UTAH DATA RESEARCH CENTER

Workforce Outcomes for Utah Associate Degree Recipients

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Abstract

Research shows that receiving a post secondary education raises wages for graduates. While there has been a lot of research analyzing bachelor's degrees or higher, there is an absence of research on associate degrees, and more particularly, Associate of Applied Sciences (AAS) degrees. AAS degrees are for individuals who want to start in an entry-level position after graduating. AAS degrees differ from all other associate degrees which are meant to be used to further their education in a bachelor's or other post secondary degrees. This research follows associate degree recipients in 2014 from the Utah System of Higher Education (USHE) into the workforce. We compare AAS recipients to all other associate degree recipients as well as bachelor's degree recipients in terms of quarterly wages they received after graduating. The results show that bachelor's degree recipients make the most quarterly, followed by AAS recipients, then all other associate recipients.

Keywords

associate degrees, associate of applied sciences, transfer associate degrees, Utah System of Higher Education

1 | Introduction

1.1 | Background/Intro

Attending post secondary school has many benefits; individuals who attended college, regardless if they received a certificate, have higher median earnings and a lower unemployment rate compared to individuals whose highest educational attainment is high school (BLS, 2021). While most research on post secondary outcomes focuses on bachelor's degrees, a lot of the findings are applicable to associate degree recipients as well, albeit not at the same rates. For example, both associates and bachelor's recipients earn higher weekly wages than their high school graduates counterparts (BLS, 2017). However, most research that does include associate degree recipients does not separate associate degrees from other types of undergraduate degrees or certificates, therefore, the value of different types of associate degrees in the workforce is often not well understood.

Associate degrees from the Utah System of Higher Education (USHE) institutions can be separated into two different types: associate of applied sciences (AAS) and transfer associate degrees. AAS degrees are designed to prepare individuals for a career as such these degrees have specific occupational programs such as welding, accounting, etc. AAS degrees are for individuals who want to start an entry-level position after graduating. Transfer associate degrees are for individuals who intend to continue their education after completing the program, these degrees include associate of science (AS) and associate of arts (AA) (Salt Lake Community College).

Because of these labor market differences in associate degree types, research that groups them in a single "Associates" category will not capture differences in workforce outcomes. If one type of degree focuses on helping an individual start a career right after receiving it (AAS), while another is designed to continue education into a bachelor's program (AS or AA), it follows to hypothesize that AAS recipients will have higher wages than transfer associates (AA/AS) after graduating.

The primary objective of this research is to understand the differences in wages after graduation between the different types of associate degrees. Bachelor's degree earnings post-graduation are included as a reference in some analyses. The specific research objectives for the paper are as follows: 1) analyze the trend in wages that AAS and transfer associate degree recipients experienced pre and post-graduation, 2) compare the demographic composition of the two associate degree types, 3) analyze the difference in wages that AAS and transfer associate degree recipients experienced between their first year after graduating and their fifth, 4) analyze wages for the top fields of study that degree recipients earn, and 5) compare the distribution of the North American Industry Classification System (NAICS) for AAS and transfer associate degree recipients. Bachelor's degree earnings and outcomes are included in some analyses for reference.

1.2 | Literature Review

Research shows that post secondary graduates have higher earnings and better job security (BLS, 2021). However, while it is beneficial and understandable for researchers to focus mainly on bachelor's degrees, there is a lack of research on associate degree recipients. It is not uncommon for studies to group associate degree recipients with individuals who fall under the categories of "some college, no degree", which is not representative of the specific outcomes associate recipients experience.

Associate degrees are unique in that associate degree types are optimized for different purposes. If individuals want to continue their education and complete a four-year degree or higher, they should complete an AA, AS, or another transferable associate degree. In comparison, if an individual intends on exiting college and beginning a career after receiving their degree, an AAS degree will suit them better (Salt Lake Community College). Earners of different types of associate degrees likely experience different workforce outcomes: an AAS recipient may earn higher wages due to their specialization in a given field, i.e. welding or nursing. Transfer associate recipients, should they enter the workforce, may earn lower wages relative to AAS recipients due to the lack of occupational specialization.

A difference in post-graduation wages between associate degree types has been found in research conducted in other states. For example, researchers from Colorado examined associate degree recipients and found that AAS degrees earn more than AA/AS degrees by a significant margin. The research found that AAS degrees earn more than $18,000/year compared to AA/AS graduates when comparing their wages one year after graduating. This gap narrows at the 10-year mark though the difference is still about $12,000/year. The research goes on to compare the differences in wages between AAS degrees and bachelor's degree recipients. The results found that when comparing AAS to bachelor's degree recipients the AAS recipients are making $8,000 more in the first year. This discrepancy does disappear at the 10-year mark when both AAS and bachelor's degreer ecipients earn approximately the same wage

(Schneider, 2015a).

While the research from Colorado shows AAS degrees to be comparable in wages to bachelor's degree completers, research in Florida contrasts those findings. The researchers analyzed the median wages one and five years after graduating for numerous types of degrees including AAS, AS, AA, and bachelor's degrees. After one and five years after graduating, AAS degrees earned $34,724 and $45,496, respectively. AA recipients in their first year earned $28,704 while in their fifth year their income was $40,112, the lowest wages between the four degree types.AS recipients, in comparison, received the highest income of $44,436 in their first year and $53,272 in their fifth. Bachelor's degree in their first year after graduating earned $43,584, about $850 less than their AS colleagues, while in their fifth year they earned $49,580, about $3,700 less than AS recipients (American Institutes for Research, 2019).

While degree types have been shown to impact the wages individuals earn, demographics are also correlated with earnings, especially gender, race, and ethnicity. According to research in Ohio, women who earned an associate degree had an average quarterly return of $2,014 while men experienced a return of $1,363, measured six years after enrolling in a post secondary institution (Minaya and Scott-Clayton, 2017). Similarly, in Kentucky, women saw an average quarterly return of $2,363, and men saw an increase of $1,484; in percent terms of their average earnings, the return was about 56% and 24% for women and men, respectively. These results were six years post-entry, the same as the study in Ohio (Jepsen, et al., 2014). It is important to note that these two studies did not make distinctions between transferable associate and AAS degrees, so the results are likely to be different in this study.

The other main demographic correlated with an individual's wages is their race or ethnicity. The National Center for Education Statistics (NCES) reported the median wages by educational attainment and race/ethnicity found that Black individuals with associate's degree had the lowest median wage at $30,400, while people who were two or more races had the highest median income at $45,000. White, Asian, and Hispanic full-time workers saw median wages of $39,700, $39,600, and $34,900, respectively. The Urban Education Institute had similar findings to the NCES when looking at ethnic differences and wages for the first year following the highest degree earned for individuals in Texas. Black and Hispanic individuals had the lowest wages at $34,000 each, while White and Asian individuals had wages of $39,000 and $38,000, respectively. While White and Asian individuals had wages of $39,000 and $38,000, respectively.
Finally, the last two areas this research focuses on are the programs that individuals graduate from and the industry they work in after graduating. Researchers from Ohio separated graduates by the top two programs for women and men, health and engineering, respectively, while all other programs were aggregated together. Both men and women earned higher wages in health; men saw a quarterly wage gain of $2,501 while women saw an increase of $3,460, though men ultimately earned more (Minaya and Scott-Clayton, 2017).
Associate recipients tend to be employed in a less diverse range of industries than other degree types. An analysis done in South Carolina found that associate degree holders or less had a large plurality of recipients in the Health Care and Social Assistance industry at about 44%. Bachelor's degrees, in comparison, were more diversified. Bachelor's recipients had about 19% in Health Care, 12% in education, and over 9% in both Professional, Scientific, and Technical Services as well as Administrative Support. This may be an indication that post-secondary education is allowing people to access higher wage and skill positions that otherwise would not have been available to them. Given that South Carolina did not distinguish between different associate degrees and included people who received less than an associate degree in the same category, it is likely that the distribution that Utah has will be quite different.

2 | Data

2.1 | Data Overview

The data used in this research paper were obtained from the Utah System of Higher Education (USHE). The data contained all students that graduated from a USHE institution in Utah in 2014 who obtained an associate of applied science (AAS), any other kind of transfer associate degree, such as AA or AS, or bachelor's degree. This analysis does not take into consideration certificates that students can receive from specific post-secondary USHE institutions. In 2014, there were 1,167 AAS graduates, 3,068 transfer associate graduates, and 15,059 bachelor's graduates. In total, there are 19,294 individuals included in this study.
The data from USHE also contained ethnicity, the institution a student graduated from, age at graduation, the classification of instruction programs (CIP) codes, and exit quarters from post-secondary education. The following analyses only include students who received their degree and entered the workforce, thus, if a student re-enrolled in an institution after receiving their degree, we omitted them from the analysis. If a student received numerous degrees in the same quarter, we used the first observation listed in the USHE data to prevent individuals from being included in the analysis multiple times.

We used data from the unemployment insurance (UI) system from Utah's Department of Workforce Services (DWS) to determine post-graduation wages. Most employers in Utah are required to report the wages their employees receive quarterly as part of their participation in the Unemployment Insurance system. If individuals worked numerous jobs throughout a given quarter, we aggregated the wages together. This data allows us to view quarterly wages for individuals from the first quarter of 2010 through the fourth quarter of 2019. To compare the wages across the observed time frame, we adjusted for inflation using the Consumer Price Index for All Urban Consumers (CPI-U) indexed to 2020 wages. The CPI-U measures the monthly prices for a basket of market goods and services that is based on urban consumers (BLS, 2018). Furthermore, the UI wage data provides us with each individual's industry of employment via the North American Industry Classification System (NAICS) code.

All of the analyses in this paper were performed in RStudio 1.4.1717 alongside the statistical package tidyverse.

2.2 | Data Limitations

The first major limitation of the data used in the analysis pertains to the UI wage record. Unfortunately, UI wage data does not have access to the number of hours that individuals worked in a given quarter, so we do not know whether or not the individuals included in this study were working full-time, while attending school, or after graduating. To overcome this limitation, we decided to indicate students who were "strongly attached to the workforce." We define someone who is strongly attached to the workforce as an individual with a UI wage no less than the wage for individuals who works 40 hours a week and earns the federal minimum wage of $7.25 per hour for all four quarters of the calendar year. For this research, if an individual had a quarterly income of less than $3,770 (7.25*40 hours per week *52 weeks per year/4 quarters) they would not be considered strongly attached to the workforce and would be removed from the analysis.

Second, while NAICS codes provide the industry that someone is working in, they do not indicate occupation. For instance, it is possible for someone who works as a janitor at a bank to receive the NAICS code for finance or a related sector.

Another limitation that this study faces is that the wage data from the UI system does not capture all income that an individual may receive in a quarter. UI data, for example, may not include income from self-employment, federal agencies, black market transactions, non-profit employment, and non-covered agriculture. Income from outside the workforce (i.e., dividends, real estate, etc.) is also not recorded. If income is obtained outside of Utah, it will not be captured by the UI data.

The data from USHE will only include individuals who received a degree in the 2014 cohort year, if a student received a degree before the observed years, it will not be captured in this study. Furthermore, the data we are using is for individuals who worked in Utah between the years 2010-and 2019 and individuals who attended post-secondary education in Utah. For instance, if a student left in 2013 for college and returned to Utah in 2017, the data would not include the education they received out of state and they would thus be excluded. Moreover, USHE data does not include private post-secondary institutions in Utah, such as Brigham Young University, Western Governors University, Ensign College, and Westminster College.

3 | Methodology

3.1 Difference in Wages

To compare quarterly wages of recent associate's recipients, we looked at the difference in wages for the first year and fifth. To analyze the change in wages Model 1 and Model 2 were used:

Model 1: $\Delta Y=\beta_0+\beta_1 (\Delta Women)+\varepsilon$

Model 2: $\Delta Y=\beta_0+\beta_1 (\Delta Women)+\beta_2 (\Delta Nonwhite)+\beta_4 (Age)+ \beta_4 (Age^2)+\varepsilon$

For both Models 1 and 2 ΔY is the difference between the quarterly wages of one and five years after graduating for each degree type; women is a binary variable where one indicated the individual was a woman, zero otherwise; non-White is a binary variable where one was set to equal to non-White individuals and zero otherwise; Age is the age of the individual when they graduated from a post-secondary degree; and Age^2 is the squared age for an individual in a given quarter. Age captures the relationship between age and wages while Age^2 allows for diminishing returns to age. To test the statistical significance of these covariates, and statistical significance for all other models in this research paper, significance has been set at $\alpha=0.05$.

3.2 CIP Model - Top CIP for Men and Women

Next, to estimate how the top two programs, health and business, impacted the quarterly wages for individuals, Model 3 was implemented.

Model 3:CIP Wages=Women+Degree+Nonwhite+ ε

Where CIP Wages is the quarterly earnings that an individual received based on the CIP they graduated with, women is a binary variable where one is equal to women and zero otherwise, degree is the degree that someone received, with transfer associate degrees being the reference group, and non-White is a binary variable where one indicates a non-White individual and zero otherwise.

3.3 Interaction Variables

Model 4 incorporates interaction variables to estimate whether the top two CIPs and AAS and bachelor's degree have an impact on quarterly wages. Interaction variables are when an explanatory variable interacts with another explanatory variable in the model. Interaction variables allow researchers to estimate the effect that two variables together may have on the dependent variable, called the response effect. The model that we are using that incorporates interaction variables is defined below:

Model 4: CIPWages=Gender+Nonwhite+(AAS*Health) +(Bachelor*Business)+ ε

The two interaction variables in the model are (AAS*Health) and (Bachelor's*Business). These two interaction variables were chosen because Health had the and Business were a large proportion of CIPS for both women and men.

3.4 CIP Model - Top 5 Associate Degree CIPs

The final model, Model 5, examines the difference in wages between the first year and fifth year after graduating for the top five CIPs for associate degree recipients only. Model 2 is similar to this model though it did not take into consideration the program an individual graduated from. It may be possible that individuals who are in programs such as business will earn more than individuals who only received an associate degree with their program of study being general studies. Model 5 takes the form:

Model 5: $\Delta Y=\beta 0+\beta 1$ (AAS)+ $\beta 2$ (Women)+$\beta 3$ (Nonwhite)+β_4 (Top CIPs)+$\beta 5$ (Age)+$\beta 6$ (Age2)+ε

Where ΔY is the change in wages from the first year after graduating and the fifth year after graduating; AAS is a categorical variable where one is an individual who received an AAS degree and zero for all other transfer associate degrees; women is a binary variable where one is for women and zero otherwise; Nonwhite is a binary variable where zero is someone who is white, one otherwise; Top CIPs is a categorical variable where one is equal to top 5 programs that students graduated from, zero is all other degrees; Age is the age of an individual in a quarter; Age^2 is the squared age of an individual in a given quarter.

4 | Results

Descriptive Statistics

There were 19,294 individuals included in this analysis; 1,167 were AAS recipients, 3,068 transfer associate recipients, and 15,059 bachelor's recipients. The median quarterly wages for each degree type in the fourth quarter of 2010, 2010Q4, (before earning a degree) were similar to one another. Before graduation, individuals who eventually received an AAS degree earned $6,412 while transfer associate and bachelor's degree earned $6,502 and $6,263, respectively. The difference between quarterly wages among degree types becomes significant in 2019Q4: AAS recipients received $13,446, transfer associate received $12,254, and bachelor's degree recipients earned $14,426.

To compare these median wages, the Wilcoxon ranked sum test was employed. The null hypothesis for this test is that the median wages were not significantly different. For 2010Q1, all tests resulted in $p > 0.05$, failing to reject the null hypothesis – the degrees did not make significantly different wages from one another. For 2019Q4, however, all tests resulted in $p < 0.05$, rejecting the null hypothesis – all degree types earned statistically significantly different wages–although the differences in earnings were economically significant.

Age

The median age AAS recipients were the oldest at graduation at 30, indicating that AAS recipients are more likely to be non-traditional, older students, while for bachelor's and transfer associate recipients the median ages were 26 and 25, respectively. The small age difference is surprising given that transfer associate degrees require around 60 credits while bachelor's degrees require 120. The difference in ages does not change much when considering gender; the median age for men and women AAS recipients was 30 and bachelor's was 26. The only age difference observed is between transfer associate recipients: women graduate two years earlier than men who earn the same degree. Some of this age difference may be explained by the ecclesiastical missions that men may go on if they are a part of The Church of Jesus Christ of Latter-Day Saints that lasts two years and one and a half

years for women. Men may serve a mission with the Church of Jesus Christ of Latter-Day Saints at age 18, while women must wait until they are 19.

Race

White individuals made up the majority of students for all degrees – more than 80% of the total students were White, although the distribution differed by degree. AAS and transfer associate degree recipients were similar in their proportion of White individuals at just under and over 84%, respectively. White individuals made up over 88% of those who earned a bachelor's degree.

White and non-White individuals experienced comparable wages to one another in 2010Q1. We implemented the Wilcoxon signed-rank test to determine if the median wages between White and non-White individuals were significantly different while controlling for the degree they eventually received. The null hypothesis for this test is whether the median wages experienced were statistically different. With a $p < 0.05$ the null hypothesis was rejected: the difference in incomes that White and non-White individuals received in 2010Q1 was statistically insignificant.

Five years after graduating, both White and non-White individuals experienced a substantial increase in their wages, though the increases were not equitable. White individuals' median wage increased by $7,030, $5,900, and $8,306 for AAS, transfer associate, and bachelor's recipients, respectively. Non-White individuals, in comparison, saw wage increases of $6,701 for AAS recipients, $4,784 for transfer associate recipients, and $7,114 for bachelor's degree recipients. Using the Wilcoxon ranked sum test to analyze median wages for White and non-White individuals by degree type, Non-White versus White individuals had statistically significantly different wages for each degree type in 2019Q4 (all $p < 0.05$).

Gender

Men made up the majority of graduates in this study at 51.62%, though men do not make up the majority of students in each degree type. AAS and transfer associate programs had a majority of women graduating with these degrees at 55.36% and 58.34%, respectively. Women were only 48.45% of all bachelor's graduates, however.

In 2010Q1, the largest difference in quarterly wages between men and women was for those who eventually earned AAS degrees, where men earned $7,382 and women earned $5,978. The smallest difference in wages was between transfer associate recipients where men and women earned $6,908 and $6,176, respectively. Men who earned bachelor's degrees had a quarterly wage of $6,550 while women had a wage of $6,176. Applying the Wilcoxon ranked sum test between men's and women's wages, men and women earned significantly higher wages in 2010Q1 (all degree types, $p < 0.05$).

Five years after graduating the wage difference between men and women grew. The difference in AAS wages is now the smallest difference between men and women - men earned $15,606 while women earned $12,000. Women who earned a transfer associate degree had a median quarterly income of $10,512, while men earned $4,214 more, making their quarterly earnings $14,726. The largest difference between men's and women's wages was between individuals who earned a bachelor's degree: men earned $17,238, almost $5,000 more than women who earned $12,414. Using the Wilcoxon ranked sum test to determine if 2019Q4 median wages by degree and gender were statistically significant from each other, men and women earned significantly different wages in 2019Q4 (all degree types, $p < 0.05$).

4.1 | Objective 1: Wage Trend Results

Figure 1 looks at the median quarterly wages for all AAS, transfer associate, and bachelor's degree recipients before and after they received their degree starting in the first quarter of 2010, 2010Q1, and ending in the fourth quarter of 2019, 2019Q4 (Fig. 1). Before graduating, quarterly wages between the three observed degree types were comparable. The quarter after students graduate, though, the

Table 1: Median Wage for White and Non-Whie Individuals, 2010 Quarter 1 and 2019 Quarter 4

	2010 Quarter 1			2019 Quarter 4		
	White	Non-White	P-Value	White	Non-White	P-Value
AAS	$6,458	$ 6,114	0.1141	$ 13,488	$ 12,815	0.036
Transfer Associate	$ 6,491	$ 6,604	0.6672	$ 11,388	$ 11,388	0.036
Bachelor's	$ 6,240	$ 6,364	0.6153	$ 13,478	$ 13,478	0.0001

Table 2: Median Wage for Men and Women, 2010 Quarter 1 and 2019 Quarter 4

	Men			Women		
	AAS	Transfer Associate	Bachelor's	AAS	Transfer Associate	Bachelor's
2010Q1 (pre-graduation	$7,382	$6,908	$6,550	$5,978	$6,176	$5,802
2019Q4 (post-grauation)	$15,606	$14,726	$17,238	$12,000	$10,512	$12,414

differences are more noticeable. AAS recipients experienced the largest quarterly wage growth of about $700, raising their income to $9,033. Transfer associate and bachelor's recipients saw their wages increase as well, though not by the same rate. Transfer associate recipients experienced the fewest increase in their wages of $100, earning $7,305 while bachelor's recipients saw an increase of about $400, giving them a quarterly income of $8,910. (Fig. 1).

By 2019Q4, while all degrees experienced quarterly wage growth, the increases were not equal. AAS recipients, now earning about $250 less than their bachelor's colleagues, earn $14,515. Transfer associate recipients also saw their earnings increase, though they were about $1,850 less than bachelor's degree recipients, at $13,145. Bachelor's recipients had the highest quarterly earnings at $14,764. Compared to their 2010Q1 quarterly wages, all degrees have experienced substantial wage growth.

While Figure 1 shows us that earning an AAS, transfer associate, or a bachelor's degree will increase an individual's income, it does not indicate whether differences in wages between demographic groups exist. Figures 2a and 2b compare the difference in wages between men and women concerning degree type. One quarter after graduating, men who received AAS had the highest quarterly earnings at $10,646, whereas men who transfer associate recipients earned $8,004 while bachelor's degree earned a quarterly income of $9,730. Women, in comparison, received significantly less: one quarter after graduating, AAS recipients had quarterly earnings of $8,008, transfer associate recipients received $6,492 quarterly wages, and bachelor's recipients had an income of $8,022.

Between their first quarter after graduating and 2019Q4, both men and women experienced wage growth, albeit with women earning far less than men. By 2019Q4, men who earned AAS received $18,754 in quarterly income while women AAS recipients earned $13,095. Likewise, men and women who received transfer associate degrees had the closest quarterly income at $14,873 and $11,648, respectively. Women bachelor's recipients earned $12,897, or $4,205 less than their male bachelor's recipients who earned $17,102.

Figures 2a and 2b above show wages going up for both men and women, albeit unequally. There were likely increases and differences for other groups as well, such as between White individuals and other racial/ethnic minorities. To analyze the potential divergence in quarterly wages, we separated individuals based on whether they were White or non-White and their gender. We attempted to look at quarterly wage trends for all ethnic groups separately due to Utah being predominantly White. Unfortunately, there were not enough observations for all ethnic minority groups. So, instead, we aggregated all non-White individuals. Figure 3 shows the pre-and post-wages for White and non-White males and females.

Figures 3a and 3c below look at the trend of quarterly wages that White and non-White men associate degree earners experienced from 2010Q1 to 2019Q4. Before entering college, White men were receiving higher wages, and it seems as though their incomes were more stable than their non-White colleagues. After graduating, though, the difference in wages becomes larger. White men with AAS degrees, the first quarter after graduating, received approximately $1,550 more than their non-White AAS colleagues, earning $10,307 and $8,739, respectively. The difference in wages between transfer associate degrees is similar: White graduates earned $10,144 while non-White individuals earned $8,773, a difference of more than $1,350. By 2019Q4, the differences in wages changed substantially between White and non-White men for each degree type. AAS White men had a quarterly income of $14,108, approximately $750 more than their non-White AAS counterparts who earned $13,353. White men who earned transfer associate degrees had the highest quarterly wage at $15,167, whereas non-White transfer associate recipients had an income of $12,634, or $2,533 less.

Figures 3b and 3d are for White and non-White, respectively. The quarterly earnings for non-White women were higher than White women's wages in the majority of quarters pre-graduation. Once they

graduated, though, AAS white women earned more than $7,967 while AAS non-White women earned $7,058. In comparison, non-White women who received a transfer associate degree earned more than White transfer associate recipients; in the first quarter after graduating: non-White women earned $7,387 while White women earned approximately $300 less, for a quarterly income of $7,094. By the end of the observation period, White AAS women were still earning more than their non-White colleagues though the difference shrunk to less than $400, or $10,935 and $10,558, respectively. Non-White transfer associate recipients also increased the difference in wages. By 2019Q4 non-White women were earning $11,242 while White transfer associate women were earning $10,120, a difference of over $1,100.

4.2 | Objective 2: Difference in Wages Results

To see if wages increased for graduates after receiving their degrees, we compared their quarterly income from the first year after graduating to the fifth year to determine if they were statistically different from one another. To measure these differences, we used Models 1 and 2.

Model 1, which only includes gender, shows that in every case, besides 2014Q3, the difference in wages from the first quarter out of college to the fifth year out of college between men and women is statistically significant ($p < 0.05$). The differences in the percent increase in wages are stark between the two genders: on average, women who earned AAS degrees grew only at 50.48% of the wage increases men observed. Further, still, transfer associate and bachelor's women only experienced 37.08% and 41.14%, respectively (Table 3).

Model 2 is similar to Model 1 though it adds the Non-White, Age, Age^2 variables to estimate whether there is a difference for non-White individuals and whether the age of the individual impacts their quarterly wage. The Age^2 variable measures whether or not there are diminishing returns to wages as an individual gets older. Table 3 shows that while gender is still statistically significant, non-White, Age, and Age^2 are not statistically significant in any of the cohorts we observed. The Non-White, Age, and Age^2 variables being statistically insignificant is perhaps because of the sample sizes for both variables. Non-White individuals only make up around 12% of the graduates in the data and the Age and Age^2 effects, or lack thereof, may be explained due to the younger age population being observed. Perhaps if we were looking at the entire labor force, these variables would have been more robust.

4.3 | Objective 3: CIP Models Results

To determine if the program an individual graduated

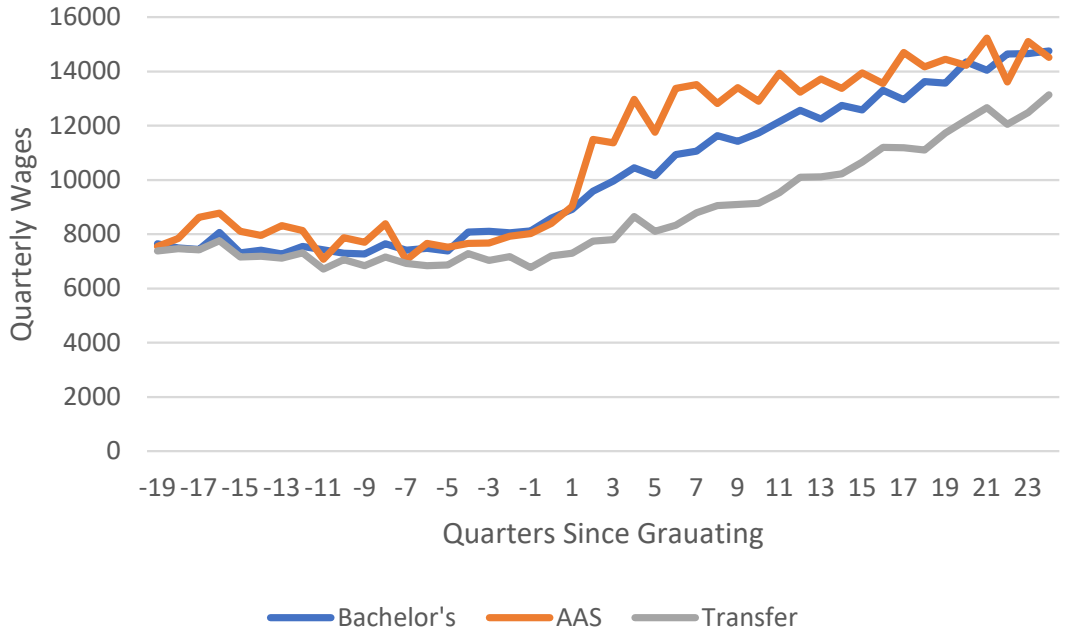

Figure 1: Median Quarterly Earnings for Bachelor's, AAS, and Transfer Associate Recipients
Figures 1 shows the median quarterly wages in USD by graduation quarter, where quareter 1 is the first quarter after gradution for bachelor's, AAS, and trasnfer associate recipients.

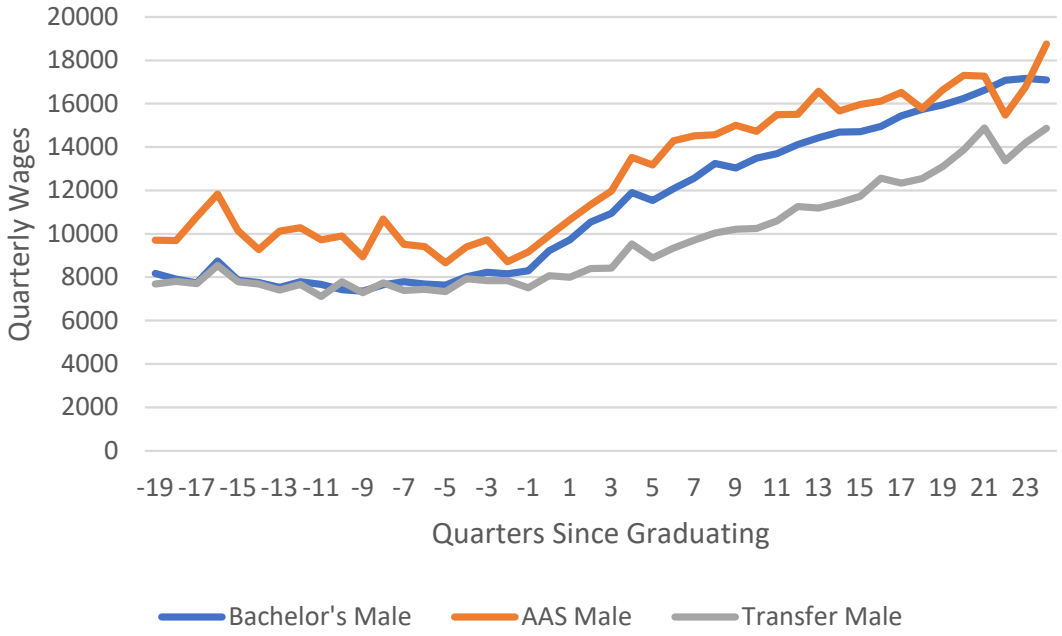

Figure 2a: Men's Median Quarterly Wages by Degree Type

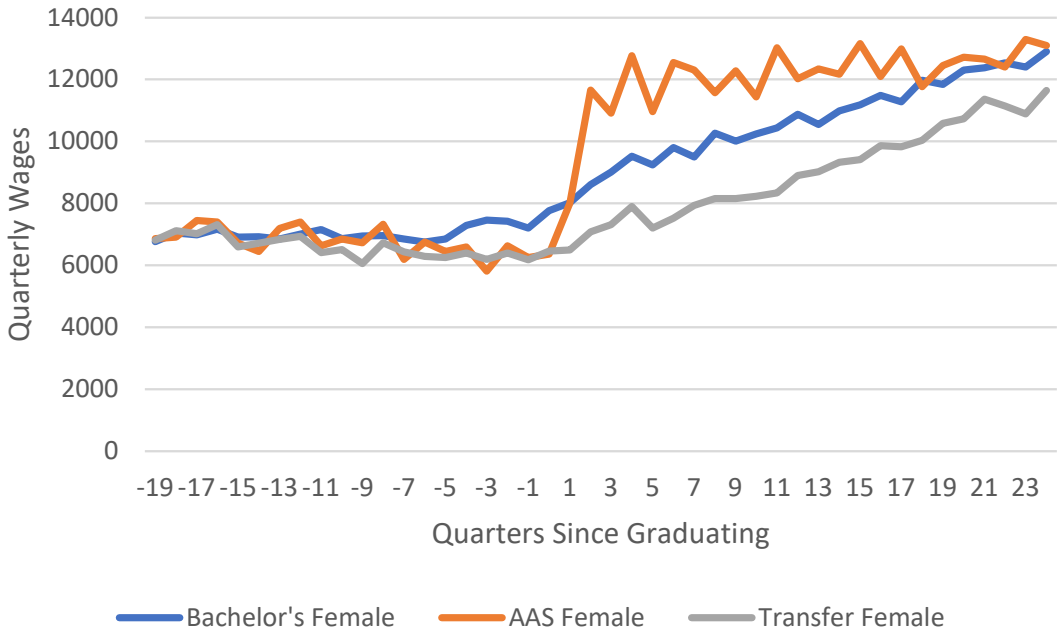

Figure 3a: Women's Median Quarterly Wages by Degree Type
Figures 2a and 2b show the median quarterly wages in USD by graduation quarter, where quareter 1 is the first quarter after gradution for bachelor's, AAS, and trasnfer associate recipients.

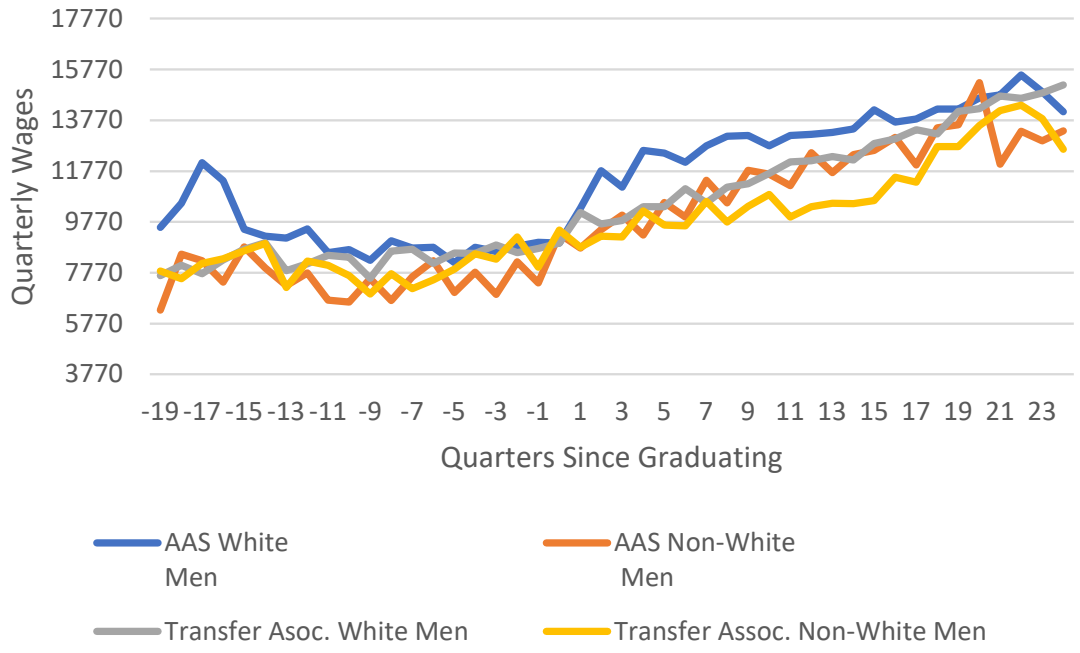

Figure 3a: White and Non-White Men Quarterly Wages

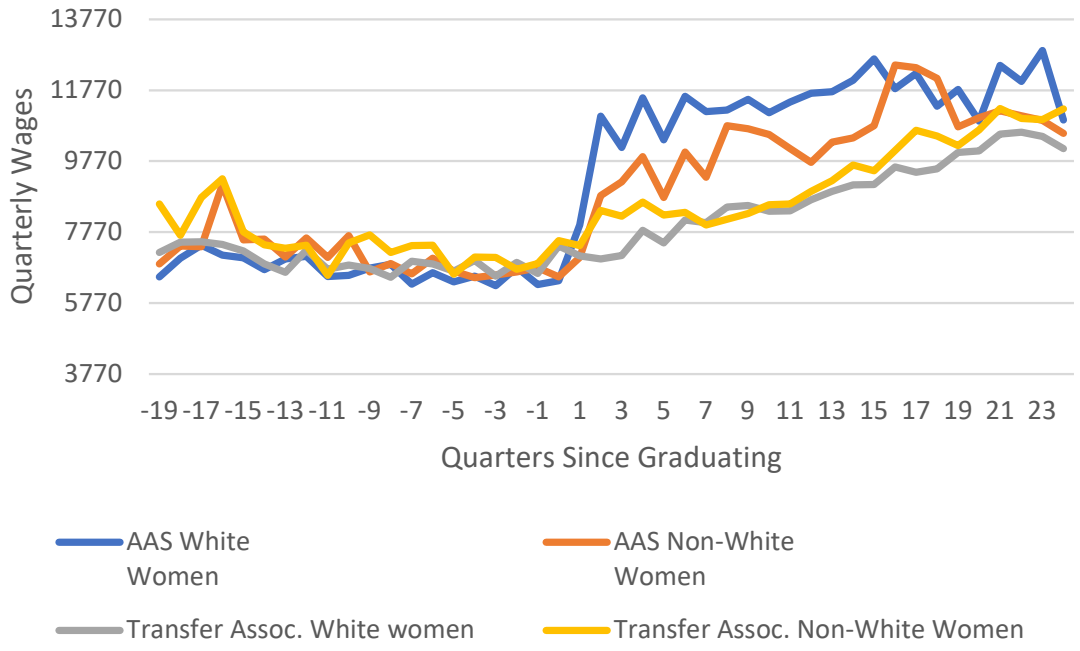

Figure 3b: White and Non-White Women Quarterly Wages

Figures 3a and 3b show the median quarterly wages in USD by graduation quarter, where quareter 1 is the first quarter after gradution for bachelor's, AAS, and trasnfer associate recipients.

Table 3 : Difference in Wages Model Results by Educational Attainment

	Model 1			Model 2				
Cohort	Education	Intercept	Female	Intercept	Female	Non-White	Age	Age^2
2013Q4	AAS	$4,978*** ($651.40)	-$2,922.20*** ($847.20)	$10,905.87 . ($6,418.85)	-$2,688.67** ($885.33)	($429.49) ($1,465.65)	($356.35) ($364.39)	$5.00 ($4.97)
2013Q4	Transfer Associate	$5,823.80*** ($544.50)	-$2,742.30*** ($762.40)	$1,856.89 ($5,521.57)	-$2,491.313** ($833.74)	($318.02) ($1,393.13)	$242.05 ($327.10)	($3.53) ($4.67)
2013Q4	Bachelor's	$6,813.10*** ($385.40)	-$2,820.20*** ($581.60)	$13,418.58* ($5,520.75)	-$2,764.04*** ($611.92)	($91.36) ($886.15)	($350.43) ($328.85)	$3.75 ($4.96)
2014Q2	AAS	$3,620.10*** ($364.90)	-$1,935.60*** ($502.40)	$6,294.72 ($3,872.67)	($2,066.08) ($504.99)	$556.15 ($783.66)	($151.27) ($228.09)	$1.86 ($3.24)
2014Q2	Transfer Associate	$5,594.10*** ($345.40)	-$2,628.60*** ($484.00)	$8,856.89** ($3,405.51)	-$2,905.41*** ($510.58)	($1,141.30) ($775.50)	($151.09) ($205.00)	$1.60 ($2.94)
2014Q2	Bachelor's	$6,928.70*** ($651.70)	-$2,321.60* ($958.10)	$12,517.05* ($5,093.60)	-$2,255.16* ($1,030.54)	($496.21) ($1,435.23)	($256.67) ($282.61)	$1.90 ($3.74)
2014Q3	AAS	$4,039.00* ($1,634.00)	($2,655.00) ($2,867.00)	$29,866.75 . ($17,055.63)	($1,780.71) ($3,101.47)	($6,043.77) ($4,297.05)	($1,066.89) ($933.36)	$8.17 ($12.39)
2014Q3	Transfer Associate	$5,010.60*** ($618.00)	($1,100.10) ($881.10)	($4,526,141.00) ($4,740,595.00)	($617,085.00) ($766,804.00)	($708,252) ($1,045,839)	$291,801.00 ($274,655.00)	($3,518.00) ($3,767.00)
2014Q3	Bachelor's	$7,168.80*** ($360.00)	-$2,948.20*** ($558.10)	$9,003.48 . ($4,706.12)	($2,705.77) ($582.62)	($480.79) ($740.46)	($94.09) ($276.20)	$0.75 ($3.85)
2014Q4	AAS	$5,701.90*** ($638.50)	-$4,399.90*** ($883.80)	$4,211.62 ($7,690.49)	-$4,357.82*** ($915.51)	$921.50 ($1,432.84)	$57.58 ($447.95)	($0.53) ($6.28)
2014Q4	Transfer Associate	$5,487.80*** ($637.30)	-$2,755.40** ($926.00)	$1,127.05 ($6,518.99)	-$2,496.48** ($951.28)	($220.36) ($1,356.29)	$338.65 ($391.95)	($6.32) ($5.59)
2014Q4	Bachelor's	$7,235.50*** ($262.70)	-$3,487.10*** ($408.40)	$12,881.25 ($3,698.37)	($3,394.19) ($427.36)	($176.69) ($606.22)	($284.05) ($220.76)	$2.59 ($3.17)

Statistical significance: ***p<0.001; **p<0.01; *p<0.05; †p<0.1; standard errors are in the parentheses.

from impacts their income, we separated individuals by their CIP. Table 4 below separates men and women and highlights the top three CIPs each gender received in each degree type. When aggregated, the top CIP for women was Health; men, in comparison, were more heavily concentrated in Business and Management. The CIP most shared between men and women was Liberal Arts and Sciences, General Studies, and Humanities for transfer associate degrees; this may be expected given that AA and AS are both categorized as transfer associate degrees in this research. When compared to each other, men and women have different distributions of CIP codes. These CIP code differences could be having an impact on the differences in wages seen in the wage trend and the difference in wages analysis. For instance, women AAS students had Personal and Culinary Services in the top three programs while men had Engineering Technologies in their top three. These differences in programs are more than likely to have an impact on what industries graduates are being employed in. For the complete distribution for each degree, see Appendix table 1.

Using the top CIP for men and women, Business and Health, respectively, we used Model 3 that is listed below:

Model 3:CIP Wages=Women+Degree+Nonwhite+ ε

AAS recipients earned approximately $3,200, or 32.72%, more than transfer associate recipients (the reference group). Bachelor's degree recipients had the highest quarterly wages, earning $3,789 more than the reference group and about $586 more than AAS recipients. The top two CIPS, Health and Business, had significant impacts on the wages graduates received; individuals in the Health program earned $1,525 while people from the Business program earned $1,854 more than the reference group. Similar to the other analyses listed above, women earned significantly less than their male counterparts, earning -$3,131.94, or 31.99% less (Table 5). Non-White individuals earned just under $200 less compared to their White counterparts.

Table 4: CIP Distribution by Degree

	Women			Men		
CIP Family	AAS	Transfer Associate	Bachelor's	AAS	Transfer Associate	Bachelor's
11: Computer and Information	*	*	77 (1.05%)	34 (6.53%)	33 (2.60%)	626 (8.06%)
12: Personal and Culinary Services	63 (9.77%)	*	*	28 (5.37%)	*	*
13: Education	*	38 (2.13%)	1,171 (16.05%)	*	*	322 (9.91%)
14: Engineering	*	*	62 (0.85%)	*	13 (1.02%)	552 (7.11%)
15: Engineering Technologies	*	*	12 (0.16%)	58 (11.13%)	*	100 (1.29%)
24: Liberal Arts and Sciences, General Studies and Humanities	*	1,350 (75.80%)	65 (0.89%)	*	923 (72.67%)	54 (0.70%)
47: Mechanic and Repair	11 (1.71%)	*	*	107 (20.54%)	*	12 (0.15%)
50: Visual and Performing Arts	74 (11.47%)	20 (1.12%)	385 (5.28%)	39 (7.49%)	*	303 (3.90)%
51: Health Professions and Related Clinical Studies	378 (58.60%)	139 (7.80%)	1,278 (17.52%)	83 (15.93%)	38 (2.99%)	415 (5.34%)
52: Business, Management, Marketing, and Related Support Services	28 (4.34%)	61 (3.43%)	680 (9.32%)	11 (2.11%)	94 (7.40%)	1,763 (22.71%)

* Subgroups did not meet the study criteria of at least 10 individuals

Table 5: Top CIP Regressions (Model 3)

Intercept	$9,789.77*** ($26.37)
Women	-$3,131.94*** ($28.14)
Non-White	-$199.63*** ($41.15)
AAS	$3,203.24*** ($62.76)
Bachelor's	$3,789.03*** ($28.13)
Health	$1,525.34*** ($40.49)
Business	$1,854.50*** ($38.98)

Statistical significance: ***p<0.001; **p<0.01; *p<0.05; †p<0.1; standard errors are in the parentheses.

4.4 | Objective 4: CIP Interaction Variables

Model 4 included the interaction variables (AAS*Health) and (Bachelor's*Business) to estimate how quarterly wages are impacted when individuals receive an AAS in Health or a bachelor's degree in business. These were the top CIPs for AAS and bachelor's degrees. Model 4 is defined below:

Model 4: Wages=Gender+Nonwhite+(AAS*Health)+ (Bachelor*Business)+ ε

AAS individuals made about $357 more than the transfer associate recipients whereas bachelor's degree recipients earned about $845 more. The individuals who earned an AAS degree in Health earned, on average, approximately $364 less than the reference group. Interestingly, individuals who earned a bachelor's degree in Business did not have statistically significant wages from the reference group. Health and Business majors, when not interacting with degrees, had a significant impact on increasing wages by $2,319.28 and $2,613.24, respectively.

4.5 | Objective 5: Difference in Wages for Associate Recipients Using Top Five CIPs – Results

This analysis focuses exclusively on the top five CIPs that all associate degree recipients received. In the previous section, we demonstrated that bachelor's degree recipients, on average, have quarterly earnings higher than their colleagues with AAS or

Table 6: Interaction Variables Statistical significance: ***p<0.001; **p<0.01; *p<0.05; †p<0.1; standard errors are in the parentheses.

Intercept	$12,917.22*** ($50.24)
Females	-$3,964.98*** ($36.95)
Non-White	-$501.40*** ($53.90)
AAS	$357.53*** ($96.06)
Health	$2,319.28*** ($59.24)
Bachelor's	$844.75*** ($50.99)
Business	$2,613.24*** ($162.90)
AAS*Health	-$363.98 * ($142.34)
Bachelor's*Business	$77.35 ($171.67)

Statistical significance: ***p<0.001; **p<0.01; *p<0.05; †p<0.1; standard errors are in the parentheses.

transfer associate degrees. Furthermore, the second objective in this paper, the difference in wages, illustrated that regardless of the degree received, women did not experience the same increase in wages that men received over the same time frame. However, the second objective does not take into consideration the CIP that an individual received.

In order to measure the difference in wages between CIP, the model below was used:

Model 5: $\Delta Y=\beta_0+\beta_1(AAS)+ \beta_2(Women)+\beta_3 (Nonwhite)+\beta_4 (Top\ CIPs)+\beta_5 (Age)+\beta_6 (Age^2)+\varepsilon$

Between the first and fifth year after graduating, White men who received a transfer associate degree, the reference group, saw an increase of $6,125 to their quarterly wages (Table 7). The only program to have wages significantly different from the reference group were those who graduated in Health, earning approximately $1,000, or about 16%, less.

On average, individuals who received AAS degrees earned $1,365.64 less than the reference group on average. Similarly, women who graduated with a transfer associate degree received -$2,357.15 less, or only 61.52% of the increase in wages that their male counterparts earned. Non-White individuals, similar to the other models that controlled for CIPs, earned less than their White colleagues; non-White individuals earned about $1,024 less than their White colleagues. To see how the means for each

each variable differed, a Tukey test was employed, and it found that Health was the only variable that had significantly different means between liberal art, business, and all other programs. To see the full results of the Tukey test, see Appendix Figure 1.

The Age and Age^2 variables are consistent with what Model 2 estimated insofar that the variables are not significant. The rationale that was used for Model 2 can be applied here as well: the majority of individuals who were included in this study are younger than Utah's general population.

Table 7: The Difference in Wages for Associate Degree Top 5 CIPs

Intercept	$6,125.10** ($1,961.31)
AAS	-$1,365.64*** ($402.81)
Women	-$2,357.15*** ($297.82)
Non-White	-$1,024.31* ($485.90)
Liberal Arts	-$758.58 † ($418.09)
Business	$855.45 ($630.04)
Health	-$996.46* ($444.54)
Education	-$2.747.10 † ($1.646.18)
Performing Arts	$264.78 ($855.09)
Age	$38.05 ($113.83)
Age^2	-$1.16 ($1.61)

Statistical significance: ***p<0.001; **p<0.01; *p<0.05; †p<0.1; standard errors are in the parentheses.

4.6 | Objective 6: NAICS Distribution Results

This section will analyze the NAICS of graduates one year and five years after graduating. While the industries a group works in are by no means a comprehensive assessment of their outcomes, they do provide us with insight into where recent graduates work after they receive their degree; likewise, the industry graduates work in may be related to the wages they receive. Understanding this allows us to analyze whether certain degrees are more dominant than others in particular industries.

The UI wage data from DWS allows us to track individuals and what industry they are working in by providing their NAICS. We were able to look at the distribution of NAICS for AAS, transfer associate, and bachelor's degree recipients and compare them to the NAICS for the general Utah population. Table 8 below looks at NAICS for degree recipients one and five years after receiving their diploma (five years after is in parenthesis).

When comparing the distributions to one another, there are noteworthy observations. First, AAS recipients are concentrated in the Health Care and Social Assistance industry, making it the plurality between all the industries. Second, while transfer associate recipients do have a large portion of graduates in the Health Care and Social Assistance sector as well, about 15% are in the Retail Trade industry. It is worth noting that transfer associate recipients have a larger proportion of individuals in the Retail Trade industry, which is thought to be a low-skill, low-paying sector, compared to the general population (Table 8).

AAS degrees are also slightly more concentrated in a fewer number of industries than graduates with transfer associate and bachelor's degrees. The top two industries for AAS recipients make up over 46% of the workers; in comparison, the general population's top four industries make up about 44% of all workers, the top four industries for transfer associates are over 50%, and the top three industries for bachelor's degrees are just over 47%. These differences in industries indicate that different degrees help recent graduates to enter different sectors.

The state's general population is distributed across industries that range from Retail Trade, Accommodation and Food Services, Administrative and Support, Educational Services, and finally, Health Care. Transfer associate degrees are similar to the state population in that numerous sectors have a small-to-medium-sized proportion of workers; some of those industries include Retail Trade, Public Administration, and Educational Services. Finally, bachelor's degrees are more concentrated in Educational Services as well as Professional, Scientific, and Technical Services. The other degree types do have employees in these industries, but bachelor's degrees have a higher proportion of their graduates present in these sectors. (Table 8).

Comparing the NAICS one- and five-years post-graduation shows there were not many significant changes in the NAICS across the four groups we observed (Tables 8). AAS degree's largest difference was in the Health Care and Social Assistance industry; the industry's share fell by 2.85%. Conversely, the transfer degree associate degrees had individuals leaving the Retail Trade industry, which decreased by 3.92%. This change for transfer

associate recipients could be due to individuals gaining work experience after they graduated, allowing them to leave low-skill industries, such as Retail Trade. Finally, bachelor's degree recipients had their largest change in the Retail Trade industry, similar to transfer associate degrees, though the difference was under 2%.

While we can analyze how the NAICS has changed over time, we cannot determine what occupations each individual had with this analysis. Rather, this analysis shows us how the degrees in question can impact what industries college graduates were employed in, and the differences are quite different. For instance, while the Health Care and Social Assistance industry is about a tenth of the workers in the general population in 2020, for AAS and transfer associate recipients this industry is the largest. Likewise, Accommodation and Food Services had over 8 percent of Utah's workforce in this sector, but AAS, transfer associate, and bachelor's degree recipients had about 2 percent or less.

5 | Discussion

The first year after graduating, AAS recipients earned the largest increase in their quarterly wages earning $3,946 more than the quarter they graduated, receiving $12,980. In comparison, bachelor's degree graduates saw their quarterly income increase by $1,545, earning $10,455, while transfer associate recipients received $1,351 more, having the smallest quarterly income of $8,657. After the first year, as the graduates earned experience in the workforce, the wage growth for AAS recipients is the slowest among the observed degree types. AAS recipients saw their wages only grow by $1,534 between the first and fifth year after graduating. In comparison, bachelor's degree and transfer associate recipients saw their median wages increase by $4,308 and $4,488, respectively. While the wage growth for transfer associate recipients is the largest, they are the lowest-earning observed degree type with a median wage of $13,146 by the end of the observation, earning $1,618 and $1,369 less than their bachelor's and AAS colleagues, respectively.

The difference in wages between degree types may be explained by the specialization that each provides. Specialization allows individuals to learn skills for occupations that would not have otherwise been available to them as well as it also helps individuals bargain for higher wages. AAS degrees help students specialize in a particular field, such as nursing, which may allow them to receive higher wages when they first exit college. In comparison, transfer associate recipients did not receive any specialization from their education, resulting in lower wages after graduating. As transfer associate recipients gained experience in the workforce, though, their quarterly income increased, and after the first year, they grew faster than AAS recipients.

For both men and women, wages for AAS and bachelor's degrees recipients were higher than their colleagues who only earned transfer associate degrees, both one- and five-years post-graduation (Figs. 2a & 2b). Transfer associate wages did narrow the gap by the end of the analysis; by the last quarter observed, men and women, transfer associate recipients were earning approximately $3,900 and $1,400, respectively, less than their AAS counterparts. Researchers from Ohio who had access to quarterly wages eleven years after graduating argue that a longer follow-up period is needed for sub-baccalaureate degrees. Their research found that associate degree recipients' quarterly wages "continue[d] to grow substantially" throughout the entire observation period. The researchers did not distinguish between AAS and transfer associate degrees (Minaya and Scott Clayton, 2017).

In this study, non-White individuals usually earned less than their White counterparts (Fig. 3). By the end of the observation period, non-White men who earned AAS degrees earned $755 less than their White counterparts, while non-White transfer associate recipients earned $2,533 less than their White colleagues who received the same degrees. Similarly, non-White AAS women had a quarterly income of $377 less than White women who earned the same degree. Non-White women who earned transfer associate degrees were the only non-White subgroup that received a higher quarterly income than their White counterparts, earning $1,122 more five years after graduation (Figure 3).

For each degree type in this study, there was a substantial increase in quarterly wages from the first year after graduating through the fifth year (Table 3). While, on average, there were increases in wages for all degree types, this is not to say that all groups benefited the same. It is unsurprising, unfortunately, that in all of the analyses performed women received lower quarterly wages compared to men. The gender wage gap shown in Figures 2a and 2b is a concept that has been analyzed by many researchers, including research from the Utah Data Research Center, where we published research analyzing the gender wage gap thoroughly in Utah (Utah Data Research Center, 2021). While the results from Figures 2a and 2b may not be surprising, they are consistent with trends that have been observed previously.

This discrepancy in wages could be for a variety of reasons, and the research on the gender wage gap

Table 8: Distribution of Employment by Industry and Degree Received One Year Post Graduation and Five-Years Post-Graduation

Industry	Utah General Population 2016 and 2020	AAS Degree Recipients	Transfer Associate Recipients	Bachelor's Degree Recipients
11: Agriculture	0.41% 0.41%	0% 0.13%	0.19% 0.11%	0.26% 0.24%
21: Mining and Logging	0.58% 0.53%	0.12% 0.26%	0.19% 0.34%	0.35% 0.23%
22: Utilities	0.36% 0.34%	0. 35% 0.52%	0.62% 0.62%	0.20% 0.28%
23: Construction	6.18% 7.10%	3.87% 3.23%	4.02% 4.60%	2.71% 3.35%
31-33: Manufacturing	8.09% 8.90%	6.22% 7.23%	6.81% 7.13%	6.90% 7.15%
42: Wholesale Trade	3.85% 3.80%	2.82% 3.89%	4.46% 3.76%	4.02% 3.84%
44-45: Retail Trade	12.91% 12.38%	8.80% 7.74%	14.98% 11.06%	9.45% 7.50%
48-49: Transportation and Warehousing	3.37% 3.90%	3.64% 4.26%	1.86% 2.02%	1.46% 1.84%
51: Information	2.47% 2.26%	1.53% 1.29%	2.66% 3.48%	3.90% 4.41%
52: Finance and Insurance	4.17% 4.31%	2.70% 2.84%	9.90% 8.48%	7.11% 7.59%
53: Real Estate and Rental and Leasing	1.41% 1.39%	0.82% 0.90%	1.49% 1.18%	1.39% 1.26%
54: Professional, Scientific, and Technical Services	6.55% 7.01%	7.04% 8.26%	8.72% 9.88%	12.24% 12.44%
55: Management	0.51% 0.65%	0.35% 0.26%	0.37% 0.45%	0.31% 0.53%
56: Administrative and Support	11.00% 11.28%	5.51% 6.84%	7.12% 8.09%	6.56% 6.89%
61: Educational Services	10.19% 9.96%	11.27% 9.94%	8.73% 10.05%	18.34% 17.60%
62: Health Care and Social Assistance	10.09% 9.68%	34.98% 32.13%	18.13% 19.37%	16.14% 15.20%
71: Arts, Entertainment, and Recreation	1.69% 1.51%	0.23% 0.39%	0.87% 0.39%	0.88% 0.88%
72: Accommodation and Food Services	8.96% 8.31%	2.58% 1.94%	3.47% 2.13%	1.83% 1.25%
81: Other Services (except Public Administration)	2.36% 2.40%	2.46% 2.94%	1.18% 1.63%	0.93% 0.79%
92: Public Administration	4.54% 4.30%	4.69% 4.90%	4.15% 4.77%	4.33% 5.76%

is extraordinarily large. One possible explanation is occupational segregation, which states that demographic groups may be underrepresented or overrepresented in one industry. Gender occupational segregation can account for approximately 28% of the gender wage gap and, at the same time, racial occupational segregation can account for 39% to 49% of the discrepancy in wages, as research from the Stanford Center on Poverty & Inequality has asserted (Weeden, 2019).

Gender occupational separation may explain some of the differences in wages that we are analyzing with these cohorts. Table 3, which looks at the top CIPs for each degree, indicates that the programs that men and women are going into are different. While the program an individual graduated from does not directly tell us the industry they started working in after graduation, it does show us that men and women are focusing on different educational programs that may influence the industry they become employed in and ultimately influence the income that they will experience.

Finally, the distribution of industries that individuals were employed in differed by each degree type. Five years after graduating, AAS recipients had approximately a third, 32.13%, of all graduates working in the Health Care and Social Assistance industry. In comparison, transfer associate recipients were not as concentrated in one industry, rather they were more diversified in Health Care, Retail Trade, and Education with 19.37%, 11.06%, and 10.05%, respectively, of graduates working in those industries. According to the University of Washington, it takes college graduates three to six months to find employment. The NAICS one year after graduating captures most of the new post-graduation jobs that recent graduates were receiving (Table 8). However, the five-year NAICS table may provide a more comprehensive understanding of the distribution of NAICS. Five years after graduating allows individuals to find not only their first job after graduating but perhaps several more jobs allowing them to acquire experience and be able to negotiate for higher wages.

6 | Conclusion

Using administrative data from the Utah System of Higher Education and Unemployment Insurance wage data from the Department of Workforce Services, we analyzed the post-graduation quarterly wages for AAS, transfer associate, and bachelor's degree recipients and determined that receiving any of these degrees increases the quarterly income for individuals, albeit, not equally. Bachelor's and transfer associate degrees saw their wages increase the most over the five years, but AAS recipients still experienced significant increases to their wages over the same time frame. To determine if all degree types continue to earn more, though, more data is needed beyond the fifth year after graduating.

In terms of who had the best outcomes in this study, perhaps unsurprisingly, White men earn more than their non-White colleagues in terms of quarterly wages across all degrees and CIPs that were analyzed in this study. When only looking at gender and the difference in the increase in wages one and five years after graduating, women saw their wages increase only by 60% of what men observed. Interestingly, however, Table 3 shows the difference in wages estimation did not find a significant difference in the increased quarterly income between White and non-White individuals. Having said that, the other models used in this analysis show that non-White individuals are at a disadvantage.

This study illustrates that a post-secondary education, resulting in one of the degrees analyzed in this study, from a USHE institution will increase the quarterly wages, on average, for all individuals compared to their pre-graduation earnings. By the end of the analysis, AAS recipients had wages that were comparable to bachelor's degree recipients and transfer associate recipients, while earning approximately $1,300 less than AAS recipients by the end of the analysis, still experienced substantial wage growth.

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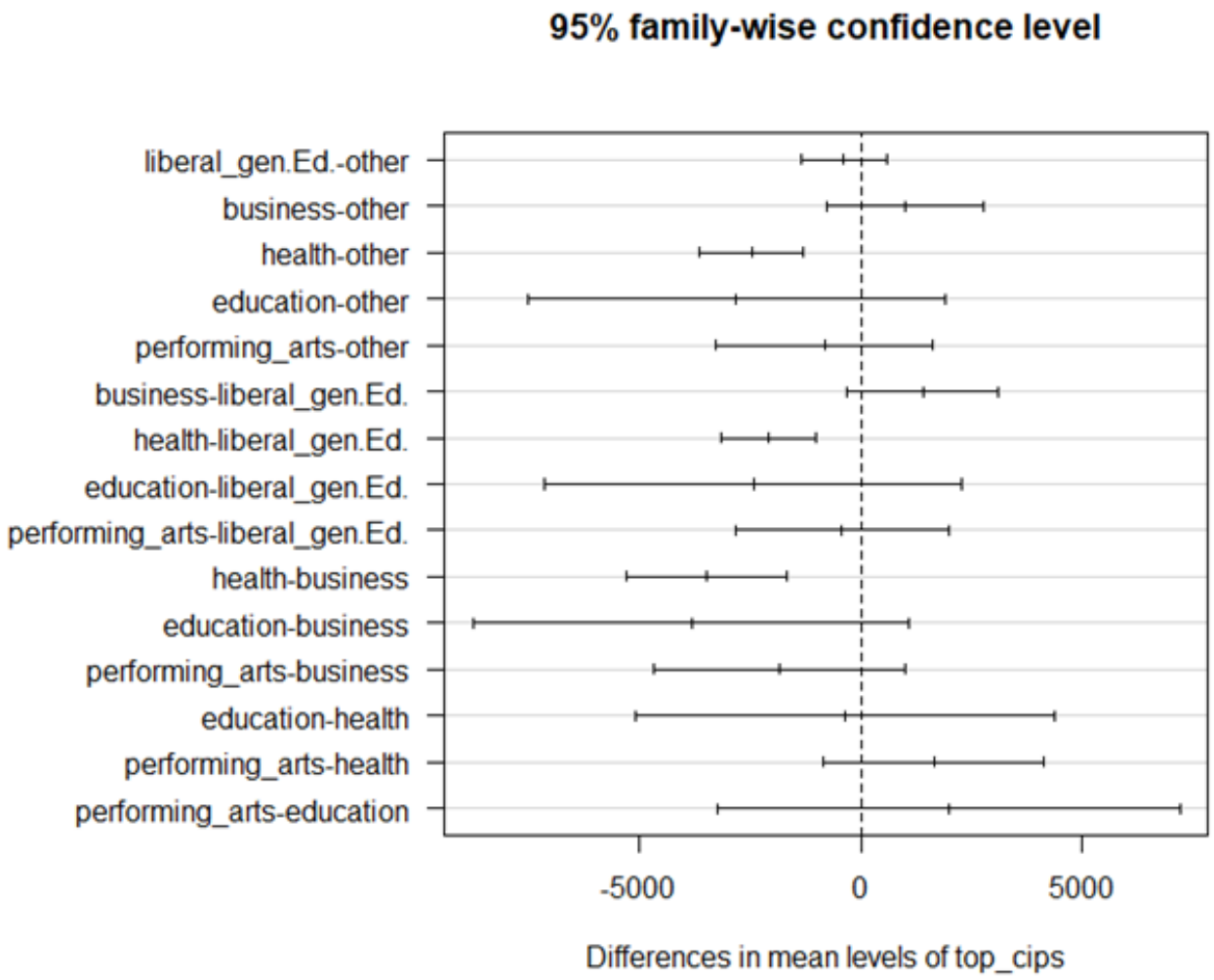
Appendix Table 1

	Women			Men		
	AAS	Transfer Associate Degrees	Bachelor's Degrees	AAS	Transfer Associate Degrees	Bachelor's Degrees
01) AGRICULTURE, AGRICULTURE OPERATIONS, AND RELATED SCIENCES	*	*	40 (0.55%)	*	*	63 (0.81%)
03) NATURAL RESOURCES AND CONSERVATION	*	*	41 (0.56%)	*	*	35 (0.45%)
04) ARCHITECTURE AND RELATED SERVICES	*	*	22 (0.30%)	*	*	43 (0.55%)
05) AREA, ETHNIC, CULTURAL, AND GENDER STUDIES	*	*	20 (0.27%)	*	*	26 (0.33%)
09) COMMUNICATION, JOURNALISM, AND RELATED PROGRAMS	*	16 (0.90%)	430 (5.89%)	*	10 (0.79%)	422 (5.44%)
10) COMMUNICATIONS TECHNOLOGIES/ TECHNICIANS AND SUPPORT SERVICES	*	*	*	26 (4.99%)	*	*
11) COMPUTER AND INFORMATION SCIENCES AND SUPPORT SERVICES	*	*	77 (1.05%)	34 (6.53%)	33 (2.60%)	626 (8.06%)
12) PERSONAL AND CULINARY SERVICES	63 (9.76%)	*	*	28 (5.37%)	*	*
13) EDUCATION	*	38 (2.13%)	1,171 (16.05%)	*	*	322 (4.15%)
14) ENGINEERING	*	*	62 (0.85%)	*	13 (1.02%)	552 (7.11%)
15) ENGINEERING TECHNOLOGIES/ TECHNICIANS	*	*	12 (0.16%)	58 (11.13%)	19 (1.50%)	100 (1.29%)
16) FOREIGN LANGUAGES, LITERATURES, AND LINGUISTICS	*	*	91 (1.25%)	*	*	143 (1.84%)
19) FAMILY AND CONSUMER SCIENCES/ HUMAN SCIENCES	*	*	444 (6.08%)	*	*	82 (1.06%)
22) LEGAL PROFESSIONS AND STUDIES	36 (5.58%)	*	22 (0.30%)	*	*	19 (0.24%)
23) ENGLISH LANGUAGE AND LITERATURE/LETTERS	*	*	305 (4.18%)	*	*	174 (2.24%)
24) LIBERAL ARTS AND SCIENCES, GENERAL STUDIES AND HUMANITIES	*	1,350 (75.80%)	65 (0.89%)	*	923 (72.68%)	54 (0.70%)
25) LIBRARY SCIENCE	*	*	*	*	*	*
26) BIOLOGICAL AND BIOMEDICAL SCIENCES	*	*	327 (3.11%)	*	*	330 (4.25%)
27) MATHEMATICS AND STATISTICS	*	*	45 (0.62%)	*	*	62 (0.80%)
28) RESERVE OFFICER TRAINING CORPS (JROTC, ROTC)	*	*	*	*	*	*
29) MILITARY TECHNOLOGIES	*	*	*	*	*	*
30) MULTI/INTERDISCIPLINARY STUDIES	*	22 (1.24%)	166 (2.28%)	*	13 (1.02%)	170 (2.19)

31) PARKS, RECREATION, LEISURE, AND FITNESS STUDIES	10 (1.55%)	*	208 (2.85%)	*	*	282 (3.63%)
32) BASIC SKILLS	*	*	*	*	*	*
33) CITIZENSHIP ACTIVITIES	*	*	*	*	*	*
34) HEALTH-RELATED KNOWLEDGE AND SKILLS	*	*	*	*	*	*
35) INTERPERSONAL AND SOCIAL SKILLS	*	*	*	*	*	*
36) LEISURE AND RECREATIONAL ACTIVITIES	*	*	*	*	*	*
37) PERSONAL AWARENESS AND SELF-IMPROVEMENT	*	*	*	*	*	*
38) PHILOSOPHY AND RELIGIOUS STUDIES	*	*	15 (0.21%)	*	*	38 (0.49%)
39) THEOLOGY AND RELIGIOUS VOCATIONS	*	*	*	*	*	*
40) PHYSICAL SCIENCES	*	*	71 (0.97%)	*	10 (0.79%)	148 (1.91%)
41) SCIENCE TECHNOLOGIES/TECHNICIANS	*	*	*	11 (2.11%)	*	*
42) PSYCHOLOGY	*	44 (2.47%)	599 (8.21%)	*	*	361 (4.65%)
43) SECURITY AND PROTECTIVE SERVICES	*	20 (1.12%)	140 (1.92%)	41 (7.87%)	34 (2.68%)	286 (3.68%)
44) PUBLIC ADMINISTRATION AND SOCIAL SERVICE PROFESSIONS	*	*	183 (2.51%)	*	*	41 (0.53%)
45) SOCIAL SCIENCES	*	19 (1.07%)	406 (5.56%)	*	11 (0.87%)	581 (7.48%)
46) CONSTRUCTION TRADES	*	*	*	19 (3.65%)	*	74 (0.95%)
47) MECHANIC AND REPAIR TECHNOLOGIES/TECHNICIANS	11 (1.71%)	*	*	107 (20.54%)	*	12 (0.15%)
48) PRECISION PRODUCTION	*	*	*	24 (4.61%)	*	*
49) TRANSPORTATION AND MATERIALS MOVING.	*	*	*	11 (2.11%)	*	124 (1.60%)
50) VISUAL AND PERFORMING ARTS	74 (11.47%)	20 (1.12%)	385 (5.28%)	39 (7.49%)	*	303 (3.90%)
51) HEALTH PROFESSIONS AND RELATED CLINICAL SCIENCES	378 (58.60%)	139 (7.80%)	1,278 (17.52%)	83 (15.93%)	38 (2.99%)	415 (5.34%)
52) BUSINESS, MANAGEMENT, MARKETING, AND RELATED SUPPORT SERVICES	28 (4.34%)	61 (3.43%)	680 (9.32%)	11 (2.11%)	94 (7.40%)	1,763 (22.71%)
53) HIGH SCHOOL/SECONDARY DIPLOMAS AND CERTIFICATES	*	*	*	*	*	*
54) HISTORY	*	*	79 (1.08%)	*	*	107 (1.38%)
60) Residency Programs	*	*		*	*	*

* Subgroups did not meet the study criteria of at least 10 individuals



Appendix Figure 1