UTAH DATA RESEARCH CENTER

Postsecondary and Workforce Outcomes for Charter High School Students in Utah

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Abstract

This study examines associations between charter school attendance and postsecondary enrollment, graduation rates, and workforce outcomes in Utah. Charter schools operate with increased autonomy in exchange for accountability and introduce alternative approaches within public education. Starting in 1998, Utah charter schools have since expanded to serve 12.3% of K-12 students, or 81,810 individuals, in the 2025 school year (Utah State Board of Education, 2024).

This research examines the relationship between charter high school attendance and students' postsecondary and workforce outcomes. It compares students who attended charter schools between grades 9-12 against those who did not from the Utah State Board of Education (USBE) cohort years 2012-2021, using data from the Utah System of Higher Education (USHE) and the Utah Department of Workforce Services (DWS). The study analyzes USHE enrollment and graduation rates, identifies differences in time to USHE enrollment and completion, and examines workforce participation after education. Descriptive statistics indicate that, on average, charter high school students have lower high school graduation rates, USHE enrollment rates, and USHE graduation rates compared to their non-charter school peers. Additionally, charter high school students have lower average USHE GPAs and report lower average earnings in the workforce compared to their non-charter school peers.

Finally, this study uses matching techniques to estimate the relationship between attending a charter high school and these outcomes. While propensity score matching pairs individuals with similar propensity scores, inverse probability weighting (IPW) adjusts for differences in treatment assignment—attending charter high schools in this study—by weighting individuals based on their propensity scores. Using IPW to ensure comparable demographic distributions between student groups, this study indicates an association between attending a charter high school and differences in USHE enrollment rates, USHE graduation rates, USHE GPA, time to USHE enrollment, time to USHE graduation, and workforce participation and reported wages.

Keywords

: charter schools, Utah State Board of Education, Utah System of Higher Education, State of Utah, Department of Workforce Services, postsecondary education, postsecondary enrollment, postsecondary graduation

1 | Introduction

Charter schools emerged in the United States in the early 1990s as an innovative approach to public education. These schools operate under a performance contract, or "charter," that provides them with more autonomy than traditional public schools (TPSs) while being held accountable for academic and financial outcomes. According to the National Charter School Resource Center, charter schools function as a unique model within the public education system, offering school choice with operational flexibility and specified accountability measures (National Charter School Resource Center, n.d.). An authorizing agency grants these institutions a charter, requiring them to commit to specific educational objectives while exempting them from certain state or local regulations governing their operation. The charter school model relies on two fundamental principles: public accountability and operational autonomy. Open enrollment policies and written performance contracts with authorized public chartering agencies uphold public accountability, allowing families to choose these schools. Simultaneously, charter schools have greater flexibility in their operations and management than TPSs, allowing them to experiment with different educational approaches (National Charter School Resource Center, n.d.).

The number of charter schools has increased over time. By the 2008-09 school year, approximately 5,000 charter schools in the United States enrolled over 1.5 million students (Blaze, 2010). As of Fall 2021, 46 states and the District of Columbia had legislation allowing public charter schools. Between the 2010–11 and 2021–22 school years, the number of public charter schools in the U.S. grew from 5,300 to 7,800, while charter school enrollment more than doubled from 1.8 million to 3.7 million students, increasing their share of total public school enrollment from 4% to 7%. In contrast, TPS enrollment declined by 2 million students, or 4% (National Center for Education Statistics, n.d.).

Charter schools have been part of Utah's educational landscape since their inception in the state in 1998. The purpose of charter schools was to improve student learning through innovative teaching methods, provide professional opportunities for educators to shape school programs, and increase student choice in education. Lawmakers in Utah designed charter schools to establish new models of public education that emphasized accountability, measured learning outcomes, and encouraged greater parental involvement in school management (Utah Charter School Legislation, 1998). The Utah State Charter School Board (SCSB) currently oversees charter schools in the state and implements various initiatives to support their operation and development. As of Fall 2021, 11.0% of all Utah public school students enrolled in a charter school (National Center for Education Statistics, 2023). By 2023, the SCSB oversaw 126 charter schools serving 78,732 students, representing 11.5% of all K-12 public school students in the state, consistent with what the NCES reported. During the 2025 school year, 12.3% of students, or 81,810 individuals, are enrolled in charter schools (Utah State Board of Education, 2024). These schools offer diverse educational models, including classical, leadership, arts-focused, STEM, and personalized learning approaches (Utah State Charter School Board, 2023).

This study explored the long-term outcomes associated with the charter school educational model. While existing research highlighted various academic performance trends, this study examined trends related to postsecondary education and workforce participation. This study classified any student who attended a charter school between grades 9 and 12 as a charter school student. Similarly, it classified any student without charter school attendance during those grades as a non-charter school student or a comparison group student. The study also accounted for the number of days students enrolled in charter high schools, and preliminary analysis suggests that variations in enrollment duration did not substantially alter the observed differences between groups. See Appendix A for a detailed examination of enrollment duration in charter high schools.

Among the 126 charter schools in Utah, six are early college high schools (ECHS). This study examined students from ECHSs to explore whether they exhibited different postsecondary enrollment and graduation patterns compared to other students. The USHE enrollment rates for this group were not substantially higher, which may be due to students enrolling in postsecondary institutions outside of Utah or attending private institutions within the state. For additional details on ECHS student outcomes, see Appendix B and C. Similarly, this study examined students who attended online charter schools. The outcomes of online charter school students also did not differ substantially from outcomes of the overall charter school students. For the outcomes of online charter school students, see Appendix D.

Finally, this study examined the locations of charter high schools and charter high school students. While considering the zip codes of charter high schools, it is important to recognize that students are not geographically restricted to schools within their immediate area. To account for this circumstance, this study collected and aggregated the zip codes

of students who attended at least one charter high school. This approach provides a broader view of the geographic distribution of charter high school students, while acknowledging that students may travel outside their residential area to attend these schools. See Appendix E for geographic areas in Utah with higher concentrations of charter high schools and charter high school students.

This study has potential implications for educational policy and practice in Utah. By analyzing postsecondary enrollment, completion rates, and long-term wage trends, it contributes to understanding the role of charter high schools in students' transitions to higher education and careers. These findings may inform decision-making processes for policymakers, educators, and families considering charter school options. For policymakers, a nuanced understanding of the intricate effects of charter high school attendance may help in designing and interpreting metrics that assess educational outcomes. Recognizing these trends could also provide useful context for students and families making educational choices, as well as for school administrators aiming to support student pathways. Additionally, these insights may contribute to discussions about funding allocation and broader policy considerations.

With students' demographic data from USBE, postsecondary enrollment and graduation data from USHE, and quarterly wage data from DWS, this study aims to fulfill the following objectives:

- Objective 1 is to analyze USBE high school students' enrollment and completion rates at USHE institutions, examining potential differences between charter and non-charter high school students.
- Objective 2 is to identify differences in the time to enrollment and completion at USHE institutions between charter and non-charter high school students.
- Objective 3 is to study the workforce participation of charter high school students after leaving high school or USHE using DWS wage data.
- Objective 4 is to estimate the relationship between attending a charter high school and postsecondary/workforce outcomes using matching techniques, a rigorous approach designed to improve the comparability of student groups.

By completing these objectives, this study adds to the ongoing discussion on charter school outcomes and offers insights that may inform future considerations in Utah's educational landscape.

1.1 | Literature Review

Researchers have extensively studied and debated the framework of charter schools. Numerous studies examine how charter school attendance relates to student outcomes, including graduation rates (Booker, Sass, Gill, & Zimmer, 2011; Cohodes & Pineda, 2024), college enrollment (Booker, Sass, Gill, & Zimmer, 2011; Cohodes & Pineda, 2024), academic performance (Figlio, Hart, & Karbownik, 2024; Harris & Chen, 2022; Keller, 2015) and future earnings (Dobbie & Fryer, 2020; Sass, Zimmer, Gill, & Booker, 2016). Researchers continue to debate how charter schools function compared to TPSs, considering factors such as educational outcomes, demographic composition, and regional contexts. This body of research underscores the complexities of charter school education and presents diverse perspectives on its potential effects rather than asserting definitive conclusions.

A 2011 study examined student outcomes for those who attended charter middle schools and later enrolled in charter high schools (Booker, Sass, Gill, & Zimmer, 2011). They found that these students were 7-10 percentage points more likely to graduate within five years compared to those who transitioned to traditional public high schools. In Florida and Chicago, students who attended charter high schools were about 10 percentage points more likely to enroll in college than their peers in TPSs. In Florida, charter high school attendees were 13 percentage points more likely to persist in college for at least two years, while in Chicago, this likelihood was 7 percentage points higher. However, the estimate for Chicago did not meet the threshold for statistical significance.

A 2013 study found that, on average, charter schools enrolled a relatively higher proportion of Black and Hispanic students than TPSs. This pattern was more evident in urban areas, where charter schools concentrated in greater numbers. Researchers also found that charter schools enrolled a higher percentage of students from low-income families. Additionally, researchers found that charter schools operated unevenly across the country, with approximately 57% in urban areas, compared to 25% of TPSs. While researchers observed demographic differences in charter school enrollment, they did not specifically examine the distribution of charter schools or voucher programs across states or nationwide (Angrist, Cohodes, Dynarski, Pathak, & Walters, 2013).

Harris and Chen (2022) found positive effects between charter school enrollment and changes in elementary- and middle-school test scores in math and reading in districts where at least 10% of students attended charter schools. They also reported that this association was stronger in metropolitan areas and in schools that had initially ranked in the bottom 50% in mathematics scores (Harris & Chen, 2022).

A comprehensive 2024 study used data from Ohio and employed various strategies, including individual fixed effects and sibling fixed effects, to examine the relationship between charter school competition and public school student outcomes. The study found no consistent evidence that increased charter competition improved reading test scores for students in TPSs. In mathematics, the effects varied; some models indicated positive or neutral effects in elementary grades, while others suggested declines in middle school grades. The study also reported that charter school competition correlated with changes in reading achievement and attendance in TPSs, though the direction and magnitude of these changes depended on the model used (Figlio, Hart, & Karbownik, 2024).

A recent study examined National Student Clearinghouse (NSC) data for students from "no excuses" charter schools in Massachusetts. These schools typically implement higher behavioral expectations, stricter disciplinary codes, uniform requirements, and longer school days and years. While not all charter schools adopt the "no excuses" model, distinct trends in student outcomes emerge among those that do. Researchers found that both urban and nonurban charter school students enrolled in four-year colleges at higher rates than their peers in TPSs. For example, the immediate four-year enrollment rate for urban charter students increased from 38% to 45%, while for nonurban charter students, it rose from 53% to 62%. Students from urban charter schools had a 4.1 percentage-point higher likelihood of earning a bachelor's degree by the sixth year after their projected high school graduation, while their likelihood of earning any degree increased by 4.8 percentage points. Similarly, students from nonurban charter schools had a 10.4 percentage-point higher likelihood of earning a bachelor's degree and a 9.7 percentage-point higher likelihood of earning any degree. The findings indicate differences in postsecondary outcomes between urban and nonurban charter school students. Future studies should examine whether the "no excuses" approach has similar effects across different charter and TPSs, as well as among diverse student populations (Cohodes & Pineda, 2024).

In contrast, a causal comparative quantitative research study found that Texas open-enrollment charter schools enrolled more Black students but fewer white students than TPSs. Researchers found that students in TPSs scored higher on achievement measures than those in charter schools, with white students having the highest scores. Additionally, researchers reported that, on average, charter schools had higher dropout rates, lower attendance, and lower graduation rates compared to TPSs. More TPS students met the researchers' criteria for college readiness compared to those in charter schools (Keller, 2015).

While research on the postsecondary outcomes of charter school students has yielded mixed results, with studies from different regions presenting conflicting findings, wage outcomes for students who attended charter schools also vary across contexts. Researchers in Florida found that students who attended charter high schools earned up to $2,300 more annually than their peers who attended TPSs. This wage difference raises questions about whether charter schools in Florida provide students with skills or experiences that contribute to higher earnings in adulthood (Sass, Zimmer, Gill, & Booker, 2016). However, in contrast to the Florida study, researchers in Texas found no measurable effect on future earnings associated with attending a "no excuses" charter school. Additionally, researchers found that other types of charter schools in Texas were linked to lower test scores, reduced college enrollment, and lower future earnings (Dobbie & Fryer, 2020). These mixed findings highlight the complexities involved in evaluating charter school performance.

In Utah, the SCSB Annual Reports highlight the growth, performance, and innovative practices of charter schools, as well as the SCSB's role in supporting and overseeing these educational institutions. Charter schools in Utah have steadily grown, offering various educational models to address diverse student needs. These models include core knowledge, direct instruction, classical education, leadership-focused curricula, whole-child approaches, Montessori, Waldorf, online schools, and some that incorporate the "no excuses" approach. The "no excuses" approach is distinct from other models, and not all charter schools in Utah adopt the "no-excuse" model. This variety of models provides families with different educational options that align with their children's learning preferences. Charter schools in Utah have demonstrated strong academic performance across various metrics. Proficiency rates in Math, Science, and English Language Arts have shown improvement over time. Many charter schools consistently rank among Utah's top 100 schools, with charter high schools outperforming TPSs in

several measures. For example, ACT scores for charter school students have been higher than the state average, and graduation rates remain steady and comparable with district schools (Utah State Charter School Board, 2023).

In summary, studies on charter schools show varied outcomes across different regions and measures of student success. While some research indicates improvements in certain measures, other findings remain mixed, especially regarding future earnings and test scores. The mixed range of educational models within charter schools and their uneven distribution across urban and rural areas further complicate the assessment of their overall effectiveness. As policymakers and educators continue to explore ways to expand educational opportunities, developing a nuanced understanding of charter schools can support informed decision-making and future educational reforms.

3 | Methods

2.1 | Data

This study focuses on students' demographics, high school graduation, and subsequent educational achievements by analyzing USBE and USHE enrollment data. The analysis included key demographic variables obtained from USBE. Additionally, the study explored differences in educational outcomes between students who attended charter high schools and those who attended TPSs. This study linked USBE and USHE data, along with wage records from the Utah DWS, to provide insights into the educational and economic trajectories of Utah charter school students.

This study used enrollment data from USBE and USHE to analyze patterns of postsecondary enrollment and completion for Utah students. It excluded students who were home-schooled or attended private schools. This study obtained students' race, sex, disability status, immigrant status, ELL status, refugee status, low-income status, and high school graduation data from USBE records. It categorized students' most recent English Language Learner (ELL) status in USBE data as a binary variable, with 1 representing those who are English learners (Y) or eligible but opted out (O), and 0 representing those who have reclassified as fluent (F), are monitored (M), or English language learning not needed (N). In addition, eligibility for free or reduced-price lunch benefits served as a proxy for low-income status. This study collected each student's low-income status from their last enrollment record in USBE data.

In the race category, the main subgroups are Asian, Black, white, Hispanic, American Indian or Alaskan Native, multiracial, and Native Hawaiian, or Pacific Islander. This study excluded students of unknown race. Overall, students of unknown race made up less than 0.1% of USBE students in the examined time frame. This study represented other demographic variables for each student as binary variables. For the sex category, USBE data classifies students as either female, coded as 1, or male, coded as 0. For the high school graduation category, 1 represents a high school graduate, and 0 represents a non-high school graduate. This study defined a high school graduate as a student who had one of the following high school completion status codes: Adult Education Secondary Diploma Carnegie Units (GC), Basic High School Diploma with Advanced Math Requirement (GQ), Basic High School Diploma (GR), Graduate – UBSCT (G2), Graduate without UBSCT (G1), and Basic High School Diploma Military (GM).

This study examined students in USBE cohorts from 2012 to 2021 who were in grades 9 through 12. It defined a charter school student based on whether they ever attended a charter high school between grade levels 9 and 12. The study designated students who never attended charter high schools as the control group. Additionally, it used the number of days a student attended charter high schools between grades 9 and 12 as a continuous variable. However, the analysis did not reveal a noticeable difference between using the number of days enrolled in charter high schools as a continuous variable and categorizing students as either having attended or not attended a charter high school. See Appendix A for the analysis of the number of days enrolled in charter high schools. These USBE cohorts include 426,095 students, with 377,004 belonging to the control group and 49,091 classified as charter high school students.

Next, this study merged enrollment and graduation data from USHE with USBE data. The study assigned binary variables to indicate whether a student enrolled in a degree-granting institution or technical college and whether they earned at least one postsecondary award. For students who enrolled at a USHE institution, the study retrieved the highest recorded Advanced Placement (AP) and Concurrent Enrollment (CE) credits they earned while still in high school. Additionally, the study classified each student's first postsecondary award according to the Integrated Postsecondary Education Data System (IPEDS) nomenclature.

This analysis considers the fact that different educational attainments may require varying lengths of time from postsecondary enrollment to completion. To accurately reflect this variability, it categorizes IPEDS 1, 1A, and 1B as USHE certificates

requiring less than one year. It classifies IPEDS 2 as a USHE certificate requiring one to two years to complete and designates IPEDS 3 as associate degrees. Similarly, it groups IPEDS 4, 5, and 6 as bachelor's degrees and classifies IPEDS 7 and above as graduate degrees. For technical certificates, this analysis converts the number of required hours into the corresponding level of attainment. It assigns an attainment level of 1A to certificates requiring fewer than 300 hours, categorizes certificates requiring 300 to 900 hours as level 1B, and classifies certificates requiring more than 900 hours as level 2.

Time to postsecondary enrollment refers to the period between a student's high school completion and their first USHE enrollment, as measured in months. Similarly, time to the first USHE award represents the duration between a student's initial enrollment at a USHE institution and their first postsecondary award. This approach helps account for potential delays between high school completion and postsecondary enrollment.

Additionally, a student's highest educational attainment is determined using USHE records if the student has at least one graduation record from a USHE institution. If a student has enrollment data from USHE without graduation, they are classified as having 'some college, but no degree.' A student who has graduated high school but does not have a USHE enrollment record is classified as a 'high school graduate, no USHE enrollment.'

Finally, this study collected students' last reported cumulative GPA from degree-granting institutions for those who enrolled, represented as a continuous numeric variable. This study also measured the time elapsed between high school completion and the first postsecondary enrollment, and the time elapsed between the first postsecondary enrollment and the first postsecondary award.

This study matched wage records from DWS with USBE students. Most employers across Utah are required to report employee wages quarterly to the DWS. If a student did not enroll in USHE, the analysis examines their wage outcome after their high school completion date. For students with USHE enrollment data, the analysis reviews wage outcomes after the last postsecondary enrollment date for those who did not graduate and after the last postsecondary graduation date for those who did. This process ensures that students are available to participate in the workforce rather than pursue postsecondary education, without imposing the condition of being "strongly attached to the workforce," as defined in the following paragraphs.

If a student earned wages from multiple employers in a given quarter, the total quarterly wages were computed by summing all wages. Because wage records do not include the number of hours worked, determining full-time status based on a 40-hour work week is not possible. To address this limitation, this analysis approximated quarterly full-time workforce participation by defining it as earning at least the amount a person working 40 hours per week at the federal minimum wage of $7.25 per hour would earn, or $3,770 per quarter.

To be considered 'strongly attached to the workforce' for the year, a student must meet the $3,770 threshold in all four quarters. For the remainder of this study, 'students with wages,' includes all students who had any earnings within the given time frame, regardless of their workforce attachment status. However, only students who met the criteria for strong workforce attachment are included in the 'strongly attached' condition.

As this study includes the USBE cohort year 2021, some students may still be pursuing postsecondary education at the time of its completion. This study balances capturing long-term wage trends with ensuring sufficient wage data. To provide insight into post-education earnings, it examines students' wages for up to five years after they leave education. For additional context, Appendix F presents an initial analysis of wage data covering up to ten years after students exit education.

2.2 | Data Preparation

This study combined data from degree-granting institutions and technical colleges to create binary indicators of postsecondary enrollment and award status, determining whether students continued their education beyond high school and received an award. The analysis included technical college enrollment only for students seeking a certificate. Students qualified as receiving an award from a technical college only if their exit code was 'graduate.' The study coded a student as USHE enrolled if they enrolled in either a degree-granting institution, a technical college, or both. Similarly, the study classified a student as a USHE graduate if they received an award from a degree-granting institution, a technical college, or both. This approach includes all high school students who enroll or graduated in either type of institution in the analysis.

2.3 | Statistical Technique

This study uses the statistical technique Inverse Probability Weighting (IPW) to estimate the association between attending a charter high school and various outcomes, while controlling for other demographic variables. Variables such as parental education and social capital influence students' decisions to attend charter high schools, pursue postsecondary education, or achieve

workforce outcomes. However, since the models do not include these variables because they are not available from UDRC's data sources, the results should be interpreted with caution. The exclusion of these variables demonstrates the limitations of the analysis.

Using IPW, the study assigns weights to each student based on the inverse of the probability of attending a charter high school, given their other observed demographic characteristics (Equation 1). To estimate these probabilities, also known as propensity scores (ps), the treatment variable—charter high school attendance—is regressed on observed covariates such as immigration status, refugee status, disability status, ELL status, low-income status, sex, and race. The propensity score for each student in this study is:

$$ps = P(Charter = 1 \mid X) \quad (1)$$

where [*X*] represents the vector of demographic variables. The calculated propensity score represents the probability that a student attended at least one charter high school, given the student's demographic background.

Next, this study removed students with propensity scores greater than 0.99 or lower than 0.01, or trimmed them, to exclude those with extreme scores. Trimming helps produce more reliable and stable estimates of the treatment effect by mitigating the influence of outliers (Crump, Hotz, Imbens, & Mitnik, 2009). After trimming, the study retained more than 99.9% of the original USBE students.

Once propensity scores are calculated for each student, the inverse probability weights for each student are computed based on the propensity scores (Rosenbaum & Rubin, 1983). The inverse probability weights are calculated as:

$$IPW = Charter\left(\frac{1}{ps}\right) + (1 - Charter)\left(\frac{1}{1 - ps}\right) \quad (2)$$

where *ps* is the student's propensity score representing the probability of a student attending at least one charter high school, calculated using Equation 1, and *Charter* is a binary variable with 0 indicating the student did not attend a charter high school, and 1 indicating the student attended at least one charter high school.

Inverse probability weighting (IPW) uses a distinct numerical approach to calculate Average Treatment Effects (ATE) and estimate treatment effects related to charter high school attendance. The study treats students' attendance at charter high schools as the treatment. The fundamental principle behind IPW is to assign weights to each student based on the inverse probability of attending a charter high school, considering their demographic characteristics. When students with a low probability of attending a charter high school actually attend, or vice versa, this observation becomes unusual and may provide valuable insights (Seaman & White, 2013).

The study calculates the weighted average for each of the outcome variables for the two groups of students. The formula below calculates the weighted average for students in the charter school group,

$$Weighted\ charter\ average = \frac{\sum_{i=1}^{n_{charter}} \left(Y_{ic} IPW_{ic}\right)}{\sum_{i=1}^{n_{charter}} IPW_{ic}} \quad (3)$$

where *ic* represents a charter school student, *IPWic* denotes the IPW for this student calculated using Equation 2, and *Yic* denotes the outcome variable for the student.

Similarly, to calculate the weighted outcomes for non-charter school students, this study uses the following formula:

$$Weighted\ non\text{-}charter\ average = \frac{\sum_{i=1}^{n_{noncharter}} \left(Y_{inc} IPW_{inc}\right)}{\sum_{i=1}^{n_{noncharter}} IPW_{inc}} \quad (4)$$

where *inc* represents a non-charter school student, *IPWinc* denotes the IPW for this student calculated using Equation 2, and *Yinc* as the outcome variable. This approach accounts for differences in student characteristics and enables a balanced comparison between charter and non-charter school students.

Finally, this study calculates the ATE for the following outcome variables: the binary postsecondary enrollment variable, the binary postsecondary graduation variable, binary AP credits earner variable, binary CE credits earner variable, numeric AP credits earned variable, numeric CE credits earned variable, numeric months to postsecondary enrollment variable, numeric months to postsecondary graduation, numeric USHE GPA variable, binary workforce participation variables for five years, and numeric annual wages for five years. This study includes these variables to fulfill the objectives of estimating the average effects of attending a charter high school on postsecondary and workforce outcomes. For each of these outcomes, the analysis compares the weighted average for the non-charter school group, Equation 4, to the weighted average for the charter school group, Equation 3. The following formula calculates the ATE for each outcome:

$$ATE = weightedcharteraverage - weightednoncharteraverage \quad (5)$$

Medical researchers initially developed and widely applied IPW to estimate causal treatment effects in observational studies, particularly when randomized controlled trials were not feasible (Bettega, Mendelson, Leyrat, & Bailly, 2024). Medical researchers commonly apply IPW in causal inference to estimate the ATE. In this study, charter

high school attendance serves as the treatment variable. The ATE provides an estimate of the association between charter high school attendance and an outcome while adjusting for differences in the likelihood of attending a charter high school. When estimating the ATE for a binary outcome, such as enrolling in USHE, the ATE represents the average difference in the outcome between charter and non-charter high school students, accounting for potential confounders. For example, if the model estimates the ATE at -0.062, this suggests that charter high school attendance is associated with a 6.2 percentage point difference in USHE enrollment rates, adjusting for differences in the probability of attending a charter high school. In contrast, for a continuous outcome, such as annual wages, if the model estimates the ATE at -500, this indicates an average difference of $500 in wages between charter and non-charter high school attendees after accounting for differences in charter school attendance likelihood. This estimate reflects a statistical association. These interpretations provide insight into the direction and magnitude of the estimated treatment effect, with the ATE serving as a key measure in causal inference studies.

2.3 | Limitations

This study has several limitations that could introduce potential biases in interpreting graduation and workforce participation rates. First, USHE data include only Utah's public technical colleges and degree-granting institutions. Data from private postsecondary institutions such as Brigham Young University and Westminster University are unavailable for this study. Additionally, enrollment and award records are not available for students who attended or earned degrees outside of Utah. A USBE student who enrolled in private postsecondary education in Utah or pursued postsecondary education outside of Utah does not appear in the USHE enrollment rate reported in this study. According to the USHE 2020 High School Feedback Report prepared with USBE data and NSC college enrollment data, private postsecondary and out-of-state enrollment rates for Utah high school graduates and charter high school graduates were nearly identical, with 6.8% of all high school graduates and 7.0% of charter high school graduates attending Brigham Young University, Westminster University, Ensign College, or an out-of-state postsecondary institution (Utah System of Higher Education, 2021). Furthermore, Appendix B demonstrates that the USHE enrollment rate appears artificially low for ECHS students. One possible explanation is that ECHS students enrolled in private postsecondary institutions or pursued education outside of Utah. Similarly, students who initially enroll in USHE but later transfer to a private or out-of-state institution do not appear in this study's graduation data, potentially creating the illusion of a lower USHE graduation rate.

Similarly, data on workforce participation outside of Utah is unavailable. If a student enters the workforce outside of Utah after leaving their education, the dataset does not capture their workforce participation and annual wages. DWS wage data do not include all sources of income. Reporting requirements may exclude income from self-employment, federal agencies, illegal market transactions, non-profit employment, and agriculture. Additionally, DWS wage records do not provide details on hours worked. Section 2.1 describes the approximation of strong workforce attachment status. However, this approximation lacks precision and flexibility to account for individuals earning high hourly wages while working fewer hours. Furthermore, the USBE cohort year and USHE data follow an academic calendar, whereas employers report DWS wage data quarterly. This calendar misalignment results in an imprecise calculation of the time between students leaving education and entering the workforce.

Moreover, this study includes USBE students from cohort years 2012–2021, excluding those who were home-schooled or attended private schools. Some of these students may still be pursuing a postsecondary degree at the time this research is completed. Others may not have accumulated five years of post-education wages for data analysis yet. Some students may serve a mission for The Church of Jesus Christ of Latter-day Saints after high school and have yet to enroll in postsecondary education. Others may enroll in a postsecondary institution before their mission but have not yet received an award from a USHE institution. These limitations apply to both charter and non-charter high school students, meaning the comparisons between the two groups are affected in the same way. However, they may influence the overall USHE enrollment rate, graduation rate, workforce participation, and wage outcomes.

Additionally, multicollinearity among demographic variables may limit the accuracy of the analysis, as it may obscure the unique contributions of each factor to outcomes such as graduation and workforce participation rates. Correlations between variables such as race and low-income status make it difficult to separate their individual effects.

Finally, the Utah Data Research Center (UDRC) is exploring solutions to improve the practice of connecting USBE student data to DWS data without needing a connection through USHE. Currently, for USBE students in this study without USHE

enrollment or graduation data, this study may not fully capture their presence in the Utah workforce and their annual wages. Among students who did not enroll in postsecondary education, in other words, students whose USBE data connected directly to DWS data without a connection through USHE, only 52.6% were represented in the DWS data, regardless of when the wage record appears in relation to leaving education. In contrast, among students with USHE data, where linking of USHE data with DWS data is available, 98.6% of students were represented in the DWS data, regardless of when the wage record appears in relation to their departure from education. The low capture rate of wage records for USBE students without the linking of USHE data may be due to students moving out of state to pursue postsecondary education after high school, and not returning to the Utah workforce after their postsecondary education. This limitation affects both charter and non-charter high school students and requires consideration when examining workforce participation and wage trends in this study.

3 | Results

3.1 | Descriptive Statistics

The demographic composition of students within USBE has evolved over time. This study's sample of 426,095 students reveals that racial composition and other key characteristics have shifted, particularly in the distinction between students attending charter high schools and those who have not. These shifts provide insight into long-term trends, such as the representation of underrepresented students among charter high school students. Data shows a steady rise in students of color enrollments, and changes in the representation of immigrant and refugee students. These trends offer a basis for further analysis of the broader implications of charter high school access, equity, and demographic shifts in education.

Over time, the demographic composition of the USBE student body shifted in racial diversity, sex distribution, and other demographic variables. Among the 426,095 USBE students in this study, 88.5% never attended a charter high school, while 11.5% attended at least one charter high school.

Most students are white, comprising 76.1% of the total student population. Hispanic students make up 16.1% of the student body. Asian, Black, American Indian or Alaskan Native, Multiracial, and Native Hawaiian, or Pacific Islander students each represent smaller percentages of the overall student population. When looking at students who have attended charter high schools, data show a slightly higher percentage of Asian, Black, and white students than those who have never attended charter high schools. When the study examines the attendance trend, the percentage of white students in charter high schools appears to decrease over time (Table 2).

Table 1: Percentage of students in each demographic category in this study. N_all_students=426,095; N_noncharter=377,004; N_charter=49,091.

	All students (N)	All students (%)	Never Charter in high school (N)	Never Charter in high school (%)	Ever Charter in high school (N)	Ever Charter in high school (%)
Asian	8,532	2.0%	7,409	2.0%	1,123	2.3%
Black	6,808	1.6%	5,821	1.5%	987	2.0%
Hispanic	68,626	16.1%	61,598	16.3%	7,028	14.3%
American Indian or Alaskan Native	5,528	1.3%	4,867	1.3%	661	1.3%
Multiracial	4,971	1.2%	4,310	1.1%	661	1.3%
Native Hawaiian or Pacific Islander	7,244	1.7%	6,517	1.7%	727	1.5%
White	324,386	76.1%	286,482	76.0%	37,904	77.2%
Male	218,329	51.2%	194,078	51.5%	24,251	49.4%
Female	207,766	48.8%	182,926	48.5%	24,840	50.6%

The percentage of white students in charter high schools gradually decreased from 82.7% in 2012 to 73.0% in 2021. In contrast, the percentage of Hispanic students in charter high schools steadily increased from 10.4% in 2012 to 17.9% in 2021. The study found that students of color maintained a relatively stable percentage over the years (Figure 1). Similarly, the percentage of all white students decreased from 78.7% in 2012 to 73.8% in 2021, while the percentage of all Hispanic students increased from 14.4% in 2012 to 17.9% in 2021 (Appendix H).

Overall, the percentage of underrepresented students increased from 2012 to 2021 (Table 3). The percentage of immigrants, refugees, and ELLs steadily increased over the years. The percentage of female students remained relatively consistent over the years.

Table 2: Change in percentage of students who attended charter high schools by race/ethnicity over time.

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
White	82.7%	81.4%	81.3%	80.2%	80.8%	77.7%	77.0%	75.1%	73.9%	73.0%
Hispanic	10.4%	10.9%	11.5%	12.6%	11.4%	13.6%	13.7%	15.7%	17.1%	17.9%
Students of Color	6.9%	7.7%	7.2%	7.2%	7.8%	8.7%	9.3%	9.2%	9.0%	9.1%

Table 3: Change in percentage of underrepresented students who attended charter high schools over time.

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Immigrant	0.0%	0.2%	0.4%	0.7%	1.3%	2.4%	2.3%	2.3%	2.8%	3.1%
Refugee	0.0%	0.0%	0.1%	0.3%	0.7%	1.4%	1.4%	1.2%	1.4%	1.1%
Disability	17.0%	19.0%	20.7%	21.7%	24.2%	25.3%	23.8%	25.6%	25.5%	24.8%
ELL	2.4%	2.9%	4.3%	5.5%	6.2%	8.2%	8.3%	9.6%	12.6%	14.0%
Low income	30.2%	29.1%	29.6%	30.0%	31.3%	31.2%	31.9%	31.3%	30.4%	26.2%
Female	51.6%	51.1%	49.9%	50.5%	50.3%	52.1%	50.9%	50.0%	49.9%	50.6%

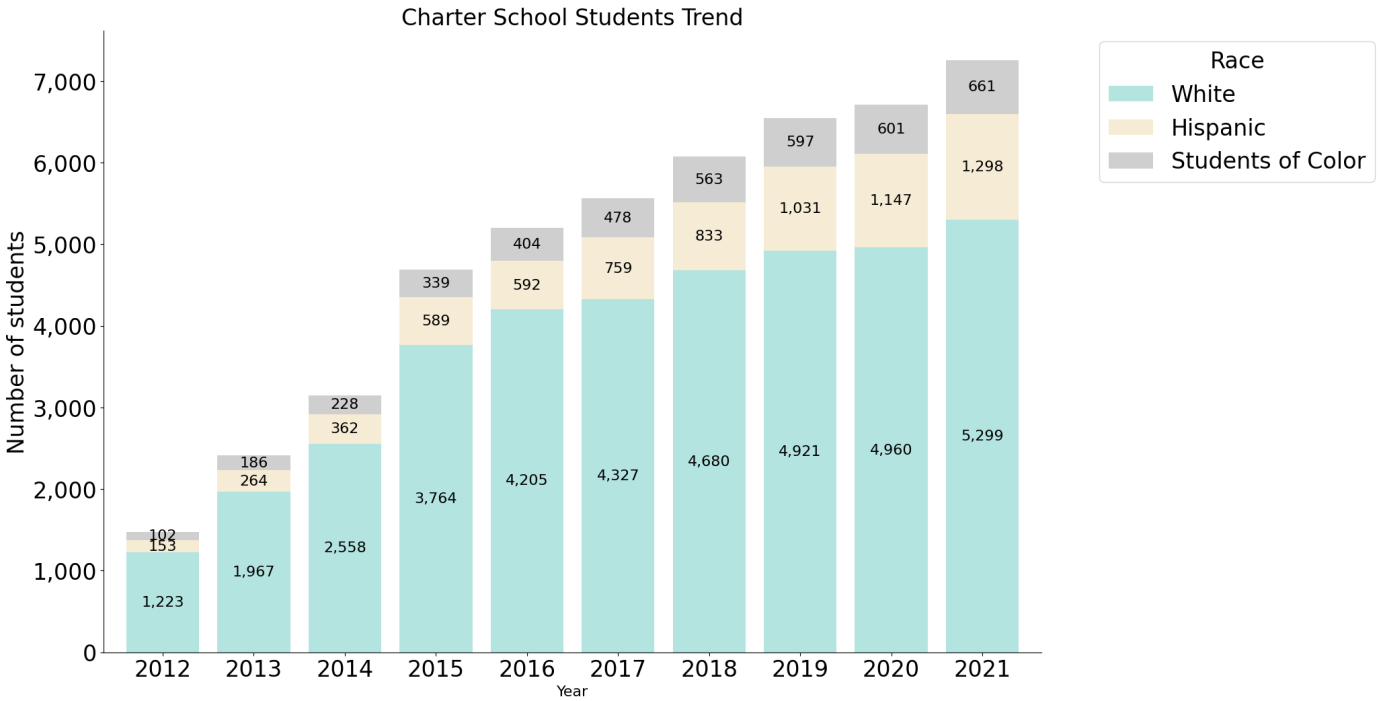

Figure 1: Demographics of charter high school students over time. N = 49,091.

3.1.1 | Concurrent Enrollment and Advanced Placement Attainment

The analysis of CE and AP credit attainment shows trends in academic opportunities for high school students. This section highlights the participation rates of charter and non-charter high school students in earning college credits prior to graduation. While a higher percentage of non-charter high school students earned CE credits overall, charter high school students earned a greater number of both AP and CE credits on average. The variability in credit attainment suggests different academic paths and invites further exploration of access for charter compared to non-charter high school students.

High school students can earn CE credits at USHE institutions before graduating from high school, and they can earn AP credits through coursework and tests in high school. Of the 426,095 students in this study, 6,132, or 1.4%, received at least one AP credit before high school graduation, and 131,580, or 30.9%, received at least one CE credit before high school graduation (Table 4). AP and CE credit accumulation by students in ECHSs were provided for comparison.

A greater percentage of charter high school students earned AP credits, while a higher percentage of non-charter high school students earned CE credits. However, charter high school students earned, on average, more AP and CE credits, with greater variability. Given the variability in AP and CE credit attainment and the potential influence of students from ECHSs on the results, IQRs and medians are provided in Appendix C to offer additional insight into the distribution of credits earned, with the understanding that only 14.7% of charter high school students attended an ECHS.

Charter high schools, especially those that are not ECHSs, may face limitations in offering a wide range of AP or CE courses. The data suggest potential differences between students at ECHSs, who typically have more opportunities to earn college credits, and other charter high school students who may have fewer opportunities to access advanced courses.

Additionally, while a minority of students in each group earned AP credits (1.3% of non-charter high school students, 2.3% of charter high school students, and 11.8% of ECHS students (Table 4)), higher percentages of students earned CE credits. However, reporting the median value is not particularly informative, as over 50% of students in each group did not earn these credits, resulting in a median of 0. See Appendix C for further analysis of AP and CE credits earned by these students.

Table 4: Summary of USBE students earning AP and CE credits by charter high school status. N_all_students=426,095; N_noncharter=377,004; N_charter=49,091; N_ECHS=7,168.

	All students	Never attended a charter high school	Ever attended at least one charter high school	Ever attended at least one ECHS
AP earners (N)	6,132	4,998	1,134	845
AP earners (%)	1.4%	1.3%	2.3%	11.8%
CE earners (N)	131,580	117,741	13,839	5,433
CE earners (%)	30.9%	31.2%	28.2%	75.8%
AP credits earned (mean)	1.6	1.4	2.8	14.8
AP credits earned (SD)	19.5	17.3	31.5	74
CE credits earned (mean)	25	22.4	44.9	173.6
CE credits earned (SD)	63.9	49.2	128.1	221.2

3.1.2 | Highest Educational Attainment

In general, a higher percentage of charter high school students did not graduate from high school compared to those who did not attend a charter high school. Additionally, a smaller percentage of charter high school students had some postsecondary education, and lower percentages of charter high school students earned USHE degrees in each degree type compared to those who had never attended a charter high school (Table 5).

The educational attainment results highlight differences between charter high school students and those who did not attend charter high schools. Charter high school students are less likely to graduate from high school or attain postsecondary degrees, such as associate or bachelor's degrees, compared to their non-charter peers. These trends suggest that some charter high schools may struggle with challenges in supporting students through high school and into higher education. The findings prompt important questions about the effectiveness of charter high schools in preparing students for long-term academic success and suggest areas that warrant further investigation.

This study analyzes high school graduation rates and postsecondary enrollment to compare outcomes between charter high school students and those who never attended charter high schools. While most students graduate, charter high school students experience a slightly lower graduation rate. Additionally, fewer charter high school graduates pursue postsecondary education in Utah compared to their non-charter counterparts. These patterns suggest differences in the support and preparation students receive across educational settings, highlighting areas for further investigation into access and equity in postsecondary opportunities.

3.1.3 | Enrollments in USHE Institutions

Table 5 shows the percentage of students based on their highest level of educational attainment, including categories such as non-high school graduates, high school graduates without USHE enrollments, and high school graduates who also graduated from USHE. In contrast, Table 6 provides the percentage of USBE students who graduated high school and the percentage of those USBE graduates who enrolled in USHE institutions.

Of the 426,095 USBE students in the sample, 371,886 or 87.3% graduated from high school. Among these high school graduates, 155,547, or 41.8%, enrolled in USHE after high school graduation. The high school graduation rate was slightly higher for students who had never attended a charter high school, 87.9%, compared to those who had attended charter high schools, 82.5%. Similarly, students who had never attended a charter high school enrolled in USHE at a higher rate.

In general, charter high school students enrolled in postsecondary education slightly sooner than students who had never attended a charter high school. High standard deviations indicate substantial variability within each group, suggesting potential differences among individual students.

Table 5: The highest educational attainment by students in this study by charter high school status. N_all_students=426,095; N_noncharter=377,004; N_charter=49,091.

Educational Attainment	All students	Never attended a charter high school	Ever attended at least one charter high school
Non-high school graduate	12.7%	12.1%	17.5%
High school graduate, no USHE enrollment	51.9%	51.8%	52.6%
Some college, no degree	25.9%	26.2%	23.6%
Certificate (less than one year)	0.2%	0.2%	0.2%
Certificate (one to two years)	0.7%	0.8%	0.5%
Associate degree	4.1%	4.3%	2.4%
Bachelor's degree	4.3%	4.4%	3.0%
Graduate degree	0.2%	0.2%	0.1%

Table 6: Percentage of USBE students with USHE enrollment by charter high school status. N_all_students=426,095; N_noncharter=377,004; N_charter=49,091.

	All students	Never attended a charter high school	Ever attended at least one charter high school
USBE count (N)	426,095	377,004	49,091
Graduated High School (N)	371,886	331,386	40,500
Graduated High School (%)	87.3%	87.9%	82.5%
Attended USHE (N)	155,547	140,928	14,619
% HS graduates who attended USHE	41.8%	42.5%	36.1%

Table 7: Average months between high school graduation and the first USHE enrollment.

	All students	Never attended a charter school	Ever attended at least one charter school	Ever attended at least one ECHS
Degree-Granting Institution enrollment (mean)	9.1	9.3	8	7.2
Degree-Granting Institution enrollment (SD)	13.2	13.6	12.2	11.8
Technical College enrollment (mean)	15.4	15.8	12.2	16.9
Technical College enrollment (SD)	19.4	19.6	17.1	19.9

Table 8: Last cumulative USHE GPA of students who enrolled in USHE.

	All students	Never attended charter high schools	Ever attended at least one charter high school
USHE GPA (mean)	2.69	2.70	2.56
USHE GPA (SD)	1.18	1.18	1.24

3.1.4 | GPAs of USHE Students

The following section examines trends in the academic performance of students who attended charter high schools versus those who did not, with a specific focus on their last cumulative GPA from USHE. Approximately 5.6%, or 8,779 students, of those who enrolled in a USHE institution did not have an available GPA. After excluding students without a GPA, 146,768 students remained. Among students with an available GPA, charter high school students exhibited somewhat lower GPA averages compared to their non-charter peers. Although these students had earned more AP and CE credits on average shown in Table 4, they showed greater variability in their GPAs. These observations highlight the complexities of academic preparedness, which researchers and educators should consider when exploring overall student success and performance after graduation.

3.1.5 | Graduation Rates, Time to Degree Completion, and Award Types of USHE Students

The analysis of student USHE graduation outcomes by charter high school attendance reveals several trends. While charter high school attendees had a lower graduation rate overall, they tended to complete their programs slightly faster and were more likely to earn certain types of degrees and certificates. This section examines these patterns in detail, focusing on differences in graduation rates, time to degree completion, and the types of awards earned. The findings provide insight into how charter high school attendance may influence educational trajectories and suggest potential factors that contribute to these differences.

The analysis found that students who had never attended a charter high school had a higher USHE graduation rate. Of the 155,547 students with enrollment records at USHE institutions after high school graduation, 47,334 or 30.4% received at least one award from USHE.

Among those who graduated from USHE institutions, students who attended a charter high school generally graduated more quickly. Students enrolled in technical colleges earned their awards more quickly than those in academic institutions, possibly because technical college programs typically have shorter completion times than those at academic institutions.

While a greater proportion of non-charter high school students earned associate degrees, a larger share of charter high school students earned bachelor's degrees, graduate degrees, certificates requiring less than one year, and certificates requiring one to two years. Among ECHS students, a bachelor's degree was the highest educational attainment for 63.3% of those who graduated from USHE.

Charter high school students, on average, completed their degrees earlier than non-charter high school students for all degree types, although they might experience higher variability in some cases. For example, charter high school students completing a postsecondary certificate requiring less than one year finished their degrees 7.2 months earlier than their non-charter peers on average. This trend might suggest that charter high schools associate more closely with Career and Technical Education (CTE) programs. Many charter high schools emphasize hands-on learning and partnerships with technical colleges and local industries, potentially providing pathways for students into technical fields.

Table 9: Percentage of students with USHE graduation by charter high school status. N_USHE_enrolled=155,547; N_USHE_enrolled _noncharter=140,928; N_USHE_enrolled _charter=14,619.

	All students	Never attended a charter high school	Ever attended at least one charter high school
USHE graduation count (N)	47,334	43,735	3,599
USHE graduation (%)	30.4%	31.0%	24.6%

Table 10: Average months to the first graduation by charter high school status.

	All students	Never attended a charter high school	Ever attended at least one charter high school
Degree-Granting Institution (mean)	34.6	35.7	34.1
Degree-Granting Institution (SD)	18.5	18.0	17.6
Technical College graduation (mean)	7.9	8.0	7.7
Technical College graduation (SD)	9.0	9.1	9.2

Table 11: Percentage of USHE graduates in their highest educational attainment category by charter high school status. N_USHE_graduates=47,334; N_USHE_graduates _noncharter=43,735; N_USHE_graduates _charter=3,599.

Educational Attainment	All students (%)	Never attended a charter high school (%)	Ever attended at least one charter high school (%)
Certificate (less than one year)	1.9%	1.8%	2.3%
Certificate (one to two years)	7.7%	7.7%	8.1%
Associate degree	43.1%	43.6%	38.1%
Bachelor's degree	45.3%	45.0%	49.3%
Graduate degree	1.9%	1.9%	2.2%

Note: This excludes students whose highest educational attainment were below or at high school graduate level or had some college, but no degree.

Table 12: Average months to the first graduation by charter high school status.

Educational Attainment	All graduates (mean)	All graduates (SD)	Non charter graduates (mean)	Non charter graduates (SD)	Charter graduates (mean)	Charter graduates (SD)
Certificate (less than one year)	20.8	19.4	21.5	19.5	14.3	17.1
Certificate (one to two years)	32.8	18.2	32.8	18.1	32.7	19.3
Associate degree	30.7	16.6	31.0	16.5	27.1	17.2
Bachelor's degree	51.3	14.4	51.8	14.2	45.8	15.0

Table 13: Percentage of students with wages after leaving education.
N_all_students=426,095; N_noncharter=377,004; N_charter=49,091.

	All students	Never attended a charter high school	Ever attended at least one charter high school
Year 1	49.0%	49.8%	42.8%
Year 2	41.6%	42.3%	35.6%
Year 3	22.6%	23.1%	18.6%
Year 4	15.7%	16.2%	12.6%
Year 5	10.5%	10.9%	8.0%

Note: : Table 13 includes any instance of wages for students with wage records within the year, regardless of the amount.

Table 14: Percentage of students strongly attached to the workforce after leaving education.
N_all_students=426,095; N_noncharter=377,004; N_charter=49,091.

	All students	Never attended a charter high school	Ever attended at least one charter high school
Year 1	13.1%	13.5%	9.9%
Year 2	10.0%	10.3%	7.7%
Year 3	7.4%	7.7%	5.5%
Year 4	5.5%	5.7%	4.1%
Year 5	3.9%	4.0%	2.7%

Note: : Table 14 includes only students who earned at least the full-time approximation, defined in section 2.1, each quarter, for all four quarters of the year.

3.3.6 | Workforce Outcomes

The analysis of wage data reveals differences based on students' charter high school attendance. Among the students whose wage data were analyzed, clear trends emerged in workforce participation and wage levels. Specifically, students who attended charter high schools had lower rates of wage participation and workforce attachment compared to their non-charter counterparts. This section explores these patterns in depth, highlighting differences in wage presence and levels, and examining the potential implications of charter high school attendance on workforce outcomes. These findings offer insights into how educational pathways may influence post-graduation employment and earnings, setting the stage for a broader discussion on the role of educational experiences in shaping long-term career success.

Among students in this study, 243,732, or 57.2%, had wage data available in the Utah DWS records after leaving education. This study examines wage data after students' last enrollment or graduation date, whichever occurs later. For example, if a student has no USHE enrollment or graduation, this study examines wage data after their high school graduation. If a student has USHE enrollment data but did not graduate, this study examines wage data after the student's last USHE enrollment date. If a

student has both a graduation and another USHE enrollment after the graduation, this study examines wage data after the last USHE enrollment date. This timeline ensures that the study focuses on students who are no longer engaged in formal education and are available for workforce participation.

For all charter high school students in this sample, 50.2% had wages, compared to 58.1% of non-charter high school students. This study calculated these percentages based on the number of charter and non-charter high school students in the entire sample. This study observed differences in wage data, which may reflect various factors related to the students' educational pathways, but further analysis is needed to understand the underlying causes.

The percentages of students with wages or who were strongly attached to the workforce were relatively smaller. To ensure the quality of the wage reporting, the remainder of this study will examine wages for up to five years after students leave their education. Figures 2 and 3 show the average annual wages for those with wages after leaving education and those who were strongly attached to the workforce. For more details on the annual wages of students up to five years after leaving education, see Appendix G.

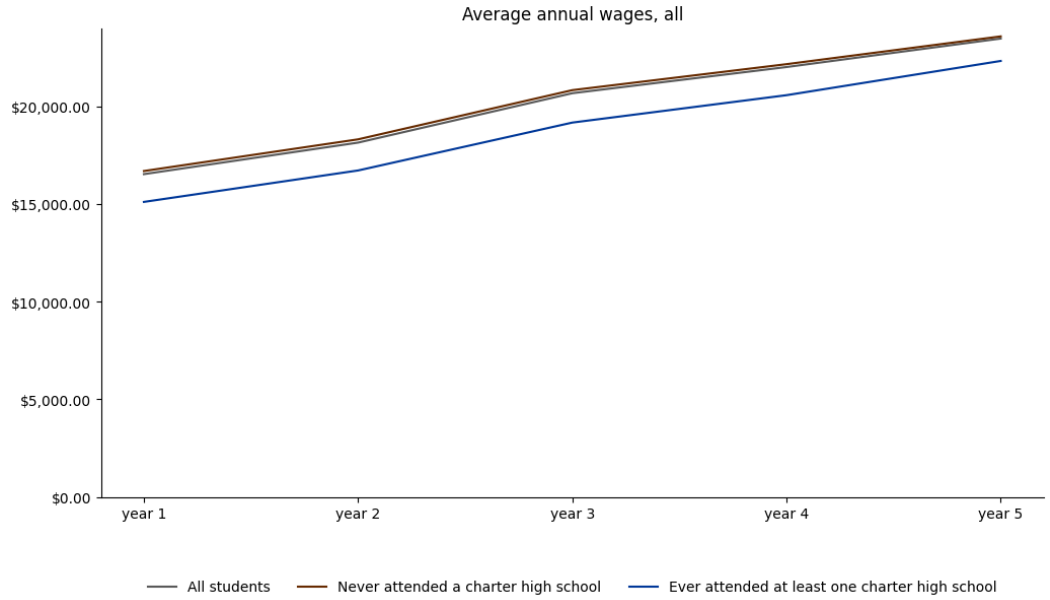

Figure 2: Average annual wages for those with wages after leaving education. This figure includes any instance of wages for students with wage records within the year, regardless of the amount.

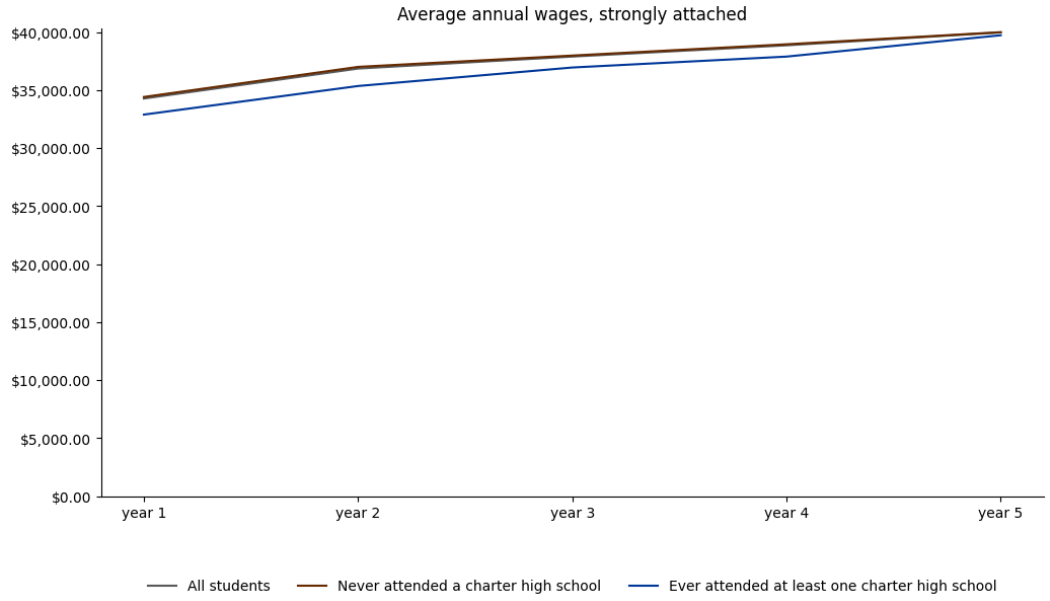

Figure 3: Average annual wages for those strongly attached to the workforce after leaving education. This figure includes only students who earned at least the full-time approximation, defined in section 2.1, each quarter, for all four quarters of the year

3.2 | Inverse Probability Weighting

This study tests the common support assumption in IPW to ensure that meaningful comparisons can be made between the two groups of students based on similar demographic distributions. The common support assumption requires sufficient overlap in the propensity scores of charter and non-charter high school students, meaning that for each set of covariates or demographic variables, students from both groups appear across the range of propensity scores. Ensuring this overlap helps support a more balanced comparison between the groups. This study manages the common support assumption by analyzing the range of propensity scores and examining the overlap shown in Figure 4. The sufficient overlap suggests that charter and non-charter high school students may be comparable in terms of their propensity scores. After applying weights to adjust for differences, this study compares the two groups to examine potential differences in postsecondary and wage outcomes.

This study finds that attending at least one charter high school corresponds with a 6.2 percentage point difference in the probability of enrolling in a USHE institution and a 6.1 percentage point difference in the probability of graduating from a USHE institution. The study observes a 0.8-month difference in the time between high school graduation and first USHE enrollment for students who attended a charter high school. Furthermore, this study identifies a 2.0-month difference between first USHE enrollment and first USHE graduation among these students. This study also identifies a 0.14 grade point difference in USHE GPA among students who attended at least one charter high school.

In workforce outcomes, the study finds up to a 3-percentage point difference in the probability of receiving wages within the first five years after leaving education and a 3-percentage point difference in the probability of being strongly attached to the workforce for students who attended a charter high school. Among students who worked and were strongly attached to the workforce, this study observes differences in wage outcomes during the first five years after leaving education based on charter high school attendance.

Recall from Section 2.3 that ATE represents the estimated difference in outcomes for students who attend a charter high school. Figure 5 offers a visual representation of the ATEs and confidence intervals for annual wages among students who earned wages for up to five years after leaving education. Figure 6 displays the ATEs and confidence intervals for students who demonstrate a strong attachment to the workforce.

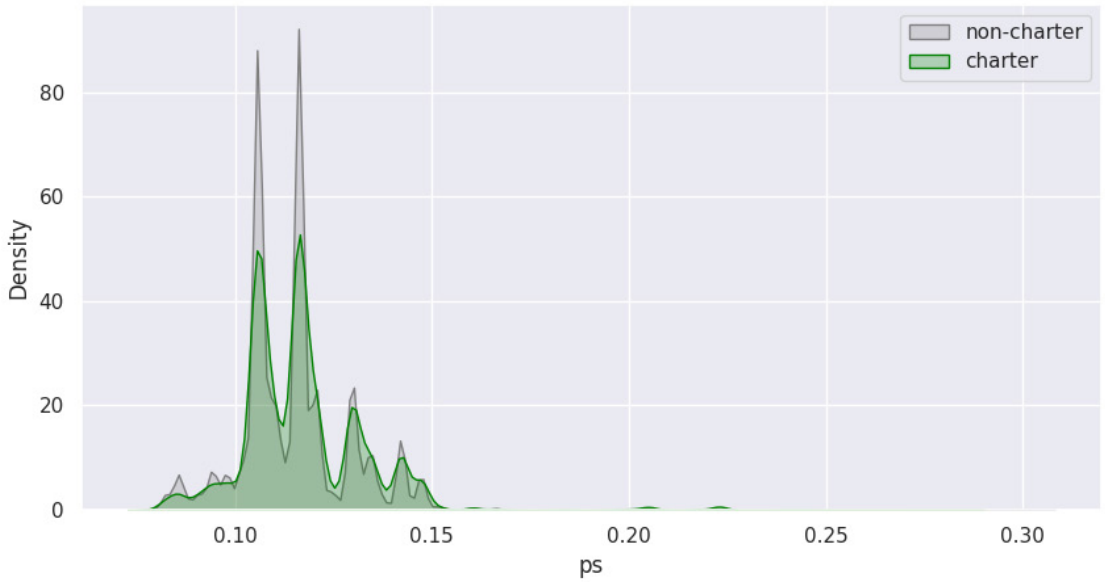

Figure 4: Common support graph of the propensity scores for the two groups of students.

Table 15: Average effects of attending charter high schools on postsecondary and workforce outcomes. (* p<0.05, ** p<0.01, *** p<0.001). The standard errors and t-statistics are reported in Appendix I.

Outcome Variable	ATE	95% Confidence Interval
AP credits earner (binary)	0.010***	(0.010, 0.011)
CE credits earner (binary)	-0.026***	(-0.029, -0.023)
AP credits earned	1.457***	(1.303, 1.611)
CE credits earned	23.427***	(22.839, 24.014)
Postsecondary enrolled (binary)	-0.062***	(-0.065, -0.060)
Months to postsecondary enrollment	-0.791***	(-0.922, -0.660)
USHE GPA	-0.139***	(-0.151, -0.127)
Postsecondary graduate (binary)	-0.061***	(-0.065, -0.057)
Months to postsecondary graduation	-1.972***	(-2.322, -1.622)
Year One having wages (binary)	-0.005***	(-0.008, -0.003)
Year Two having wages (binary)	-0.021***	(-0.025, -0.018)
Year Three having wages (binary)	-0.029***	(-0.032, -0.025)
Year Four having wages (binary)	-0.028***	(-0.032, -0.025)
Year Five having wages (binary)	-0.028***	(-0.031, -0.025)
Year One wages	-1403.59***	(-1,518.09, -1,289.10)
Year Two wages	-1461.91***	(-1,582.90, -1,340.93)
Year Three wages	-1176.68***	(-1,291.70, -1,061.67)
Year Four wages	-1002.14***	(-1,108.23, -896.05)
Year Five wages	-835.26***	(-935.78, -734.75)
Year One strongly attached to the workforce (binary)	-0.035***	(-0.038, -0.031)
Year Two strongly attached to the workforce (binary)	-0.024***	(-0.027, -0.021)
Year Three strongly attached to the workforce (binary)	-0.023***	(-0.025, -0.020)
Year Four strongly attached to the workforce (binary)	-0.018***	(-0.020, -0.015)
Year Five strongly attached to the workforce (binary)	-0.016***	(-0.018, -0.014)
Year One wages strongly attached to the workforce	-1440.65***	(-1,685.47, -1,195.83)
Year Two wages strongly attached to the workforce	-1449.41***	(-1,755.90, -1,142.92)
Year Three wages strongly attached to the workforce	-959.46***	(-1,339.69, -579.23)
Year Four wages strongly attached to the workforce	-1046.45***	(-1,493.80, -599.11)
Year Five wages strongly attached to the workforce	-227.30	(-784.29, 329.69)

WOC with an associate degree had various experiences with the wage gap depending on their race. Native American women experienced the highest wage gap, starting at 27.2% one year after graduation and ending at 37.8% eight years after graduation. Asian women (from 5.2% at one year after graduation to 16.1% at nine years after graduation), Black women (from 18.5% at one year after graduation to 23.1% at six years after graduation), and multiracial women (from 18.3% at one year after graduation to 31.3% at six years after graduation) also experience increases in the wage gap. Hispanic women and Pacific Islander women saw a slight decrease in the wage gap, from 17.9% one year after graduation to 11.5% ten years after graduation and 23.9% at one year after graduation to 18.8% six years after graduation, respectively.

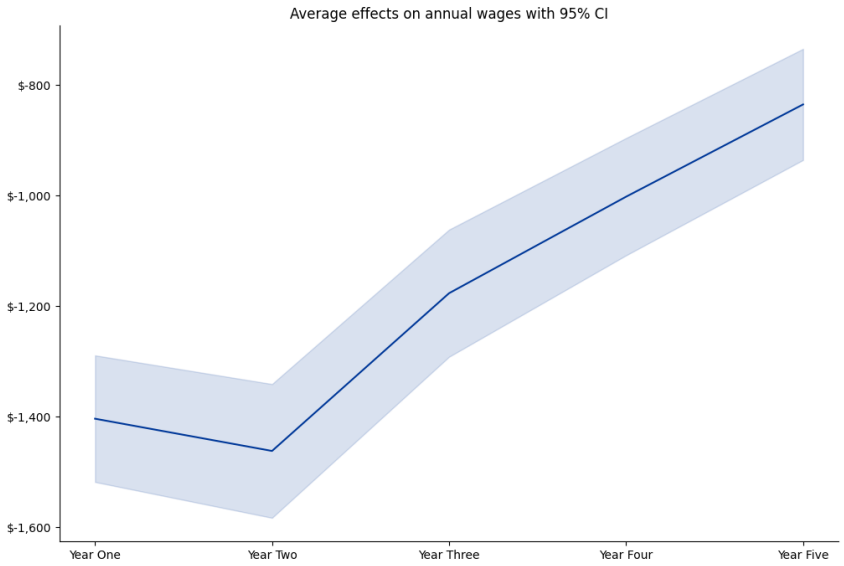

Figure 5: ATEs of charter high school attendance on annual wages for students who had wages after leaving education. This figure includes any instance of wages for students with wage records within the year, regardless of the amount.

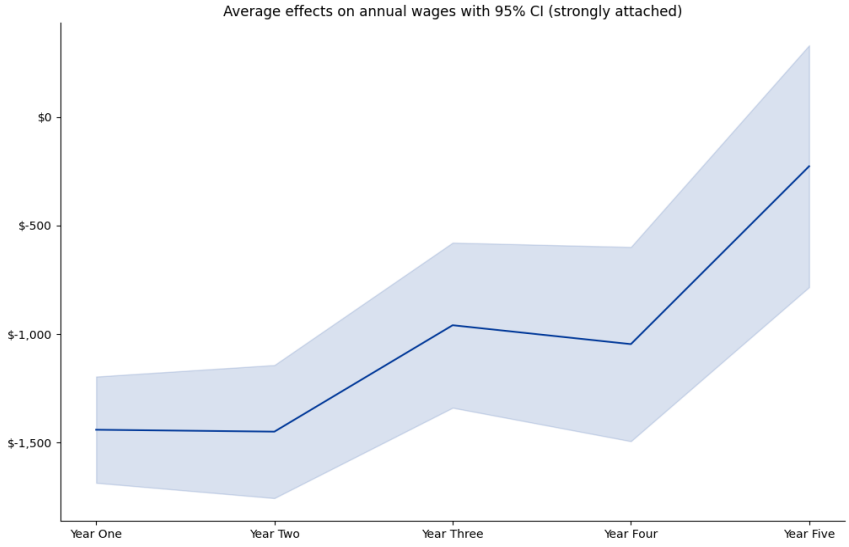

Figure 6: ATEs of charter high school attendance on annual wages for students who were strongly attached to the workforce after leaving education. This figure includes only students who earned at least the full-time approximation, defined in section 2.1, each quarter, for all four quarters of the year.

4 | Discussion

This study examined 426,095 unique USBE students from cohort years 2012 to 2021. It classified a student as a charter school student if they attended at least one charter school between grades 9 and 12. This study also considered the number of days a student attended a charter high school as a continuous variable (Appendix A). This study defined non-charter high school students, or the control group, as those who never attended a charter high school. Among the students in this study, 11.5% attended charter high schools, aligning with the percentages that NCES and SCSB reported (National Charter School Resource Center, n.d., Utah State Charter School Board, 2023).

The initial inspection of the demographic backgrounds of USBE students revealed proportions similar to those reported in the USBE data for cohort years 2017-2021 (Utah State Board of Education, 2021). In Appendix B of the USBE 2021 Graduation Rates report, the top demographic groups from these years were white (73.9%) and Hispanic (17.5%). Tables 2 and 3 highlighted the trend of increasing underrepresented attendance in charter high schools over time. In 2012, 82.7% of charter high school students were white, compared to 73.0% in 2021. Hispanic students comprised 10.4% of charter high school students in 2012 compared to 17.9% in 2021, while students of color increased from 6.9% in 2012 to 9.1% in 2021. More male students (51.2%) than female students (48.8%) were in the total student population. However, the study found a slightly higher percentage of female students among those who attended charter high schools compared to those who never attended (Table 1). Underrepresented students, including immigrants, refugees, students with disabilities, ELL students, and low-income students, increasingly attended charter high schools (Table 3).

Changes in reporting requirements due to the COVID-19 pandemic resulted in artificially low percentages of low-income students for cohort years 2020 and 2021. Household income on free or reduced lunch applications typically determines low-income status. However, at the beginning of the COVID-19 pandemic in 2020, Utah schools provided free lunch to all K-12 students under a federal program that waived the need for applications, as part of broader federal and state relief efforts under the Coronavirus Aid, Relief, and Economic Security (CARES) Act, including the Elementary and Secondary School Emergency Relief (ESSER) Fund and other federal funding (Utah State Board of Education, 2024). Consequently, the reported percentages for these years do not accurately reflect students' and families' actual economic situations.

Past UDRC research has consistently indicated that underrepresented students, such as students with disabilities (Hill, 2023), students from low-income families (Tao, 2022), students from the most deprived areas (Fenn, 2021), and students who experience intergenerational poverty (Martinez, 2019), have faced significant challenges in postsecondary enrollment and completion. Charter high schools, which have increasingly served higher proportions of these underrepresented students, have demonstrated success in helping students progress in AP and CE credits (Table 4). A higher percentage of charter high school students earned AP credits, and, on average, they earned twice as many AP credits as their non-charter high school peers. Though fewer charter high school students earned CE credits, those who did, on average, earned twice as many CE credits as their non-charter high school peers.

However, these figures may not fully capture the complexities involved. Charter high schools, especially those without the resources of ECHSs, may not be able to provide a wide range of advanced coursework directly. Instead, charter high school students may take advanced classes through alternative arrangements, such as enrolling in courses that their charter high school does not provide or attending both their charter high school and a local high school. These alternative pathways suggest that while charter high school students appeared to be more prepared for postsecondary education in terms of AP and CE credit accumulation, they may have taken different pathways to earning these credits compared to their non-charter high school peers. Furthermore, charter high schools may partner with external organizations to offer extracurricular activities like sports, making comparisons of overall college readiness more complex. Policymakers should carefully consider these nuances when shaping education policies and allocating resources to ensure that students from underrepresented backgrounds continue to receive strong academic support, both in terms of advanced coursework and extracurricular opportunities, to foster their future success.

Grouping all students by their highest educational attainments, Table 5 presented the percentage of students who were non-high school graduates, high school graduates, and students with some college education but no degree. A higher percentage of charter high

school students were non-high school graduates and high school graduates compared to students who never attended a charter high school, while higher percentages of non-charter high school students had some college without a degree or received a USHE award. The contrast between AP and CE credits and the percentage of USBE students earning USHE awards suggests that well-prepared charter high school students may have chosen to attend private or out-of-state postsecondary institutions.

Among all charter high school students, 82.5% graduated from high school compared to 87.9% of non-charter high school students (Table 6). Among the high school graduates, 36.1% of charter high school students enrolled in at least one USHE institution, while 42.5% of non-charter high school students had at least one USHE enrollment. The USHE enrollment rate from Table 6 was comparable to the 45.7% first-year enrollment reported in the 2020 High School Feedback Report from USHE. The High School Feedback Report accounted for first-year enrollments at private postsecondary institutions such as Brigham Young University, as well as out-of-state enrollments. In contrast, this report excludes postsecondary enrollments at private or out-of-state institutions. Additionally, the 2020 High School Feedback Report showed that 3.7% of all high school graduates enrolled in out-of-state postsecondary institutions compared to 4.7% of charter school students with out-of-state enrollment (Utah System of Higher Education, 2020).

This study examined the average and standard deviation of the number of months between high school graduation and the first USHE institution enrollment. On average, charter high school students enrolled slightly sooner than non-charter high school students, with lower variability in timing (Table 7). Various factors, including differences in student support systems, college-going culture, or individual circumstances, may have influenced this difference. Once enrolled in a USHE institution, charter high school students had a lower average GPA than non-charter high school students, with slightly higher variability (Table 8). Further research may explore potential contributing factors, such as differences in curriculum, academic preparation, or support structures in charter high schools.

Among students who enrolled in USHE institutions, 24.6% of charter high school students received at least one USHE award, while 31.0% of non-charter high school students did (Table 9). On average, charter high school students graduated from USHE institutions about one month sooner than non-charter high school students (Table 10). One potential factor contributing to the lower USHE enrollment and graduation rates, despite higher AP and CE credits, is the possibility that some charter high school students chose private or out-of-state institutions instead. However, confirming this hypothesis requires additional data. Furthermore, ECHS students earned a higher average number of AP credits compared to students at other charter high schools (Table 4) and enrolled in USHE institutions more quickly than their peers (Table 7).

While a higher percentage of non-charter high school students earned associate degrees, higher percentages of charter high school students earned certificates requiring less than one year, certificates requiring one to two years, bachelor's degrees, and graduate degrees (Table 11). Various degree types require different numbers of credit hours. Table 12 shows how many months students spent from their first USHE enrollment to their first degree graduation. On average, charter high school students completed their degrees in fewer months across all degree types. Students earning certificates requiring less than one year and certificates requiring one to two years may take longer to complete them, potentially due to part-time enrollment or other factors. Various factors, including students' chosen fields, educational goals, and employment commitments, may shape differences in degree completion times and types.

Finally, a lower percentage of charter high school students joined Utah's workforce, and fewer maintained strong workforce attachment in the first five years after leaving education (Tables 13 and 14). Furthermore, charter high school students earned lower average annual wages than non-charter high school students (Figures 2 and 3). Among all students with strong workforce attachments, the difference in average annual wages narrowed from $1,519 one year after leaving education to $265 five years after leaving education. This reduction in difference may have resulted from accumulating work experience over time. The lower workforce participation rate among charter high school students may also suggest that many relocated to another state and, therefore, did not earn Utah wages. Various factors, including industry choices, career aspirations, and geographic mobility, may have shaped differences in wages and workforce participation.

To assess the association between attending at least one charter high school and various outcomes, this study employed the statistical technique of IPW to estimate effects while accounting for demographic differences. By assigning weights based on the inverse probability of attending a charter high school, this method balanced the comparison groups, allowing the study to attribute observed differences in outcomes more confidently to the treatment—charter high school attendance—rather than to confounding variables. Notably, the

models calculated propensity scores using only observed variables. Other factors, such as parents' educational attainment and additional support or mentorship students received, may have also influenced postsecondary and workforce outcomes. However, this study lacked data on these factors.

This study used IPW to estimate the ATE as defined in section 2.3. The ATE quantified charter high school attendance association with an outcome while accounting for differences in the probability of attending a charter high school. For a binary outcome variable, such as graduating from USHE, the ATE represented the average difference in the outcome between charter and non-charter high school students after adjusting for potential confounders. For example, if the calculated ATE is -0.062 for USHE graduation, the ATE indicates that, on average, students who attended a charter high school had a 6.2 percentage point lower likelihood of graduating from USHE compared to similar students who did not attend a charter high school, after adjusting for differences in attendance likelihood. Similarly, for a continuous outcome like GPA, an ATE of -0.139 suggests that, on average, charter high school attendance is associated with a 0.14 lower GPA compared to non-charter high school students, after accounting for selection differences.

Examining the ATEs that the models calculated (Table 15), the associations with postsecondary outcomes closely resembled the observed differences in USHE enrollment (-6.4%) in Table 6, USHE GPA (-0.15) in Table 8, USHE graduation (-6.4%) in Table 9, and months to the first USHE graduation (-1.6) in Table 10. However, the ATEs for workforce participation outcomes tend to be smaller than the observed workforce participation differences (Tables 13 and 14). The differences in average annual wages, as measured by ATEs, are also smaller than the observed wage gap between charter and non-charter high school students (Figures 2 and 3). For example, the ATE for having wages one year after leaving education was -0.005 or -0.5% (Table 15), while the observed employment rate difference was -7.0% (Table 13). This observation suggests that while the observed postsecondary outcomes align with the statistical model estimates after adjusting for demographic variables, differences in workforce outcomes may result from factors that this study did not account for.

The analysis indicates that attending a charter high school is associated with lower postsecondary enrollment and graduation rates. Specifically, students who attend charter high schools have a 6.2% lower probability of enrolling in USHE institutions and a 6.1% lower probability of graduating (Table 15). While this finding suggests differences in postsecondary pathways between charter and non-charter high school students, the AP and CE credits earned by charter high school students suggest that they may be pursuing private or out-of-state postsecondary institutions. The models show that charter high school attendance is associated with a 1% higher probability of earning AP credits before high school graduation and an average of 1.5 more AP credits than non-charter high school students. Although charter high school students have a lower probability of earning CE credits before high school graduation, they earn an average of 23.4 more CE credits than their non-charter high school peers. Additionally, the shorter time to enrollment and graduation among charter high school students who attended at least one USHE institution suggests differences in educational pacing. However, variations in long-term educational milestones indicate that additional factors may influence their postsecondary trajectories.

This study has identified an association between charter high school attendance and USHE GPA (-0.14), suggesting differences in academic outcomes compared to TPSs. This finding highlights the need for further exploration into factors influencing these differences, including curriculum structure, academic expectations, and available support systems. Future studies could investigate how both charter high schools and TPSs prepare students for postsecondary education and identify resources that may facilitate the transition of students into higher education.

Finally, charter high school attendance is associated with a decreased probability of strong workforce attachment by up to 3.5% in the first five years after leaving education. Additionally, the probability of strong workforce attachment appears to decrease over time. While these results suggest differences in workforce outcomes, it is also important to consider the increasing enrollment of underrepresented students in charter high schools, who may experience distinct factors influencing workforce participation. Wage data indicate that charter high school attendance is associated with lower wages in the first five years after leaving education. This difference remains among students with strong workforce attachment. Further research could explore factors contributing to these differences, such as industry demands and postsecondary pathways, to better understand how charter high school students navigate the job market.

This study's findings raise important questions about the role of charter high schools in Utah and their ability to provide students with an education that prepares them for postsecondary education

and the workforce. These findings have implications for educational policy and practice in Utah. Policymakers may consider evaluating how charter high schools are meeting their intended goals of providing innovative educational opportunities. The observed differences in postsecondary and workforce outcomes suggest that examining accountability measures and support systems could help charter high schools better address their students' diverse needs. Additionally, exploring how USHE institutions can attract and support charter high school graduates could help retain academic talent in Utah, potentially boosting the state's economic growth and development. Collaboration between charter high schools, policymakers, and educators may help identify strategies that support student success and improve long-term outcomes. By fostering a culture of continuous improvement and responsiveness to student needs, charter high schools in Utah can refine their approaches to education and workforce preparation.

4.1 | Future Research

While charter schools offer autonomy and opportunities for innovative educational approaches, this study highlights the importance of continuously evaluating their impact. The associations found in this study suggest that researchers should further explore how different educational environments shape students' long-term academic and career trajectories. Future research could expand on these findings by using diverse methodological approaches to gain a more comprehensive understanding of charter school outcomes.

A future study could leverage NCS data to track students who pursue postsecondary education outside of Utah and further examine the academic outcomes of those who attended charter high schools, particularly ECHSs. In this study, the majority of charter high school students, 85.4%, did not attend an ECHS (Appendix B). Additionally, future research could incorporate CIP data on USHE graduates to better understand how different academic pathways influence student outcomes.

This study did not have access to data on students' mentorship and support. Parents' educational attainment could contribute to students' postsecondary achievements (Ardila, Rosselli, Matute, & Guajardo, 2005; Perna & Titus, 2005). Family expectations and the environment in which students grew up may also have shaped their decisions to pursue postsecondary education. Additionally, research suggests that family emotional support can influence student success (Roksa & Kinsley, 2019). Parents may choose to enroll their children in charter schools based on their expectations of these institutions. Future research could explore the relationship between parents' educational attainment and student outcomes for both charter and non-charter school students, the potential effects of self-selection in school choice, and the role of parent and community engagement in charter schools and its relationship to student academic performance and postsecondary pathways.

This study defined charter school students based on attendance from grade 9 to grade 12. Future research could examine how attending a charter school in earlier years influences students' social and emotional development, including factors such as self-esteem, resilience, and interpersonal skills.

The percentage of underrepresented students in charter high schools has increased over time. Future research could explore subgroup differences to understand how charter high school experiences vary across demographic groups, such as students with disabilities, ELL students, and those from low-income families. Additionally, examining the factors influencing these students' enrollment decisions could provide insights into how to better support their educational experiences.

A qualitative approach can shed light on how the school climate and culture in charter high schools influence student motivation, behavior, and academic experiences. Additionally, qualitative research could examine how students and educators perceive the use of technology and innovative teaching practices in terms of engagement and learning.

From a policy perspective, future research could examine the costs and benefits of charter schools by comparing average expenditures between charter schools and TPSs, as well as analyzing the economic trajectories of students from each type of school. Additionally, studies could investigate differences in funding, resources, and support structures between charter schools and TPSs to better understand their potential associations with student experiences and outcomes. Furthermore, research could assess various educational models within charter schools (e.g., STEM-focused vs. arts-focused) to determine how they align with different measures of student success.

Future studies could offer a more comprehensive understanding of the diverse experiences and outcomes associated with charter schools, contribute to discussions about their role in the education system, and provide insights that may inform educational policy and practice.

5 | Conclusion

This study follows USBE students from cohort years 2012 to 2021 between grades 9 and 12, examining differences in postsecondary and

workforce outcomes between those who attended at least one charter high school and those who never attended a charter high school. Over time, a growing percentage of underrepresented students have enrolled in charter high schools. Using linked USBE, USHE, and DWS data, the descriptive analysis indicates lower high school graduation rates, USHE enrollment rates, and USHE graduation rates among students who attended charter high schools. Additionally, charter high school students tend to have lower average USHE GPAs and earn less, on average, in the workforce than their non-charter counterparts.

By employing the statistical technique Inverse Probability Weighting, this study estimates the Average Treatment Effects of charter high school attendance. The results suggest that attending a charter high school is associated with a 6.2% lower probability of postsecondary enrollment and a 6.1% lower probability of postsecondary graduation. Additionally, charter high school attendees tend to have a USHE GPA that is lower by 0.14, and lower workforce participation and annual wages. The models also indicate that charter high school attendance is linked to enrolling in postsecondary education 0.8 months sooner and graduating two months earlier from USHE institutions, which may reflect differences in student pathways and educational experiences.

In conclusion, this study's findings highlight the value of continued research and evaluation to inform evidence-based practices and policies to support the academic and career pathways of charter high school students in Utah. Charter schools contribute to the educational landscape and can further support student outcomes by addressing identified challenges and implementing effective practices.

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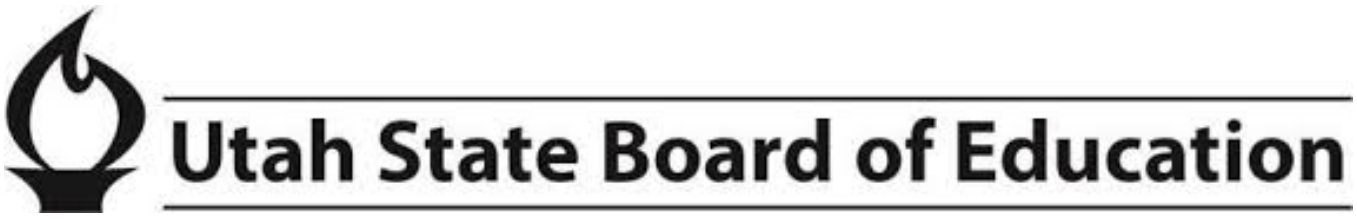
Data Partners



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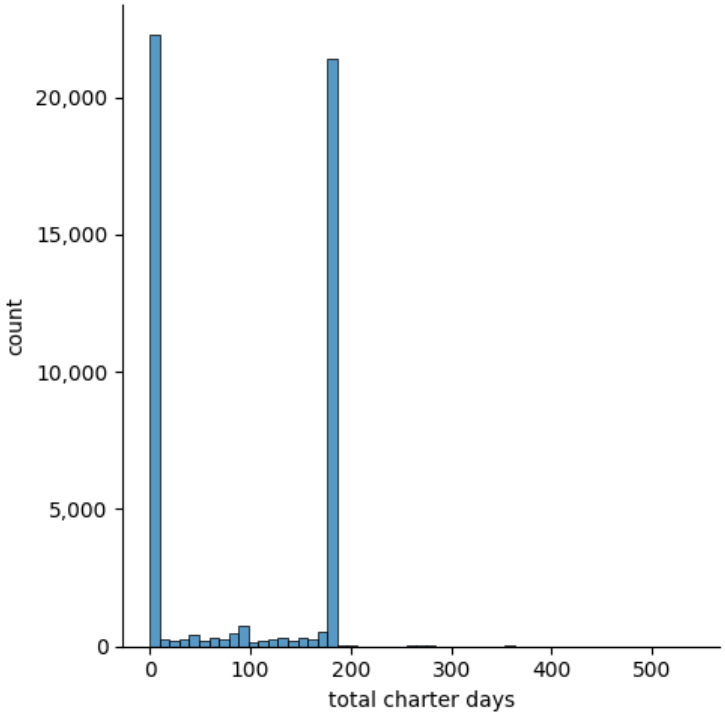
Appendix Supplementary Information A

The analysis considered students' total days of enrollment in a charter high school as a continuous variable. In Utah, an academic year typically includes 180 instructional days (U.S. Department of Education, National Center for Education Statistics, 2014), which provided a reference point for interpreting the enrollment data. Appendix Figure A illustrates the distribution of students based on their enrollment duration in charter high schools.



Appendix Figure A: Histogram of total number of charter school days from grades 9 to 12.

The graph displays four peaks, which likely correspond to students who attended a charter high school for one, two, three, or all four years. Students are grouped by the total number of days they attended charter high schools.

Appendix Table A: Distribution of students according to the number of days in charter high schools. N=49,091.

Days in charter high schools	Number of students	% of students
<200	21,782	44.4%
200-400	10,026	20.4%
400-600	9,107	18.6%
600+	8,176	16.7%

Among the four groups, students with fewer than 200 days in a charter high school account for a substantial portion. Appendix Figure A illustrates a similar pattern. Additionally, Appendix Table B provides a comparison of educational outcomes across these four student groups.

Appendix Table B indicates a trend of fewer students failing to graduate as they spent more time enrolled in charter high schools. Fewer than 7% of students who attended charter high schools for more than 600 days failed to complete high school. A relatively small percentage of students in this group enrolled at USHE institutions, according to the data. These students may have chosen to enroll in private or out-of-state institutions, similar to ECHS students. As a result, this study did not explore a linear relationship between the number of days in charter high schools and the educational outcomes.

Appendix Table B: Highest educational attainment by the number of charter high school days.

Education Attainment	% students with <200 days in charter high schools	% students with 200-400 days in charter high schools	% students with 400-600 days in charter high schools	% students with 600+ days in charter high schools
Non-high school graduate	23.8%	18.7%	9.2%	6.4%
High school graduate, no USHE enrollment	45.0%	46.3%	54.2%	68.7%
Some college, no degree	24.7%	27.3%	29.5%	21.8%
Certificate (less than one year)	0.2%	0.2%	0.2%	0.1%
Certificate (one to two years)	0.5%	0.5%	0.6%	0.4%
Associate degree	2.7%	2.8%	2.2%	1.4%
Bachelor's degree	3.0%	3.9%	3.9%	1.2%
Graduate Degree	0.2%	0.2%	0.1%	0.0%

Appendix Supplementary Information B

ECHSs are designed to provide students with opportunities to earn college credits while still in high school, setting them on a path toward higher education and potentially better career prospects. These schools have a distinct emphasis on rigorous academic programs and preparing students for postsecondary education and future success. Utah has six ECHSs partnered with seven higher education institutions, offering a combination of traditional high school courses, Concurrent Enrollment, and Early College classes. Many students graduate with an associate degree, with tuition covered as part of their public education. Students must meet college-level course requirements. With academic and social support, ECHSs foster a collaborative learning environment that assists students in their transition to higher education (Utah State Board of Education, n.d.).

Media coverage frequently highlights the experiences and outcomes of ECHSs, focusing on their high postsecondary enrollment rates, scholarship awards, and academic performance. These reports help solidify their reputation as exemplary charter schools. In addition, ECHSs were among the first charter schools established in Utah. Their early presence and subsequent success made them a visible model of what charter schools could achieve. As a result, they have left a lasting impression on the state's public perception of charter schools.

Nevertheless, among the 126 charter schools in Utah, only six (4.8%) are ECHSs (Utah State Board of Education, n.d.). They are listed below:

- Academy for Math, Engineering and Science (AMES)
- Intech Collegiate High School
- Itineris Early College High School
- Northern Utah Academy for Math, Engineering and Science (NUAMES)
- Success Academy
- Utah County Academy of Sciences

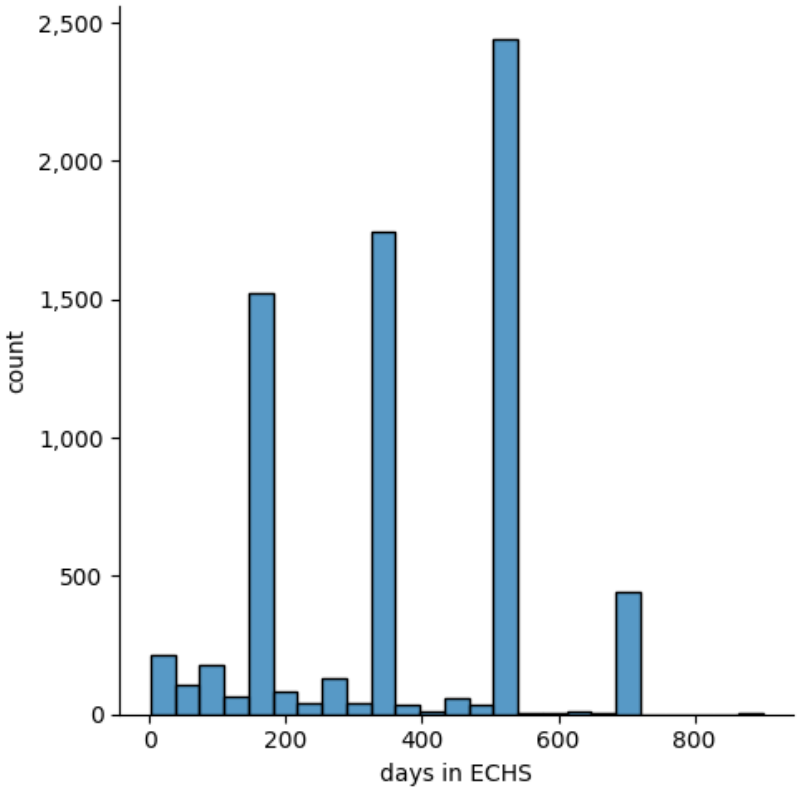
A lottery system determines admission to an ECHS for grades 9-11, ensuring a randomized selection process. However, because parents or guardians must apply for admission, some level of self-selection may take place among applicants. Families who choose to apply may have varying levels of motivation or access to information, which could influence the characteristics of the student population. Additionally, some families may encounter costs related to college coursework, such as textbooks or other associated expenses related to earning college credits. Given these factors, differences in student background and support systems may exist between ECHSs and TPSs. This portion of the appendix focuses on students who attended any of these schools.

Appendix Table C: Number and percentage of charter high school students by the number of years in ECHSs. N=49,091.

Years in ECHS	# of students	% students
0	41,923	85.4%
1	2,070	4.2%
2	2,049	4.2%
3	2,578	5.3%
4	471	1.0%

Most charter high school students, 85.4%, never attended an ECHS. This context provides additional insight when examining charter high school enrollment patterns. Appendix Figure B presents a histogram illustrating the number of days students spent in an ECHS, considering only those with ECHS enrollment.

The peaks in the data suggest that students may have attended an ECHS for one, two, three, or four years. This analysis categorizes students by the total number of days they attended an ECHS.



Appendix Figure B: Histogram of the total number of ECHS days from grades 9 to 12. N = 7,168.

Appendix Table D: Number and percentage of ECHS students by the number of days in ECHSs. N = 7,168.

Days in ECHSs	# of students	% students
<200	2,160	30.1%
200-400	1,996	27.8%
400-600	2,552	35.6%
600+	460	6.4%

This study includes 426,095 USBE students, of whom 460, or approximately 0.001%, attended ECHSs for 600 days or more, which corresponds to four years. This group represents a small proportion of the overall student population.

Appendix Table E: Highest educational attainment by the number of ECHS days. N = 7,168.

Education Attainment	<200	200-400	400-600	600+
Non-high school graduate	8.5%	3.5%	1.0%	2.6%
High school graduate, no USHE enrollment	35.4%	37.8%	35.0%	69.6%
Some college, no degree	36.3%	42.4%	53.7%	27.6%
Certificate (less than one year)	--	--	--	--
Certificate (one to two years)	0.6%	0.7%	--	--
Associate degree	5.4%	5.2%	3.0%	--
Bachelor's degree	12.9%	9.7%	6.7%	--
Graduate degree	0.9%	0.6%	0.2%	--

Note: -- denotes insufficient sample size

Among students who attended an ECHS for at least 200 days, presumably one school year, only 3.5% or fewer did not graduate from high school, a lower rate than the 17.5% observed among the overall USBE student population (Table 5). However, the percentages receiving USHE awards remain similar to those in Table 11. This pattern appears among students who attended an ECHS for 600 or more days, suggesting that some may have pursued private or out-of-state postsecondary options, though confirming this trend requires additional data. This pattern aligns with findings from Appendix Supplementary Information A, which indicate that postsecondary outcomes in Utah do not consistently increase or decrease based on the number of days students spend in charter high schools or ECHSs.

Appendix Supplementary Information C

A small percentage of students earned AP credits (Table 4): 1.4% of all students, 1.3% of non-charter high school students, 2.3% of charter high school students, and 11.8% of ECHS students (Table 4). Although a higher percentage of students earned CE credits, the median remains 0 in most cases because more than half of the students did not earn these credits. This portion of the appendix reports the AP and CE credits summary for students who earned at least one AP or CE credit, respectively. Appendix Table F provides the interquartile range (IQR) and median summary, while Appendix Table G provides the IQR and the median for students earning CE credits.

Appendix Table F: Median and IQR summary of AP credits earned for students with at least one AP credit. N_all_students=426,095; N_noncharter=377,004; N_charter=49,091; N_ECHS=7,168.

	All students	Never attended a charter high school	Ever attended at least one charter high school	Ever attended at least one ECHS
25%	60.0	60.0	60.0	60.0
50% (median)	60.0	60.0	60.0	60.0
75%	120.0	120.0	120.0	120.0
IQR	60.0	60.0	60.0	60.0

Appendix Table G: Median and IQR summary of CE credits earned. N_all_students=426,095; N_noncharter=377,004; N_charter=49,091; N_ECHS=7,168.

	All students	Never attended a charter high school	Ever attended at least one charter high school	Ever attended at least one ECHS
25%	30.0	30.0	40.0	60.0
50% (median)	60.0	60.0	70.0	90.0
75%	90.0	80.0	120.0	460.0
IQR	60.0	50.0	80.0	400.0

Appendix Supplementary Information D

Among the 126 charter schools in Utah, six (4.8%) function as online schools (Utah State Charter School Board, 2023). This section of the appendix analyzes the educational outcomes of students who attended at least one online charter school. The online schools are:

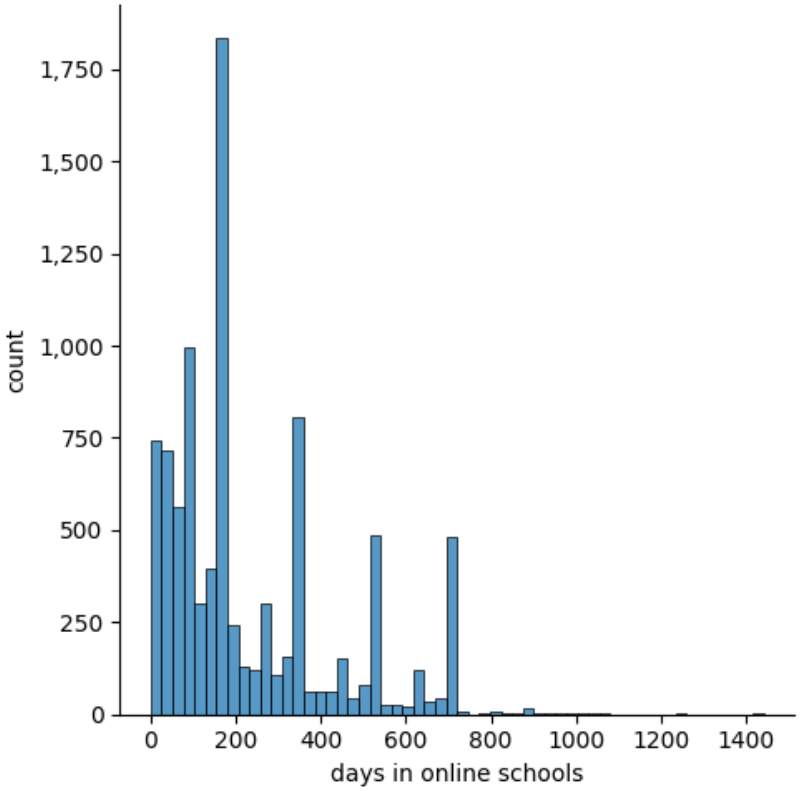
- Utah Virtual Academy
- Mountain Heights Academy
- Utah Connections Academy
- Lumen Scholar Institute
- Athenian eAcademy
- Leadership Academy of Utah

Appendix Table H presents the proportion of students based on the number of years they attended at least one online school. This analysis defines a student as having attended an online school if they were enrolled for at least one day.

Appendix Table H: Number and percentage of charter high school students by the number of years in online charter schools. N=49,091.

Years in online charter schools	# of students	% students
0	39,952	81.4%
1	5,356	10.9%
2	2,045	4.2%
3	983	2.0%
4	755	1.5%

Most charter high school students, 81.4%, did not enroll in an online school between grades 9 and 12. Appendix Figure C presents a histogram that shows the distribution of students based on the number of days they attended an online charter school, including students who enrolled for at least one day.



Appendix Figure C: Histogram of the total number of online school days from grades 9 to 12 for those with at least one day in an online charter school. N=9,139.

The first peak in Appendix Figure C represents students who spent only a few days in an online charter school. Additional peaks seem to align with students attending for approximately one year, two years, three years, or more. For consistency, this analysis groups students similarly to those in ECHSs.

Appendix Table I: Number and percentage of online charter school students by the number of days in online charter schools. N=9,139.

Days in online charter schools	# of students	% students
<200	5,760	63.0%
200-400	1,726	18.9%
400-600	915	10.0%
600+	738	8.1%

Appendix Table J: Highest educational attainment by the number of online charter school days. N=9,139.

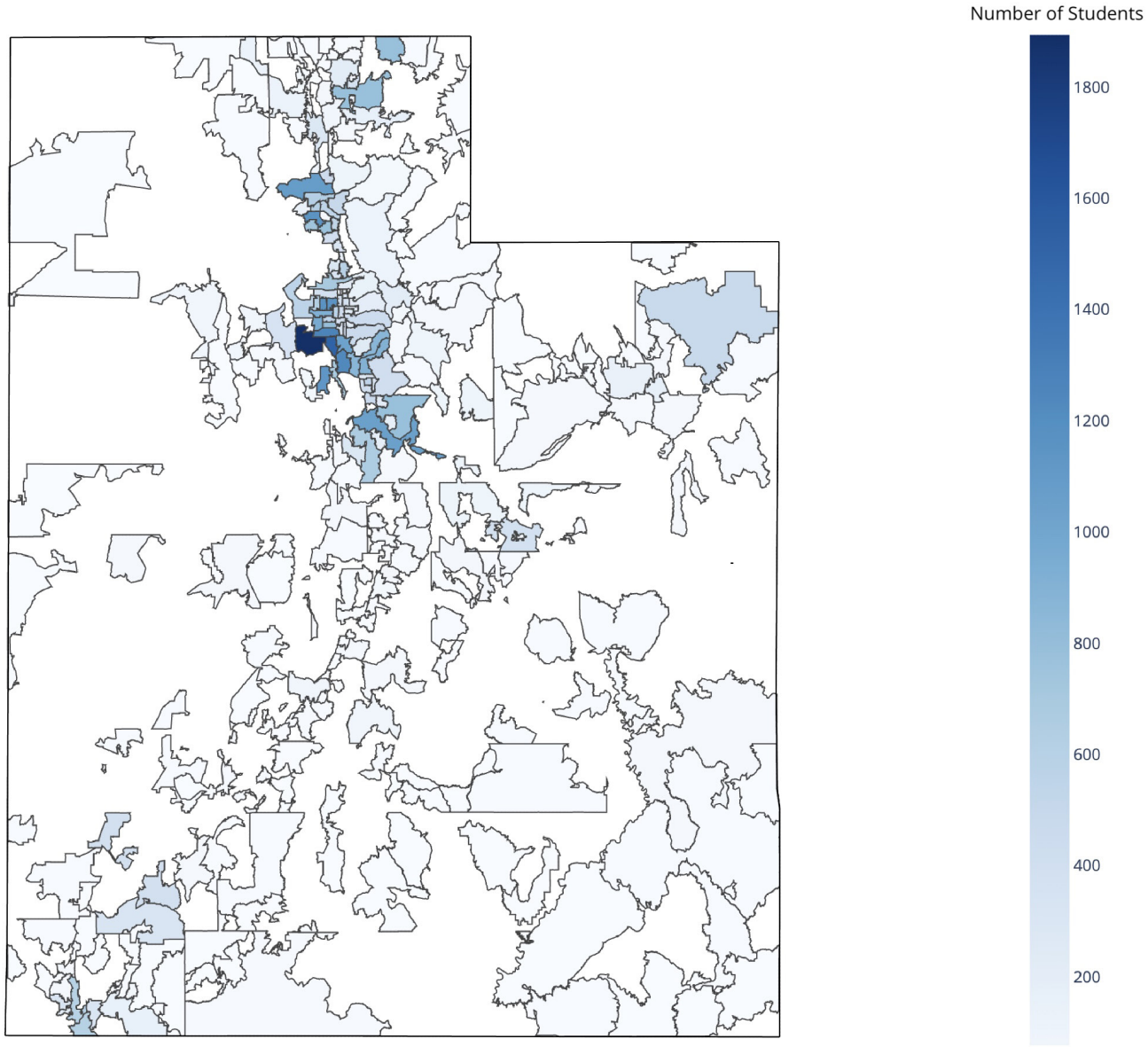
Education Attainment	<200	200-400	400-600	600+
Non-high school graduate	41.5%	32.9%	21.0%	14.8%
High school graduate, no USHE enrollment	40.7%	48.4%	63.2%	73.7%
Some college, no degree	15.5%	15.8%	13.8%	9.6%
Certificate (less than one year)	--	--	--	--
Certificate (one to two years)	0.3%	--	--	--
Associate degree	1.0%	1.6%	--	1.4%
Bachelor's degree	1.0%	0.9%	--	--
Graduate degree	--	--	--	--

Note: -- denotes insufficient sample size

Students who spent more time in online charter schools were less likely to leave high school without graduating. Those who attended for 600 or more days graduated at a higher rate than the overall charter school population (Table 5). These students receive USHE awards at a rate similar to the figures in Table 5. A similar pattern appears among ECHS students, suggesting that some may have enrolled in private or out-of-state institutions after high school. This observation aligns with the results from Appendix Supplementary Information A and B, indicating that the relationship between time spent in online charter schools and postsecondary outcomes in Utah does not follow a simple linear pattern.

Appendix Supplementary Information E

This study collected zip codes of students who attended at least one charter high school. It identified the most frequently reported zip code for each student. Appendix Figure D presents the number of unique students in each zip code who attended at least one charter high school. The five zip codes with the highest student representation are 84096 (Herriman), 84065 (Riverton), 84095 (South Jordan), 84043 (Lehi), and 84120 (West Valley City). These zip codes collectively represent 14.4% of the charter high school students in this study.



Appendix Figure D: Choropleth map of charter high school students in Utah. N=49,091.

This study aggregates charter school locations at the city level rather than the zip code level because the number of charter schools is much smaller than the number of students. The five cities with the highest number of charter schools are Salt Lake City, West Valley City, Ogden, West Jordan, and Draper. These cities contain 29.2% of charter schools in Utah.

Appendix Supplementary Information F

This study uses DWS wage data for USBE students to analyze workforce participation patterns and average annual wages. Because this study includes students up to the 2021 USBE cohort, some individuals may not yet be in the workforce due to ongoing postsecondary education. The latest available wage data extends through the fourth quarter of 2021, meaning relatively few students have a full ten years of wage records following postsecondary completion. Even for the 2012 USBE cohort, the available timeframe does not allow for ten full years of wage data, considering typical enrollment durations for USHE institutions. Appendix Tables K and L provide a complete view of the data distribution for six to 10 years after leaving the education system, while Tables 13–14 present workforce participation outcomes for the first five years after leaving the education system.

Appendix Table K: Percentage of students with wages after leaving education. N_all_students=426,095; N_noncharter=377,004; N_charter=49,091.

	All students	Charter high School Students	Non-charter high school students
Year 6	7.0%	5.1%	7.3%
Year 7	4.6%	2.9%	4.8%
Year 8	2.7%	1.4%	2.8%
Year 9	1.3%	0.7%	1.4%
Year 10	0.4%	0.2%	0.4%

Note: Appendix Table K includes any instance of wages if students had wage records within the year, regardless of the amount.

Appendix Table L: Percentage of students strongly attached to the workforce after leaving education. N_all_students=426,095; N_noncharter=377,004; N_charter=49,091.

	All students	Charter high School Students	Non-charter high school students
Year 6	2.6%	1.6%	2.7%
Year 7	1.6%	0.8%	1.7%
Year 8	0.9%	0.4%	0.9%
Year 9	0.3%	0.1%	0.3%
Year 10	0.0%	0.0%	0.0%

Note: Appendix Table L includes only students who earned at least the full-time approximation, defined in section 2.1, each quarter, for all four quarters of the year.

Workforce participation and long-term workforce attachment among USBE students in this study were recorded at relatively low rates six to 10 years after leaving education. Given these data limitations, the analysis focuses on workforce outcomes for up to five years after students leave education.

Appendix Supplementary Information G

Appendix Table M: Average annual wages for those with wages after leaving education.

	All students	Never attended a charter high school	Ever attended at least one charter high school
Year 1	$16,541	$16,700	$15,118
Year 2	$18,166	$18,324	$16,729
Year 3	$20,687	$20,844	$19,182
Year 4	$22,028	$22,175	$20,586
Year 5	$23,487	$23,598	$22,340

Note: Appendix Table M includes any instance of wages for students with wage records within the year, regardless of the amount.

Appendix Table N: Average annual wages for those strongly attached to the workforce after leaving education.

	All students	Never attended a charter high school	Ever attended at least one charter high school
Year 1	$34,269	$34,402	$32,883
Year 2	$36,849	$36,995	$35,347
Year 3	$37,883	$37,971	$36,941
Year 4	$38,853	$38,943	$37,882
Year 5	$39,963	$39,985	$39,720

Note: Appendix Table N includes only students who earned at least the full-time approximation, defined in section 2.1, each quarter, for all four quarters of the year

Appendix Supplementary Information H

Appendix Table O: Change in percentage of all USBE high school students by race/ethnicity over time.

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
White	78.7%	78.2%	78.0%	77.8%	76.8%	76.2%	75.7%	74.7%	74.0%	73.8%
Hispanic	14.4%	14.6%	14.7%	14.9%	15.6%	15.9%	16.3%	17.1%	17.8%	17.9%
Students of Color	7.0%	7.2%	7.3%	7.3%	7.6%	7.9%	8.0%	8.2%	8.2%	8.3%

Appendix Supplementary Information I

Appendix Table P: Standard errors and t-statistics of attending charter high schools on postsecondary and workforce outcomes.

Outcome Variable	standard error	t-statistics
AP credits earner (binary)	0	25.142
CE credits earner (binary)	0.001	-18.396
AP credits earned	0.078	18.563
CE credits earned	0.3	78.161
Postsecondary enrolled (binary)	0.001	-42.708
Months to postsecondary enrollment	0.067	-11.825
USHE GPA	0.006	-0.022
Postsecondary graduate (binary)	0.002	-27.352
Months to postsecondary graduation	0.179	-11.039
Year One having wages (binary)	0.001	-3.767
Year Two having wages (binary)	0.002	-11.575
Year Three having wages (binary)	0.002	-14.485
Year Four having wages (binary)	0.002	-15.688
Year Five having wages (binary)	0.002	-18.081
Year One wages	58.42	-24.028
Year Two wages	61.73	-23.683
Year Three wages	58.68	-20.052
Year Four wages	54.13	-18.514
Year Five wages	51.28	-16.287
Year One strongly attached to the workforce (binary)	0.002	-20.724
Year Two strongly attached to the workforce (binary)	0.002	-15.764
Year Three strongly attached to the workforce (binary)	0.001	-17.184
Year Four strongly attached to the workforce (binary)	0.001	-15.068
Year Five strongly attached to the workforce (binary)	0.001	-16.815
Year One wages strongly attached to the workforce	124.91	-11.534
Year Two wages strongly attached to the workforce	156.37	-9.269
Year Three wages strongly attached to the workforce	193.99	-4.946
Year Four wages strongly attached to the workforce	228.23	-4.585
Year Five wages strongly attached to the workforce	284.16	-0.800