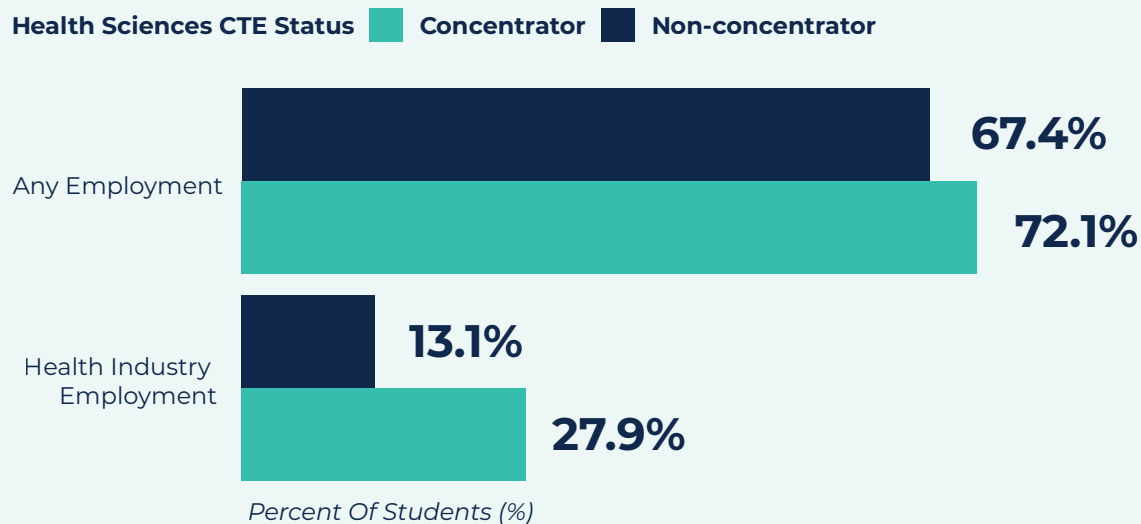
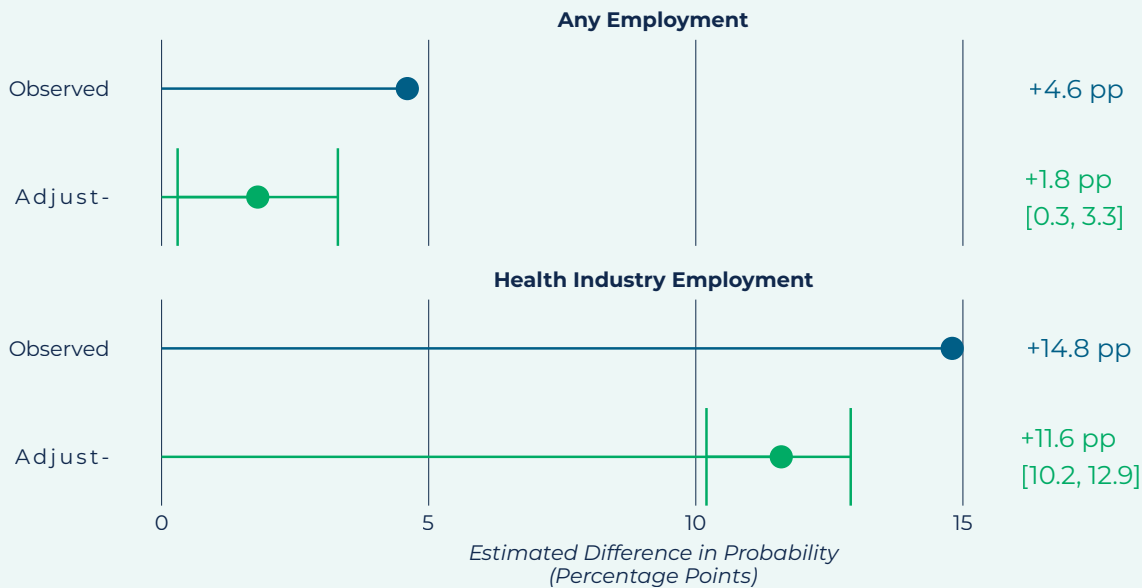


Figure 6b

HEALTH SCIENCES CTE CONCENTRATION WAS ASSOCIATED WITH HIGHER RATES OF ANY EMPLOYMENT AND HEALTH INDUSTRY EMPLOYMENT

Observed and Adjusted Differences in Nebraska Employment



Observed differences compared concentrators to non-concentrators. Adjusted differences estimate outcomes for Health Sciences CTE concentrators compared with their expected outcomes had they not concentrated. For adjusted differences, confidence intervals that include zero indicate a nonsignificant association.

Figure 6c

HEALTH SCIENCES CTE CONCENTRATORS HAD SLIGHTLY HIGHER AVERAGE ANNUAL WAGES

Average Annual Wage By Health Sciences CTE Concentration

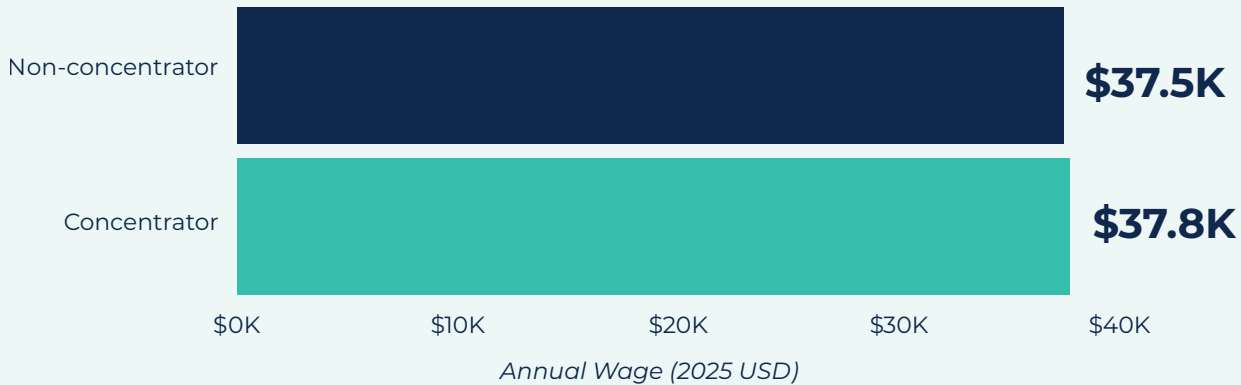
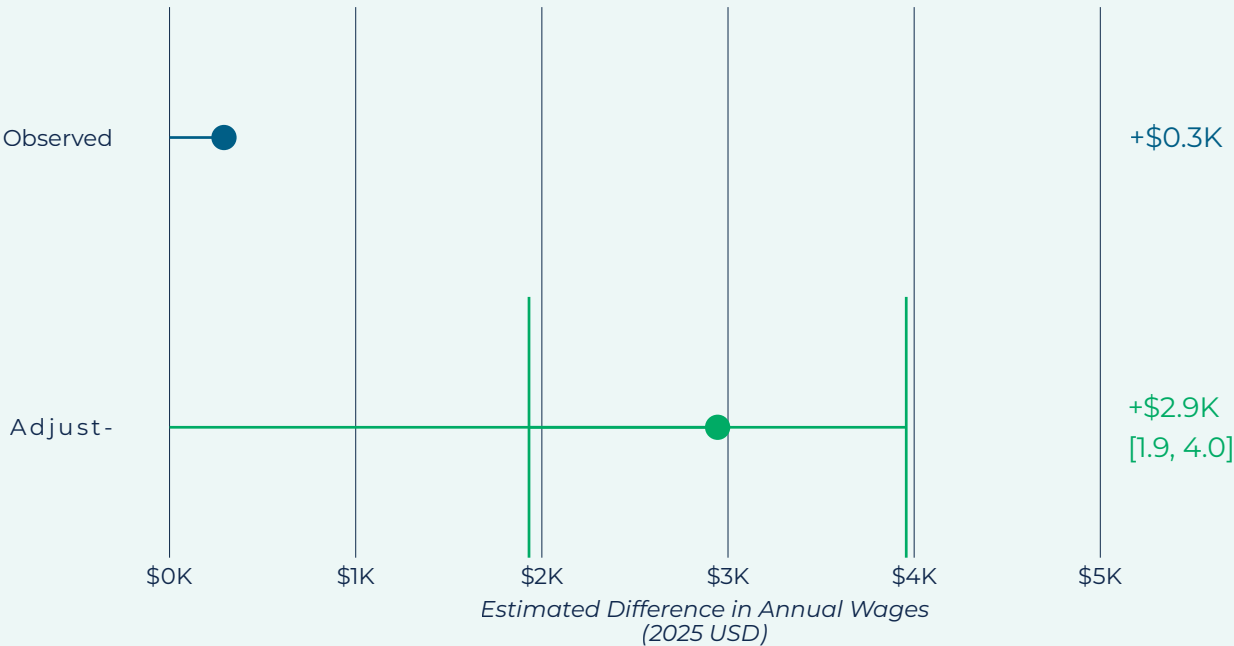


Figure 6d

HEALTH SCIENCES CTE CONCENTRATION WAS ASSOCIATED WITH A HIGHER AVERAGE ANNUAL WAGE

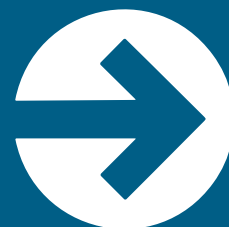
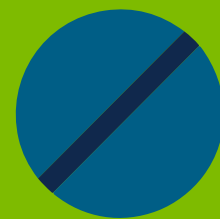
Observed and Adjusted Differences in Annual Wages



Observed differences compared concentrators to non-concentrators.
Adjusted differences estimate outcomes for Health Sciences CTE concentrators compared with their expected outcomes had they not concentrated.
For adjusted differences, confidence intervals that include zero indicate a nonsignificant association.



DISCUSSION



Study Findings



This study examined whether concentrating in a Health Sciences Career and Technical Education (CTE) program was associated with longer-term educational and workforce outcomes for Nebraska secondary students. Across the outcomes examined, a clear pattern emerged. Health Sciences CTE concentration was more strongly associated with the fields students studied and the industries in which they worked than with the overall rates of postsecondary enrollment, credential attainment, or employment.

Health Sciences CTE concentration was associated with modestly higher overall postsecondary enrollment rates. After adjustment for student characteristics, concentration was associated with a 5.0 percentage point increase in postsecondary enrollment within one year of high school graduation and a 4.6 percentage point increase within four years. Similarly, concentration was associated with a relatively small increase in overall credential attainment within six years. In contrast, substantially larger differences emerged when outcomes were examined specifically within the Health Sciences pathways. Health Sciences CTE concentration was associated with an 11.4 percentage point increase in health-major enrollment within one year of graduation and a 16.3 percentage point increase within four years.

The pathway-specific pattern continued through postsecondary completion. Within six years of high school graduation, Health Sciences CTE concentration was associated with a 10.1 percentage point increase in attainment of any health-related credential and a 7.2 percentage point increase in attainment of a bachelor's degree or higher in a health field.

The workforce findings reinforce this interpretation. Health Sciences CTE concentration was associated with only a 1.8 percentage point increase in overall Nebraska employment six years after high school graduation. However, concentration was associated with an 11.6 percentage point increase in employment within Nebraska's health industry. Among concentrators with recorded Nebraska employment, the adjusted annual wage difference was approximately \$2,944.

Taken together, the findings show strong alignment between Health Sciences CTE concentration and later health-related education and employment. Concentrators are an identifiable group within Nebraska's healthcare education-to-workforce pipeline. The current study cannot determine how much of this alignment reflects CTE experiences versus students' prior interests and goals.

The findings are also generally consistent with Witzen (2018), who used a similar propensity-score approach in Maryland and found positive associations between Health Sciences CTE completion and college enrollment, health-related postsecondary education, health-sector employment, and wages. Finding similar patterns across two different state longitudinal data systems provides additional evidence of a relationship between secondary Health Sciences CTE and longer-term educational and workforce outcomes. However, differences in state CTE systems, program structures, cohorts, labor markets, and outcome definitions mean that the magnitude of estimates should not be directly compared across studies.

Study Limitations



Several limitations should be considered when interpreting these findings, including selection into Health Sciences CTE, definition of Health Sciences CTE concentration, timing of student characteristics, follow-up period, employment and wage data, and generalizability over time and across programs.

Selection into Health Sciences CTE

Students are not randomly assigned to Health Sciences CTE programs. Students who are already interested in healthcare careers may be more likely to enroll, persist, and become concentrators. Although the matching model accounts for a wide range of academic and demographic characteristics, it cannot account for unobserved factors such as career interests, motivation, or aspirations. If these factors are related to both Health Sciences CTE concentration and later outcomes, the estimated associations may be overstated. Matching improves comparability between groups but cannot fully eliminate this potential selection bias.

Definition of Health Sciences CTE Concentration

Health Sciences CTE was analyzed as a single treatment, even though individual programs and pathways may differ in content, structure, and intensity. Because results were not estimated separately by program, this study cannot determine whether outcomes vary across specific Health Sciences pathways. In addition, the treatment group includes students who achieved concentrator status, defined as completing at least two intermediate- or capstone-level courses within the Health Sciences career cluster. As a result, the findings are best interpreted as outcomes associated with achieving concentrator status, rather than simply enrolling in or beginning a Health Sciences CTE program. Results may differ for all students who initially enter a program, including those who do not complete enough coursework to become concentrators.

Timing of Student Characteristics

Some characteristics used in the matching process, such as standardized test scores and ACT scores, were measured during high school and may not have occurred before students entered Health Sciences CTE. If participation in Health Sciences CTE influenced these measures, including them in the matching model could affect the estimated associations. Future research could address this limitation by using only characteristics measured before program entry and by examining outcomes for all students who initially enter Health Sciences CTE programs.

Follow-Up Period

Outcomes were observed for up to six years after high school graduation. This period may be too short to capture important longer-term education and workforce outcomes. For example, professional degrees in medicine, dentistry, or pharmacy typically require more than six years to complete, and wage differences may change as individuals gain experience or enter higher-paying healthcare occupations. Future research could follow students for a longer period to better capture advanced degrees, career progression, and longer-term earnings.

Employment and Wage Data

Employment and earnings were measured using Nebraska Unemployment Insurance (UI) wage records. These records primarily capture individuals working in Nebraska for employers covered by the UI system. They do not capture all types of employment or individuals working outside of Nebraska. As a result, employment and earnings may be understated, particularly for students who leave the state or work in jobs not covered by Nebraska UI records. Future research could incorporate additional employment data to provide a more complete picture of workforce outcomes.

Generalizability Over Time

The study includes students who graduated from high school from 2014 through 2018. Health Sciences CTE programs, postsecondary pathways, and labor-market conditions may have changed since that time. Future research could examine whether these patterns persist among more recent cohorts.

Opportunities for Future Evaluation in Nebraska



The study establishes a foundation for more rigorous evaluation of Health Sciences CTE in Nebraska. NSWERS's connected longitudinal data provide an opportunity to build on these findings by examining changes in CTE access and participation over time. Future research could take advantage of the introduction or expansion of Health Sciences programs across schools and districts to compare outcomes before and after new programs become available with outcomes in similar schools where access has not yet changed. Quasi-experimental approaches such as difference-in-differences may help reduce concerns that observed differences reflect students' pre-existing interest in healthcare rather than the effects of CTE itself.

Such studies would examine the effects of program availability, complementing the current study's focus on outcomes associated with achieving concentrator status. Where program changes provide suitable comparison groups and the necessary assumptions are supported, these studies could estimate the causal effects of changes in Health Sciences CTE availability on participation, postsecondary pathways, and workforce outcomes.

Additional research could examine other CTE career areas, participation in Career and Technical Student Organizations (CTSOs), and differences across Health Sciences programs.

Conclusion



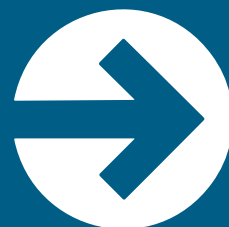
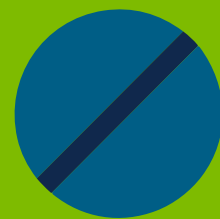
Health Sciences CTE concentration was most strongly associated with health-related educational and workforce outcomes. Concentrators were substantially more likely to enroll in health-related majors, attain health-related credentials, and work in Nebraska's healthcare industry. Among concentrators employed in Nebraska, annual wages were also higher than among comparable non-concentrators after adjustment for observed student characteristics.

The findings should be interpreted in light of the study's limitations. Statistical adjustments accounted for many academic and demographic differences between students, but could not account for their existing career interests, motivation, or goals. These factors may explain some of the remaining differences, so the full adjusted differences should not be attributed to Health Sciences CTE alone.

Overall, these findings establish a Nebraska-specific picture of the education and workforce pathways of Health Sciences CTE concentrators. Future research could examine whether access to these programs changes students' pathways and how those effects vary across programs and communities.



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NSWERS VISION

Create a data-informed decision culture that supports successful pathways of learning and earning for the people of Nebraska.

NSWERS MISSION

Integrate and organize Nebraska's education and workforce data to inform decision making.

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- Metropolitan Community College
- Mid-Plains Community College
- Northeast Community College
- Southeast Community College
- Western Nebraska Community College

Nebraska Department of Education

- 244 Nebraska Public School Districts

Nebraska State College System

- Chadron State College
- Peru State College
- Wayne State College

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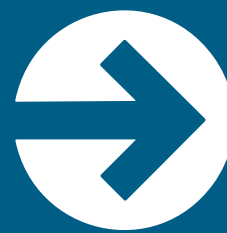
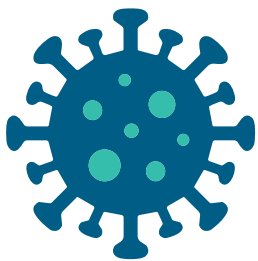
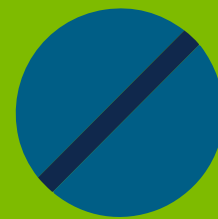
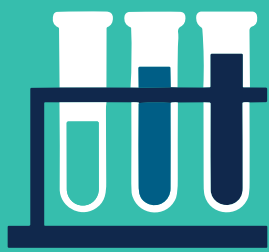
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