## ABSTRACT

RAFI, FAWAD SAMI. Exploring the Role of Demographics and Occupation-type (based on Career Clusters) on Labor Market Outcomes among the Associate Degree Holders: A Study Based on American Community Survey (ACS) Data from 2016. (Under the direction of Dr. James E. Bartlett, II, and Dr. Michelle E. Bartlett).

The enrollment of students in higher education institutions continues to increase (Porchea, Allen, Robbins, & Phelps, 2010). As enrollment increases, the diversity of the student population in higher education is also increasing. With the growth of a diverse student population, it is imperative for higher education institutions to accurately and equitably assess the labor market outcomes of their students. This assessment should include student demographics and academic disciplines in order to determine their relevance in today's evolving and increasingly globalizing economy. In this study, the labor market outcomes for individuals with an associate degree were examined in terms of income and employment level based on student demographics and type of occupation among the associate degree holders. Five research questions were examined in this study:

(1) Does age have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential? (2) Does race have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential? (3) Does gender have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential? (4) Does American citizenship have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential? (5) Does occupation type based on specific career-cluster

have a significant effect on the labor market outcomes (employment rate and annual income) among the associate degree holders?

This quantitative study utilized logistical regression analysis and multiple regression analysis to examine the labor market outcomes based on student demographics and occupation type among the people who have obtained an associate degree. Findings included higher labor market outcomes for certain demographics than others. Another important finding of this study concerns specific career clusters showing better labor market outcomes than others among the associate degree holders. Results of this study have a potential to support a solid context on the role of student demographics and occupation-type on the labor market. Individuals affiliated with a school system, higher education, community development, and legislative branch of the government can certainly use this study to advance their knowledge of an evolving and increasingly diversifying populations in the community colleges as well as in the workforce.

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# Exploring the Role of Demographics and Occupation-type (based on Career Clusters) on Labor Market Outcomes among the Associate Degree Holders: A Study Based on American Community Survey (ACS) Data from 2016

by
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# CHAPTER 1: INTRODUCTION

Research suggested that postsecondary education is vital to ensure socio-economic success in the 21st century (Kim & Sakamoto, 2008; Lemieux, 2006). Researchers have argued that due to the declining real value of the minimum wage, there is an increase in the demand for postsecondary education (Archibald & Feldman, 2008; Kim & Sakamoto, 2008; Lemieux, 2006). Recent studies in the realm of higher education are also suggesting that income disparities in the US are increasing due to a rising demand for workers with post-secondary credentials (Autor, 2010; Bennett & Vedder, 2015). The primary function of higher education is to improve critical thinking and communication skills, empowering students to contribute positively in the society, and to expose the students to a number of various intellectual pathways (Appiah, 2015; Barton, 2008; Bok, 2006).

The Organization for Economic Co-operation and Development (OECD) found that in 2007, only 48% of young adults in the U.S. found employment within six months of completing their upper secondary vocational education (equivalent to the high-school level in America) versus more than 80% of young adults in Germany who found employment within the same timeframe after they completed their vocational studies (Symonds, Schwartz, & Ferguson, 2011). Overall, only a few studies have exclusively explored the role of occupation-type (based on specific career clusters) in determining the labor market outcomes for associate degree holders (Grubb, 1997; Rojewski, 2002; Stipanovic, 2010). Due to the fact that there is a shortage of recent research studies in the area of student demographics and its impact on labor market outcomes for associate degree holders, it is imperative that this topic also gets investigated in current context. Current demographics of the U.S. population such as age, race, gender, citizenship status, and socioeconomic status must be another consideration in conducting a

comprehensive study on the labor market outcomes for the targeted population of this study. Research is suggesting that population demographics are changing as traditional minorities are surpassing the number of whites at an increasingly rapid pace in the classrooms and in the workforce (Lichter, 2012; Mawwell, 2014; Parrado, 2011). By using the American Community Survey (ACS) dataset, this study have used data on labor market outcomes for associate degree holders in terms of annual income and employment status post-degree completion. American Community Survey (ACS) is a survey of US households conducted by the US Census Bureau monthly. The information that US Census Bureau collects from the households provides information on its website for use in studies conducted to understand the emerging trends within the American population and society.

The key variables disaggregated in this study were student demographics and occupation-type based on career clusters. The rest of chapter one includes the discussion of the problem statement, the purpose statement, research questions, conceptual framework, theoretical framework, limitations, and definition of terms, and a summary.

## Problem Statement

Institutions of higher learning need to adapt to demographic and technological changes in order to remain relevant in today's era and in order to survive and continue to contribute to the U.S. labor market. It is vital to evaluate these changes as they occur in order to guide all the stakeholders in the change process. This would allow for a mechanism to be in place to address the emerging trends in the society by utilizing a data-driven approach to implement any change initiative.

Higher education literature showed that education plays a vital role in determining the labor market outcomes (Archibald & Feldman, 2008; Kim & Sakamoto, 2008; Lemieux, 2006).

Per the 2013 Bureau of Labor Statistics report, by 2022, there will be a 17% increase in the jobs requiring at least an associate degree credentials versus a 12% increase in jobs requiring at least a bachelor level credentials (Richards & Terkanian, 2013). Earlier research studies on labor market outcomes for college students have concentrated on the completers of the diploma or degree program and compared them with the non-completers of the diploma or degree program while completely abandoning the role of student demographics or the occupation-type in determining the labor market outcomes (Grubbs, 2002; McCharen, 2008).

Due to recent changes in the labor market, the institutes of higher education in the United States (US) have become more diverse in terms of a significant rise in the number of non-traditional students on college campuses. Research suggested that non-traditional students, age 25 and above, constitutes 43% of all college students in the US (Spanier, 2001). Research also suggested that individuals who are born after 1980 in the US tend to have a higher level of education than the past generations due to an increase in demand for workers with post-secondary credentials (Goodman, Sands, & Coley, 2015). Aggregate data only provides the basic information about general labor market trends as it does not allow administrators in higher education as well as the employers and other important stakeholders in the realm of workforce development to fully understand the role of population demographics and occupation-type in determining the socio-economic status of the individuals who are in the labor market.

Without disaggregating the demographics and occupation type, academic institutions and employers will not be able to determine the actual impact of education on labor market outcomes based on population's demographic characteristics and academic disciplines that are arranged in specific career-clusters. It is equally important to understand the level of equity-mindedness and equal opportunity level in a society. Many research studies have shown that employment

discrimination is a well-known phenomenon in today's workforce and that the employment discrimination reduces a society's potential since it leads to underutilization of resources (Herring, 2009; Page, 2007). Understanding the role of demographics and occupation-type on affecting the socio-economic growth is essential for a society to address any potential shortfalls, which may result from misallocation of resources. Due to rapidly occurring technological and socio-economic changes in today's era, the sense of urgency to re-evaluate the role of an associate degree on the labor market outcomes for individuals who have it will only intensify.

## Purpose Statement

Research suggested that, as the labor market demands of today's society are changing at a rapid rate; there is a dire need for a skilled workforce that is must to be addressed (Kochan, Finegold, & Osterman, 2012; Sparks & Waits, 2011). Due to the shortage of a skilled workforce, community colleges and four-year institutions are increasingly partnering with industry to meet their labor demands (Kochan, Finegold, & Osterman, 2012; Sparks & Waits, 2011). The purpose of this study is to examine the role of demographics and type of occupation in determining the labor market outcomes. The results of this study have the potential to allow the college administrators, employers, and other individuals affiliated with workforce development related fields, to understand the role of student demographics and type of occupation in determining the labor market outcomes. High school administrators should also be able to use the results of this study to partner with various stakeholders in higher education and with the employment sector.

A recent focus on equity in American society also illustrated the importance of determining the present role of demographics and education on labor market outcomes. By using the American Community Survey data from 2016, this study had compared the labor

market outcomes of associate degree holders in different occupations. This study had explored the impact of age, race, and gender on labor market outcomes of the associate degree holders.

The results that were obtained after disaggregating the data in this study have a potential to promote dialogue among various stakeholders in the academia and in the labor market to inclusively design educational and hiring policies to help the various population demographics in achieving equitable labor market outcomes. Career advising related areas can also benefit from the findings of this study. From an equity standpoint, this study has the potential to provoke the community leaders, educators, employers, job-seekers, and students to engage in a dialogue and come up with strategies which will promote an equitable and economically sustainable society.

## Research Questions

The following five research questions frame this study:

RQ1: Does age have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential?

RQ2: Does race have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential?

RQ3: Does gender have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential?

RQ4: Does American citizenship have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential?

RQ5: Does occupation type based on specific career-cluster have a significant effect on the labor market outcomes (employment rate and annual income) among the associate degree holders?

## Conceptual Framework

It is essential to investigate the impact of population demographics and type of occupation on the labor market outcome for individuals who have an associate degree. The conceptual framework for this study has supplied a guideline to examine the effect of population demographics and occupation-type on employment rate and annual income among the associate degree holders. The independent variables utilized in this study were race, age, gender, citizenship status, and the type of occupation pursued by the subjects of this study. The dependent variables in this study were the employment rate and annual income.

To measure the impact of race, age, gender, citizenship status, and type of occupation on the employment rate, the researcher used a binary logistic regression analysis as indicated in Figure 1. Logistic regression analysis had supplied the probability of employment using the independent variables. To determine the impact and statistical significance of the independent variables race, age, gender, citizenship status, and occupation type on the dependent variable annual income, a multi-linear regression analysis was employed as indicated in Figure 1. Multi-linear regression analysis gives the statistics on how the annual income is impacted by the demographics of the associate degree holders.

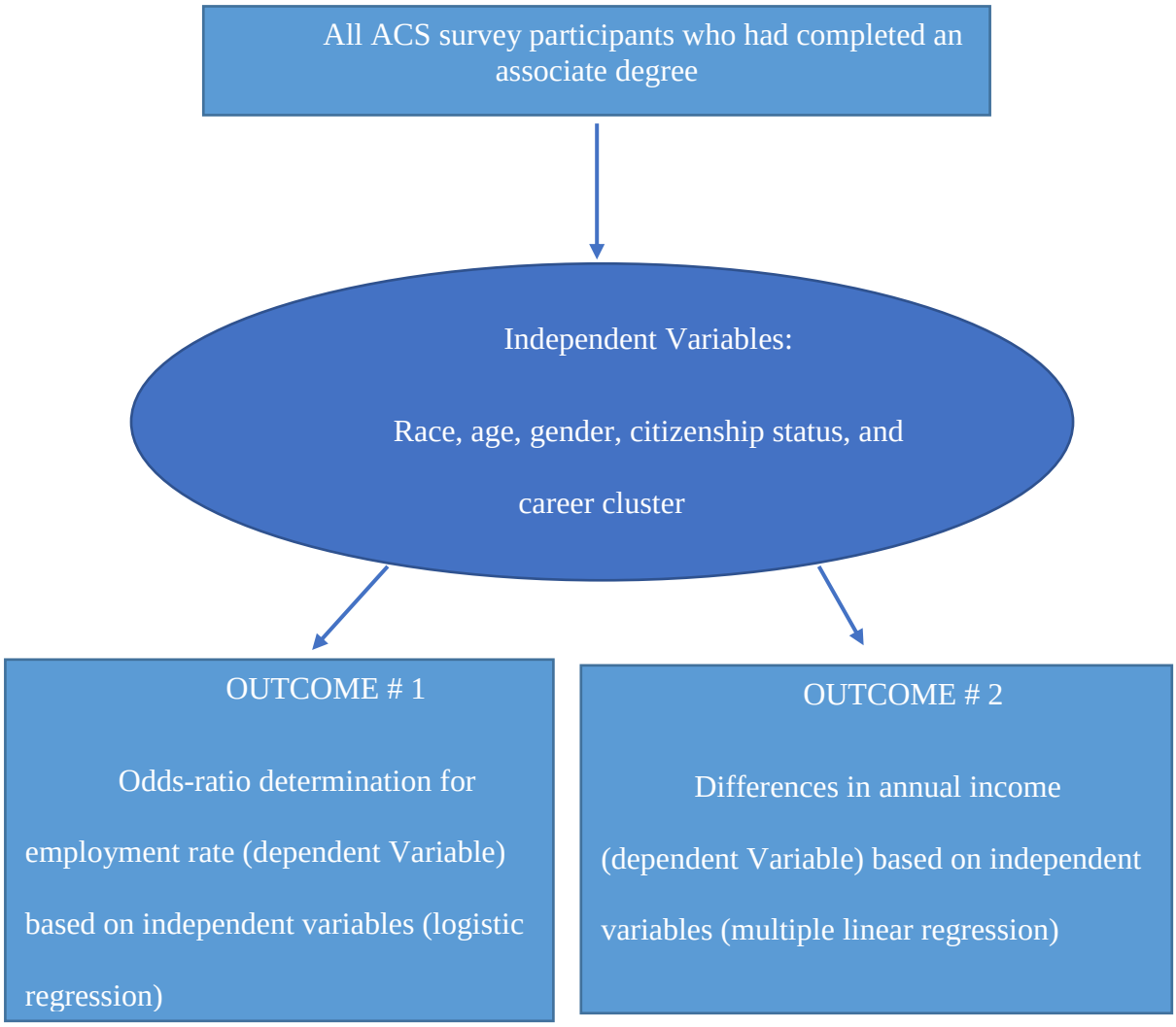


***Figure 1.*** Conceptual framework of logic regression analysis for employment rate and multiple linear regression analysis for annual income based on demographics and occupation-type among individuals with an associate degree

## Theoretical Framework

In order to gain a better understanding of the issues presented in this research paper, the theoretical framework would involve human capital theory from the research done by Becker (1964), and Mincer (1958). Since human capital theory focuses on educating and training individuals to increase labor related skills and productivity, it provides a comprehensive structure to support the investigative aspect of this research study. The human capital theory implies that an investment in human capital, i.e., education or training, would impact the economic gains for the individual in a positive direction (Schultz, 1961). Research suggest that the higher the education level, the more likely are the individuals to stay employed in a knowledge-based economy (Baum & MA 2007; Grubb, 2002).

By researching the current trends in the labor market and the American society in order to determine the potential of human capital growth in the workforce, this research will provide vital information on current employment trends in the labor market and the role of changing demographics on the workforce.

Human Capital Theory implies that investing in education and training produces profitable results for the individual, organization and for the society in general (Schultz, 1961). Many research studies of the past have also emphasized the fact that the contribution of education on economic growth and development cannot be denied (Adelakun, 2011; Babalola, 2003; van der Merwe, 2010).

There is a plethora of research studies which have indicated the effect of human capital in various sectors of the economy. For example, some studies have indicated that the effect of human capital investments on performance might vary between manufacturing and non-manufacturing sectors or between small and large firms or even temporary versus permanent

workers and effect of investments in human capital on crime rates and socio-economic status in a society (Black and Lynch, 1996; Hayton, 2003; Lochner, 2004; Rauch et al., 2005; Roca, Beltran-Martin & Seggara, 2011). For this research study, the human capital theory is selected since it explores the relationship between educational attainments with the labor market returns which is the main topic of exploration among the associate's degree holders.

## Research Method

To examine the research questions, this quantitative study has utilized logistical regression analysis as well as multiple linear regression analysis to examine the differences in labor market outcomes based on student demographics and occupation type among individuals who have obtained an associate degree. After the researcher had screened the data for outliers, multiple linear regression analysis and logistic regression analysis had occurred separately. To determine the differences in annual wages among the associate degree holders based on demographics and occupation type, the researcher conducted a multiple linear regression analysis. A binary logistic regression analysis determined the level of employment among the associate degree holders, binary logistic regression analysis.

## Significance of the Study

The literature on discrimination in the labor market based on demographics and occupation-type can be found in abundance. However, there is a lack of research studies available to provide a historical perspective on the organization of career clusters and how they have evolved with the emergence of new technological and socio-economic trends. The need to explore current trends in labor market outcomes based on demographics was the impetus for this study. Among the implications of differences in labor market outcomes are discrimination and variability in the economic demand of certain occupation-types over others.

As the demand for literacy among the work force increases, an increasing number of individuals from various demographics are enrolling in higher education institutions. Since community colleges have an open-enrollment policy, they are seeing a surge in enrollment (Porchea, Allen, Robbins, & Phelps, 2010). This study is significant since it has explored the role of demographics and field of study in determining the labor market outcomes in terms of income and employment rates. By using the American Community Survey (ACS) dataset, this study looks to provide meaningful research by disaggregating data on labor market outcomes for associate degree holders in terms of annual income and employment status. The outcomes of this study can be used by the college administrators, employers, and other individuals affiliated with workforce development related fields, to understand the role of student demographics and type of occupation in determining the labor market outcomes. High school administrators can use the results of this study to partner with various stakeholders in higher education and with the employment sector.

An increasing focus on equity in American society also illustrates the importance of determining the present role of demographics and education on labor market outcomes. This study has the potential to motivate the community leaders, educators, employers, jobseekers, and students to engage in a dialogue and come up with strategies which will promote an equitable and economically sustainable society. The current research on equity either supports the concept of equal opportunity for all or it criticizes equity on the basis that it allows certain individuals to pursue opportunities that they would not necessarily qualify for based on the general criteria for a specific type of employment (Azier 2010; Horwitz & Jain 2011; Oosthuizen & Naidoo 2010).

By analyzing the results of this study's research questions, institutions of higher learning, community leaders, employers, job seekers and students will gain an insightful information that

will allow them to understand a set of variables that would prove successful in the labor market. Community leaders in particular can use the findings of this study to address the challenges faced by an underprivileged demographics in the American society.

## Limitations

In a research study, limitations may occur when there are many variables measured simultaneously in a survey format. There is the potential to reduce the validity of a study (Coughlan, Cronin, & Ryan, 2009). This study only relies on self-reported data by the ACS survey participants for the year 2016. Due to this, there is no control over how the subjects have reported their age, race, gender, citizenship status, occupation-type, income, and employment status. Also, White/Caucasian race was more prevalent within the dataset as compared to a lower sample size among the other race categories that are in the dataset. Due to the fact that race White is significantly higher in proportion than other races, it can be considered as a limitation since a smaller sample size tend to increase the level of uncertainty and vice versa.

## Definition of Key Terms

American community survey - American community survey is a survey of US households conducted by the US Census Bureau monthly.

Associates Degree – Two year degree from a community college

Career and technical education - Career and technical education includes 16 career clusters that are taught to students in pre and post-secondary level

Human capital theory - The human capital theory implies that an investment in human capital, i.e., education or training, would impact the economic gains for the individual in a positive direction.

Labor market outcomes – employment and pay related outcomes in the workforce

Logistic regression analysis is a technique that explains the relationship between an independent variable and a binary dependent variable (Tripepi, Jager, Dekker, & Zoccali, 2008).

Multiple linear regression is a technique used in finding the linear combination of a set of predictors, which gives the most accurate estimates of a dependent variable from a set of available data (Mason & Perrault, 1991).

National career clusters framework - National career clusters framework gives a guideline for organizing the career and technical programs in 16 career clusters.

Outliers – Values that are significantly different from the mean value for a particular variable.

## Summary

For this study, data from ACS was utilized. Due to a lack of research in labor market outcomes based on specific career clusters among the associate degree holders, this study had presented the labor market outcomes based on career clusters and population demographics. Included in Chapter 1 is a discussion of the problem and purpose of the study along with the conceptual and theoretical frameworks, research questions, limitations, definition of key terms, and research method.

This chapter began with an overview of how the changes in current labor market are dictating the need to have a competent and educationally competitive workforce in place. At the same time, this chapter explores the concept of equity in the labor market for various demographics. Also discussed in this chapter were the research questions, method, and conceptual framework that supplied a direction for this study. Chapter 2 is consisted of a literature review of the pertinent research for this topic. Chapter 3 explores the research design used for this study. Chapter 4 follows with a presentation of the findings. Finally, Chapter 5

provides a summary of this study, its implications, and makes recommendations for future research.

# CHAPTER 2: LITERATURE REVIEW

This chapter supplies a context for the study in community colleges, an overview of fields of study and demographics and its impact on labor market outcomes in terms of employment rate and income. To highlight the need for such a study, this chapter will discuss the role of student demographics and occupation-type in determining the labor market outcomes. This chapter also provides a general overview of post-secondary education and its impact on the labor market outcome. For this research study, the researcher made a significant attempt to find all the available literature on career clusters. After spending a significant amount of time and effort to find all the literature pertinent to career clusters, the researcher found a lack of research studies available to provide a historical perspective on the organization of career clusters and how they evolved with the emergence of new technological and socio-economic trends. The conclusion was that dividing careers by clusters is a new concept and has comparably less significance in the past (McCharen, 2008; Rojewski, 2002; Stipanovic, 2010). Studies of the recent past have emphasized broader disciplines such as science, liberal arts, technology, business, etc. rather than having a more narrow set of associated career groupings assigned in a particular clustering of careers (Abel & Deitz, 2017; Britt, 2015; Peters & Belkin, 2014).

For this study, the researcher made the decision to focus specifically to understanding the variables such as gender, age, race, and citizenship status. Throughout this research study, this author used recent literature in the above indicated areas to provide the most recent perspective as it relates to the role of demographics and occupation-types in determining the labor market outcomes. The literature review includes sections on ACS, career clusters, benefits of post-secondary credentials, role of demographics in determining the labor market outcomes, and the role of other miscellaneous variables in determining the labor market returns.

## American Community Survey

American Community Survey (ACS) is a survey of US households conducted by the US Census Bureau monthly. According to Spielman, Folch, and Nagle (2014), the following information provides a general perspective on ACS: "The ACS is the primary national source of geographically and demographically detailed information about the American population. It is an essential resource for cartographers, geographers, or anyone interested in understanding neighborhood scale social and economic patterns" (Spielman, Folch, & Nagle, 2014, p. 2). The information that US Census Bureau collects from the households provides information on its website for use in studies conducted to understand the emerging trends within the American population and society. ACS survey is regarded as a most recognized source of obtaining demographically detailed information about the American population and is designed to capture one survey response per household as each household completes only one survey (Spielman, Folch, & Nagle, 2014). The ACS is conducted on a monthly basis as survey questionnaires are mailed to 250,000 housing units and have an average collection of about 2 million responses from households each year (Citro and Karlton, 2007). The reliability and validity of ACS has been discussed in a number of publications. Research by (Folch et al, 2016) suggests that household income in the study can yield uncertainty in estimates since data is collected differently in urban cores relative to suburban areas and in lower income areas due to variability of response rates between different population demographics.

Research by Citro and Karlton, (2007) also suggest that ACS research design can contribute to a large margin of error as the collection of responses from different areas vary based on the population demographics. Research by (Boudreaux et al, 2015) also suggest that ACS recorded data was unreliable for questions related to health insurance and Medicaid. Based

on this research, the study concluded that ACS over counted the number of survey respondents by 16-percent compared to the actual enrollment of the survey respondents in the Medicaid statistical information system (Boudreaux et al, 2015). Spielman and Folch (2015) had indicated that ACS data can have a high margin of errors especially when it comes to poverty and income level. The same researchers had also indicated that ACS utilizes a strategy to combine high margin of error data from low-income neighborhoods with a lower margin of error data from high-income neighborhoods to create a middle income neighborhood with a reduced margin of error. Spielman and Folch (2015) also argued that such aggregation still have a significant impact on the reliability and validity of outcomes.

**National Career Clusters Framework**

The National Career Clusters Framework came into existence in the early 21st century when employers and post-secondary institutions began to realize the importance of integrating academic and technical knowledge to create content for relevant and across-discipline learning opportunities (Reese, 2008). This was done to equip the new labor force to work at an evolving workplace as a result of technological advances and globalization (Rojewski, 2002).

Beginning in the 1990s, traditional vocational programs in the US were redesigned to prepare students for post-secondary education, rather than just the placement into the labor market (Giani, 2019). This developed further with the passage of Perkins IV in 2006 which resulted in the introduction of career and technical education (CTE). This new model whose origins came out of the vocational schools over the last few decades have evolved from skills-based courses to programs that align students with present day career pathways and employments (Giani, 2019). Over the last few years, the historic career and technical education pathways have evolved to accommodate the changes in technology and the demands of the labor

market (Reed, Dougherty, Kurlaender, and Mathias, 2018). The above indicated changes that resulted in CTE development were then paired with the development of the National Career Clusters Framework (NCCF) which guided the design of CTE programs into an assorted set of industry clusters and career pathways (Giani, 2019).

The National Career Cluster Framework is the grouping of higher education programs into career clusters representing many career pathways to assist students in making a connection between knowledge acquired in classrooms with practical skills that are needed to pursue a career (Stipanovic, 2010). National Career Clusters Framework gives a guideline for organizing the career and technical programs in 16 career clusters. McCharen (2008) indicated that the Office of Vocational and Adult Education (OVAE) of the U.S. Department of education came up with a national framework of career clusters and pathways that joins education to industry. According to this research study:

> This national career cluster framework established a relationship among knowledge and skills and provided a broad structure within which states may create courses with the knowledge and skills suggested as content. The implication for this new structure is a connection among knowledge and skills and courses taught in high school CTE and career technology centers and continuing in postsecondary education. (McCharen, 2008, p. 205)

Lynch (2000) has implied that clustering of academic disciplines can have various advantages for practice and research:

> Contemporary work-based learning is grounded in teaching and learning research emanating from the cognitive sciences, psychology, and pedagogy. Consistent with research from these various disciplines, work-based learning blends into an integrated

> curriculum the mental and tactile, theoretical and applied, and academic and vocational. This blending appears to result for most students most of the time in increased retention of knowledge, deeper understanding of subject matter, and the ability to apply (i.e., transfer) knowledge and skills in well-structured environments. The effectiveness of blended classroom and work-based activities also draws strength from the psychological and pedagogical principles underlying constructivism, contextual learning, and the teaching of concepts and subjects through a variety of methods based on students' preferred learning styles and authentic assessment. (Lynch, 2000, p. 67)

Other studies have also emphasized the practicality of utilizing the career clusters in today's economy (Asunda, 2012; Gregson, 2010; Kerna, 2012). The inclusion of a wide variety of academic courses along with broader and diversified type of instruction about many different aspects of a particular industry would ensure that the students are more equipped to handle the changes in the labor market (Grubb, 1997; Rojewski, 2002; Stipanovic, 2010).

## Benefits of Postsecondary Credentials on Labor Market Outcomes

Understanding how the current higher education system affects the labor market is essential to evaluate the role of higher education in today's context. A significant amount of literature in higher education on the increase of higher educational credentials indicated that higher education pursuit is often related to higher income levels and lower unemployment rates among the degree holders (Langdon, McKittrick, Beede, Khan, & Doms, 2011; Perna & Finney, 2014; Zumeta, Callan, & Finney, 2012).

### Benefits of Obtaining an Associate's and Bachelorette Degrees

Research by Carnevale and Rose (2013) suggested that the wages of workers with a post-secondary education are rising much faster than the wages of workers without such credentials.

The authors argued that increasing wage gaps for these groups, show a demand for workers with post-secondary credentials. The authors of the same study found that, in 1979, those with a college degree earned 50% more than workers with a high school diploma or less. By 2005, the wage premium increased to 74% between the workers with a college degree versus high school diploma holders and the workers without it (Carnevale & Rose, 2013).

Research by Berger and Fisher (2013) suggested that a well-educated workforce is a key to state prosperity. The authors argued that investment in education is the key to increase productivity which will increase the income and wages across an economy:

> It makes sense that if an individual's wages increase with education, then wages across an economy likely increase as more people have higher levels of education. Businesses that need well-educated workers, and pay the wages such workers earn, will grow and prosper in states that have such workers and may be forced to leave states that don't. (Berger and Fisher, 2013, p. 7)

Research by Hicks (2013) found that workers who are well educated tend to do better than their counterparts:

> This appears as an unemployment rate gap favoring more highly educated workers. For example, between 1992 and 2012, workers without a high school diploma experienced an unemployment rate roughly 3.7% higher than those with a diploma. Workers with either an associate degree or some college experience enjoyed an unemployment rate a full percentage point below those with only a high school diploma, while those with a college degree saw an unemployment rate 1.9% beneath those with some college, but not a bachelor degree. (Hicks, 2013, p. 106)

Research by Liu, Belfield, and Trimble (2015) found that the quarterly earnings increased significantly for individuals who completed an associate degree program. The same study showed that quarterly earnings increases were higher for bachelor degree holders than associate degree holders.

**Comparison between Associate's Degree and Bachelor's Degree Holders.** Julian and Kominski's (2011) study on higher education and income indicated that, on average, associate degree holders between the ages of 25-64 across all races earn at least 20% less than bachelor degree holders over a 40-year time period. Sheehy (2014) suggested that an associate degree in a high-tech field such as engineering, medical imaging/radiation technology, dental, and HVAC (heating, ventilation or air conditioning) related areas can pay big dividends than a bachelor degree with a similar major. A similar study by Abel and Deitz (2017) had found the following:

> In particular, the likelihood of being underemployed is relatively low for those with quantitatively oriented and occupation-specific majors, and much higher for those with degrees in more general fields. Those with STEM and healthcare-related majors have done particularly well in recent years. (Abel & Deitz, 2017, p. 27-28)

Research by Weston (2015) showed that according to a 2011 report by Georgetown University's Center on Education and the Workplace, more than 25% of a two-year associate degree holders will end up making higher salaries than the average salary of someone with a bachelor degree. Oreopolous and Petronejevic (2013) suggested that increasing the access to a 2-year college can increase the educational attainment as well as earnings for students who are not interested or unable to complete a four-year degree. On the other hand, there is alternative research, which suggested that students who are diverted from a 4-year college to attend a community college face lower labor market outcomes (Mountjoy, 2017). These contrary results

have implications that an expansion of access to a two-year college has different consequences for the labor market outcomes of diverse types of students. It is worth the effort to investigate this issue further as this study is a step in that direction. According to Baum, et al. (2013), individuals with a bachelor degree were approximately 50% less likely unemployed than individuals with an associate degree.

Research in higher education had also suggested that as compared to high school graduates with comparable social and academic traits, associate degree holders earn approximately 20-30% more income and a 10-15% advantage among the baccalaureate degree holders (Grubb, 2002). Grubb's (2002) study also found the following:

> Overall, then, there are clear and substantial returns to Associate degrees, though they are — as anyone would expect — lower than the returns to baccalaureate degrees. There is greater uncertainty about the benefits of certificates, partly because of small sample sizes and partly because of missing information about licenses and "private" credentials. The benefits to completing some coursework in either 2- or 4-year colleges are smaller, in the range of 5–10%, and students need to complete 1 or 2 years of coursework to derive this benefit; for students at community colleges who are "uncommitted", or "experimenters", the employment benefits are trivial. (Grubbs, 2002, p. 311)

Research also indicated that community college graduates from two-year or a four-year institution have a higher salary and are more likely employed than non-completers of a degree program (Toutkoushian, Shafiq, & Trivette, 2013; U.S. Bureau of Labor Statistics, 2016). Empirical research of the recent past has suggested a positive relationship between secondary, post-secondary, and tertiary education and economic mobility (Goldin & Katz, 2008; Hout, 2012).

The findings of a research study by Baum, Ma, and Payea (2013) indicated that unemployment rates of individuals ages 25 and older by race and education level were significantly different between associates and bachelor degree holders.

## Impact of Demographics on Labor Market Outcomes

It is vital to understand the changes in the demographics so that its impact on labor market outcomes can be understood. In this section, the role of age, gender, race, and citizenship status will be covered in detail.

### Age and Workforce

Due to the fact that age differences can vary significantly between workers, the role of age is an important variable to consider when studying the labor market outcomes. The literature that was used in this study provides mixed evidence pertaining to the role of age on the labor market. Some of the studies indicated below favors the younger workers while others favor older workers when it comes to the labor market returns. Due to these contrary evidences, the researcher had investigated the role of age in this research study. A vast majority of the studies from the past have only concentrated on traditional versus the non-traditional students without further dividing the age groups to fully understand the labor market outcomes based on variations in enrollment patterns among the US population.

The findings of a research study by Baum, Ma, and Payea (2013) indicated that unemployment rates of individuals ages 25 and older by race and education level were significantly different between associates and bachelor degree holders.

According to Bertola, Blau, and Kahn (2007), labor market tends to favor the prime age workers more than the youth and elderly individuals who are in the labor market. The authors had indicated the following:

> The results suggest that countries where union wage-setting institutions exert a more pervasive influence on labor market outcomes tend to feature relatively low employment levels among the young and the elderly, and relatively high unemployment rates among women, while preserving high employment rates for prime age men. (Bertola, Blau, & Kahn, 2007, p. 34)

As cited in Moore (2009), the role of age is vital in determining the labor market outcomes especially for older women of age 50 years and above:

> For older black women discussion of age can be simultaneously both radicalized and gendered, and move between articulations of racism, sexism, and ageism. A 52-year old unemployed Pakistani woman was trying to get back into the labour market, specifically retail, where appearance might come into play. She perceived that employers would want to employ someone younger who could 'show more cleavage', while she wore a headscarf. (Moore, 2009, p. 662)

Quite contrary to the research studies indicated above, some other research has suggested that older workers have an advantage over younger workers due to the fact that they have a more substantial employment history as compared to the relatively younger workers (Farber et al., 2019).

**Gender and Workforce**

Besides age, gender is another variable that is widely mentioned in research studies when it comes to equity and equality (Adda, Dustman, & Stevens, 2017; Blau & Kahn, 2017; Goldin, 2014).

Research by Liu, Belfield, and Trimble (2015) found that the quarterly earnings increased significantly for female associate and bachelor degree holders as compared to their male

counterparts. Some other studies suggested that middle-aged women of minority status are more likely to face discrimination as they grow old (Duncan & Loretto, 2004; Lahey, 2008; Moore, 2009).

As indicated in the above mentioned research studies, gender plays a vital role in determining the labor market outcomes. Due to this, this section will cover the role of profession and family on the labor market outcomes based on gender.

Have an introduction paragraph that talks about Gender and why you are looking at it and what areas you will address. The put subheading in the gender area.

**Professions and Gender.** Studies emphasized that the type of profession, especially among females who are of child bearing years, influenced labor force participation (Adda, Dustman, & Stevens, 2017; Blau & Kahn, 2017; Goldin, 2014). These findings are in-line with the study by Hotz, Johansson, and Karimi (2018), which suggested that after giving birth, women usually seek more family friendlier work environments, which usually have less growth opportunities in the long run:

> Thus, while there does appear to be tangible benefits of working in more family friendly work environments for mothers, these benefits may not end up enhancing their careers in the longer term. This may be due to the fact that – as our data shows – family friendly workplaces exhibit a lower- to medium skilled, and occupationally specialized workforce, lower within-workplace wage dispersion, and have altogether less room for climbing the career ladder. These patterns in the attributes of family friendly jobs and workplaces suggest that it is easier to substitute workers in jobs found in "family friendly" workplaces, thereby reducing the potential losses incurred on employers of workers with family responsibilities. (Hotz et al., 2018, p. 41)

Adda et al. (2017) also showed that women choose their occupations based on the expectation on future fertility decisions:

> A woman who knows that she will remain childless is less likely to work in routine and manual occupations (by about 3% and 2% respectively), and more likely to work in occupations involving mainly abstract tasks (by about 5%). This is an important insight, suggesting that key career decisions are affected by the expectation about future fertility, possibly long before fertility decisions are taken, and implies that some of the career costs of children are determined even before a child is born. (Adda, Dustmann, & Stevens, 2017, p. 26-27)

**Gender and Salary Disparities.** According to Goldin (2014), females with a terminal pharmacy degree in the US are more likely employed and keep their part-time status even after child birth than the females with a terminal law degree. Their pay is more consistent even with their part-time status as compared to the female lawyers. Female lawyers' have non-linear differences in wage when their status changes from full-time to part-time. These studies also emphasized the role of household income, particularly the husband's income, which indicated as a strong predictor in determining the labor market status of female workers of childbearing age (Adda, Dustmann, & Stevens, 2017; Blau & Kahn, 2017; Goldin, 2014). Goldin (2014) had found that females with a terminal law degree are less likely employed after having kids if their husbands earn 200K or above in annually.

**Evidence on Salary Gaps by Gender.** Research also suggests that due to family responsibilities, women are less likely to attain management level positions which results in achieving lower salary thresholds as compared to their male counterparts (Adda, Dustmann, & Stevens, 2017; Hoyt, 2010). These findings are in-line with the study by Loughran and

Zissimopoulos, (2009), which suggest that due to family life, women earn lower salaries than men:

> Our estimates imply that female wages fall 2-4 percent in the year of marriage. Marriage has the additional effect of lowering the wage growth of women by another two to four percentage points. A first birth lowers female wages 2-3 percent but has no effect on wage growth in subsequent years. (Loughran & Zissimopoulos, 2009, p. 346)

**Race and Workforce**

Race is another variable which is often indicated as a key variable when it comes to the study of demographics and labor market outcomes. Besides age and gender, the issue of race and labor market is increasingly gaining momentum in the realm of equity and equality (Baum et al., 2013; Gaddis, 2014; McDonald et al., 2009).

Gaddis (2014) suggested that even if job candidates from different races graduate from an elite school, they will have differences in the labor market outcomes:

> The opportunities that arise upon graduation from an elite university are not equal between whites and blacks. Although there is clearly a premium to a degree from an elite university over a less selective university for both white and black candidates, black candidates still lag behind white candidates in employer responses. Additionally, when black candidates receive responses, they are for jobs with lower listed salaries and less often for managerial or analyst jobs. Thus, even if we assume that black candidates could simply work harder and apply to many more jobs than their white counterparts, inequality would still pervade the labor market. (Gaddis, 2014, p.22)

According to Baum, et al. (2013), as compared to the other races, the difference between the levels of unemployment was greatest among African American two year and four year degree holders.

**Opportunities and Race.** McDonald, Lin, and Ao (2009) found that some races receive more job leads, which could lead to employment opportunity related disparities among the minorities.

However, further analyses show that while the receipt of job leads increases with supervisory authority for white males, it decreases for black males and females. Among workers in high authority positions, white males receive more job information than African Americans. These findings highlight the marginalization that black professionals experience in management positions. These results also suggest that black access to job opportunities in the labor market might be limited more by quality than quantity (McDonald et al., 2009, p.398).

Research by Lyons and Pettit, 2011 suggests that due to a higher risk of incarceration among blacks, they continue to be at a higher risk for lower labor market returns during their lifetime than other races, especially their white counterparts. The same research has also indicated that, after release from prison, the rate of wage growth is slower for blacks than whites.

**Role of Race Based Societal Influences on Careers.** Research by Poon, 2014 suggests that first and second generation Americans had the tendency to be influenced more by their parents and other cultural and social interactions to pursue careers that their guardians see fit based on their own experiences in their country of origin. This results in racial confinement of some races within atypical academic majors or vocational pathways due to a heavy influence of sociocultural variables.

Research by Pager and Karafin, 2009 suggests that employers have certain stereotypes about certain races and they act on them based on these stereotypes in making a hiring decision. The same research study has indicated that employers have certain stereotypes based on either their own social interactions and that the majority of employers seemed incapable of changing their views even after having some positive experiences with the race that they have stereotyped with in a negative way.

## American Citizenship and Non-Citizenship Status

### Immigrant Workers, and Workforce

Orrenius and Zavordy (2008) suggested that migrant workers earn less due to the fact that their educational credentials are usually lower than American born population as well as their limited English language proficiency, and lack of institutional knowledge. Another study by Orrenius and Zavodny (2009) suggested that the ability to speak English and lower educational credentials are the main variables which impacts the kind of work which is available to the immigrants.

> Our results indicate that differences in observable characteristics, such as English ability and education, play important roles in the tendency of immigrants to work in riskier jobs. Workers' ability to speak English is inversely related to their industry injury and fatality rates, indicating that immigrants who speak English fluently work in safer jobs. (Orrenius & Zavodny, 2009, p. 548)

The same research study by Orrenius and Zavodny (2009) found the lack of ability to communicate in English, a poorer educational background, and differences in the cultural perception of what is considered being risky, the immigrants are more likely to sign-up for work opportunities which would normally be considered as dangerous in the American culture.

> There are several reasons why immigrants might hold riskier jobs than natives. First, immigrants might have different perceptions or knowledge of job risks than natives. Immigrants may perceive work-related risks differently than natives because job conditions in the United States may be less risky than those in some developing countries, for example. Immigrants might therefore be more willing than natives to take risky jobs because they do not perceive them as particularly dangerous. (Orrenius & Zavodny, 2009, p. 536)

Research by Hall, Greenman, and Farcas (2010) had indicated that, on average, White Americans earn higher annual wages than Hispanic non-residents.

> Effects for years of schooling show even more striking inter-group differences. Thus, each additional year of schooling increases the starting wage rates of undocumented Mexican immigrants by 1.5%, whereas the effect for documented Mexican immigrants is 3.5%, that for Mexican American natives is 6.0 %, and that for non-Latino white natives is 9.3%. (Hall, Greenman, & Farcas, 2010, p.11)

Research by Waters, Kasinitz, and Asad (2014) suggested that due to immigrants some racial minorities are at a disadvantage.

> Furthermore, considerable evidence suggests that many employers prefer immigrants—including black immigrants—to African Americans in lower-skilled jobs. Whether due to simple racism, the perception that immigrants make better workers, African Americans' less effective use of social networks, or employers' perceptions that immigrants are more exploitable, the preference for immigrants seems quite consistent. (Waters et al., 2014, p. 380)

A study by Kerr, Kerr, and Lincoln (2015) found that age of an immigrant and skill level of the employment are important variable to consider to determine the demand for a high skill job.

> To summarize, we find evidence that increased employment of young skilled immigrants raises the overall employment of skilled workers in the rm, increases the immigrant share of these workers, and reduces the older worker share of skilled employees. The latter effect is evident even among natives only. As to whether the older worker skilled employment increases or declines in absolute level, the evidence is mixed but suggests that absolute declines are not likely. These estimates suggest that age is an important dimension on which rms make decisions and that there may be lower complementarity between young skilled immigrants and older domestic workers. (Kerr et al., 2015, p. 152)

## Other Miscellaneous Variables

### School Type

**Impact of School Type on Labor Market Outcomes.** Deming, Yuchtman, Abulafi, Goldin, and Katz (2016) showed that employer preferences in choosing candidates based on the type of institution also plays a significant role in determining the labor market outcomes. The type of institution referred to in their study was either public, for profit, or online institutions: First, for business job vacancies that require a bachelor's degree, employers strongly prefer applicants with degrees from public institutions as opposed to applicants with degrees from for-profits. Callback rates differ by more than 20%. Importantly, the penalty for having a bachelor's degree from a for-profit college varies across types of institutions. Applicants with degrees from local "brick and mortar" for-profits are not as severely penalized as are applicants

with degrees from large, online "chain" institutions that have grown rapidly during the last 15 years. These online, for-profit colleges have been responsible for 21% of the growth in all bachelor degrees and 33% of the growth in bachelor degrees in business from 2002 to 2012. (Deming et al., 2016, p. 22)

A few other research studies have indicated that attending the resourceful community colleges and four-year institutions, with many hands-on opportunities for students to learn their specialized academic interests can have a greater impact on the labor market outcomes in terms of earnings and employment rates than their peer institutions (Park, Flores, & Ryan, 2016; Strayhorn, 2008). These studies emphasized the role of resources in supplying opportunities for the students, which translates into a labor ready student body upon program completion.

## Economy

**Impact of Economy on Post-secondary Institutions.** According to Woodruff (2011), the rate of college enrollment at community colleges has skyrocketed due to high employment demands since the 2009 recession. The author reported that due to less time to degree completion, lower tuition costs, and convenience to home location, students are opting to attend community colleges versus a four-year school. Chen (2017) and Woodruff (2011) implied that graduating from a two-year degree program save students money over traditional four-year degree programs, which costs more in terms of cost of attendance. This is especially important with level of uncertainty about the future wages based on tight economic constraints. Also, students have to borrow less money to finish their education, which students have a chance to make up for the salary difference from a bachelor degree by majoring in an allied health related field (Britt, 2015; Sheehy, 2014).

Research by Altonji, Kahn, and Speer (2016) suggested that labor market conditions play a significant role in determining the employment and earnings. The authors also showed that the earning gaps widen during the recession since recession affects the higher-skilled majors less than the low-skilled majors:

A person in a typically high-earning major increases his or her earnings advantage by a third when graduating in a bad recession relative to an average major, and this effect remains large for the first seven years after college graduation. These differential effects reflect increases in the probability of employment and full-time employment for higher-skilled majors relative to lower-skilled majors graduating into a recession, as well as differential effects on wage rates (Altonji et al., 2016, p. 34).

**Instructional Type**

**Impact of Internships on Labor Market Outcomes.** Besides the role of years of education and demographics in determining the labor market outcomes, there is an abundance of literature indicating that many other factors also influences the labor market outcomes (Abel & Dietz, 2017; Altonji, 2016; Nunley, Pugh, Romero, & Seals, 2016; Silva et al., 2018). Internships and their impact on the labor market outcomes is another factor affecting labor market returns. Research studies showed that internships tend to improve the probability of employment for program completers at the post-secondary level (Nunley, Pugh, Romero, & Seals, 2016; Silva et al., 2018). Nunley et al. (2016) suggested that internship experience is an important determinant of salaries post-graduation:

> We find no evidence that employers prefer to interview job seekers with business degrees over applicants with nonbusiness degrees, despite applying exclusively to business-related job openings. In addition, there is no advantage, in terms of job opportunities,

> associated with particular business degrees. However, we find strong evidence that internship experience improves employment prospects: the interview rate for applicants who worked as interns (Summer 2009) before they graduated with their Bachelor degrees (May 2010) is about 14 % higher than that for those who did not work as interns. (Nunley et al., 2016, p. 2)

## Field of Study

**Impact of Field of Study on Labor Market Outcomes.** Research by Britt (2015) suggested that even though in the long-term, a bachelor degree may have higher returns than an associate degree, there are some specialized fields such as construction, IT, manufacturing, and health-care with high returns on a two year of investment and average annual initial salary of $60,000 as compared to $38,000 of average annual entry-level salary of a bachelor degree holder. A similar study by Peters and Belkin (2014) found that community college graduates of a two-year degree in a technical field are earning higher wages than the average salary of a bachelor degree holder. Other research studies emphasized that on average, bachelor degree earner will earn higher salaries and the average salary gap will continue to increase with the job experience in the long-run between the associate degree holders and bachelor degree holders (Hill, 2014; Liu, Belfield, & Trimble, 2015).

Research by Compton, Laanan, and Starobin (2010) indicated that for some career clusters, the completion rates are higher than others because there is a significantly higher employment outcome for the program completion, especially for degrees in the IT and marketing related disciplines. This showed that degree completion in certain occupation-types can give significantly better employment outcomes than others. A similar research by Dadgar and Weis (2012) implied that associates degree in general and long-term certificates in certain fields would

result in increased quarterly wages partly due to a greater likelihood of employment and availability of more work hours. The same study also showed that some fields of study would have a higher return than others:

> We find that there is great variation to returns across fields of study within a given credential level. For example, earning an associate degree in nursing increases women's wages by 37%, whereas earning an associate degree in humanities and social sciences or information science, communication, and design increases wages by only 5% and 3.6%, respectively (Dadgar & Weiss, 2012, p. 35).

## Underemployment

**Underemployment among College Graduates.** Research studies on the underemployment among college students showed that college graduation is overestimated in the US and other developed countries as it has become too much of a gold standard (Holmes & Mayhew, 2016; Sheehy, 2014). Recent research studies also suggested that many underemployed recent college graduates are working in higher ratio in comparatively well-paid non-college jobs which require some level of knowledge, skills, and abilities than similar-aged employees without a college degree (Abel & Deitz, 2017; Bennett & Vedder, 2015). According to Bennett and Vedder (2015), the relationship between college attainment and income inequality has changed over time due to an increase in the supply of college graduates versus the demand for college graduates in the labor market. The authors go on to say that since the mid-1980s, due to the increases in federally funded financial assistance programs, the supply of college-educated workers (coming primarily from middle-income level households) have grown faster than their demand. This resulted in increased income inequality by the latter part of 1990s. The same study has also implied that the majority of states in the U.S. had reached an achievement rate at a

level that any additional increases in college completion will contribute to increasing inequality in the U.S. labor market (Bennett & Vedder, 2015). This study had also concluded the following:

> Underemployment by the college educated is on the rise, aided undoubtedly by some of the aforementioned factors such as grade inflation and a decline in average cognitive ability and work effort among graduates, but also a disconnect between the supply and demand conditions of the labor market. The growth in what might be termed high skilled jobs typically associated with a college education has been much slower than the growth in the supply of college graduates, forcing an increasing proportion of those graduates to take relatively low paying unskilled jobs. (Bennett & Vedder, 2015, p. 260)

Other research studies indicated that due to a significant increase in unemployed and underemployed college graduates in the twenty-first century, more consideration should go to the role of sub-degree qualifications obtained in educational institutions other than the conventional universities (Abel, Deitz, & Yaqin, 2014; Holmes & Mayhew, 2016; Sum & Khatiwada, 2010).

## Poverty

**Impact of Poverty on Labor Market Outcomes.** Recent research in the field of student demographics and labor market outcomes suggested that lower socioeconomic status can lead to poor cognitive development, lower level of educational attainment and lower labor market and health-related outcomes in adulthood (Johnson & Schoeni, 2011). The same study had indicated the following:

> The results reveal that being born low weight ages people in their 30s and 40s by 12 years, increases the probability of dropping out of high school by one-third, lowers labor

force participation by 5 %age points, and reduces labor market earnings by roughly15 % . (Johnson & Schoeni, 2011, p. 41)

A similar research study by Lacour and Tissington (2011) showed because of poverty, students will have fewer resources their disposal which will negatively affect their labor market outcomes as compared to students not living below the poverty level. There is also an abundance of literature available on food insecurities and poor academic performance among the school-aged and college-aged populations (Cady, 2014; Dubick Matthews, & Cady, 2016; Jyoti, Frongillo, & Jones, 2005).

## Equity

**Impact of Equity on Labor Market Outcomes.** There is also an abundance of research studies on the role of equity and the impact on the society's socioeconomic conditions. There is an availability of both positive and negative literature showing the impact of equity-mindedness on the labor market and society (Azier 2010; Oosthizen & Naidoo 2010; Horwitz & Jain 2011). Generally, the current research on equity either supports this concept in terms of equal opportunity for all or it criticizes equity on the basis that it allows certain individuals to pursue opportunities that they would not necessarily qualify for based on the general criteria for a specific type of employment (Azier 2010; Horwitz & Jain 2011; Oosthuizen & Naidoo 2010).

## Summary

The literature reviewed for this chapter focused on the benefits of reaching post-secondary credentials and the role of demographics in determining the labor market outcomes based on the research studies of the past. While the literature on these issues is in abundance, however, to better understand the role of an associate degree on labor market outcomes for a diverse population demographics and career-cluster, there is a need for further research.

Literature showing other miscellaneous variables such as the role of internships, equity, discrimination, labor market conditions, institutional characteristics, and the field of study and its impact in determining labor market outcomes are also included in this chapter.

# CHAPTER 3: METHODS

This chapter explains the method used in this study to explore the research questions. The first part of this chapter shows the statistical techniques used in this study. The latter part of this chapter will cover the topics related to data analysis and re-coding of variables.

By using the logistic regression analysis and multiple linear regression analysis in SPSS 25 software, this study examined the effects of obtaining an associate degree on labor market outcomes for a diverse population. The labor market outcomes examined in this study only include the unemployment rate and annual income. Logistic regression analysis is a technique that explains the relationship between an independent variable and a binary dependent variable (Tripepi, Jager, Dekker, & Zoccali, 2008). Multiple linear regression is a technique used in finding the linear combination of a set of predictors, which gives the most accurate estimates of a dependent variable from a set of available data (Mason & Perrault, 1991).

This chapter contains a description of the population for this study, a description of the data set, the analysis techniques, a brief discussion of research questions, a discussion on the relevance of using multiple linear and binary logistic regression models, and the prospect of this research study in understanding the role of career-clusters and demographic variables in impacting the labor market returns for a diverse population.

## Participants

The population of this study includes 46,850 individuals. The ACS sampled 3.5 million individuals. From the sample, a delivered sample include 2.29 million participants who completed the American Community Survey (ACS) for the year 2016. The U.S. Census Bureau administered the ACS via mail, telephone interviews, and in-person interviews. Of the 2.29 million participants, only the participants who had obtained an associate degree are a part of this

study. This study used an initial dataset of 66,986 associate degree holders. A total of 46,850 associate degree holders were represented among the 15 career clusters. The career cluster about government related careers is omitted due to a small sample size for less than 500 individuals. For both the binary logistic and multiple linear regressions, variables such as employment status, annual income, age, race, and gender have a significantly higher sample size than other variables used. The dataset was examined for any missing values and outliers. The missing values that were omitted included missing annual income related data. By using the "select cases" option, data was filtered to include only the cases that were within the +/-3.29 standard deviations from the mean in terms of annual income. There was an abundance of missing values omitted from the analysis to increase the accuracy of the regression models.

## Research Questions

The following five research questions and hypotheses framed this research:

RQ1: Does age have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential?

$H_0$**:** Age has no significant effect on the labor market outcomes of the ACS participants

$H_a$**:** Age has a significant effect on the labor market outcomes of the ACS participants

RQ2: Does race have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential?

**$H_0$:** Race has no significant effect on the labor market outcomes of the ACS participants

**$H_a$:** Race has a significant effect on the labor market outcomes of the ACS participants

RQ3: Does gender have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential?

**$H_0$:** Gender has no significant effect on the labor market outcomes of the ACS participants.

**$H_a$:** Gender has a significant effect on the labor market outcomes of the ACS participants.

RQ4: Does American citizenship have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential?

**$H_0$:** American citizenship has no significant effect on the labor market outcomes of the ACS participants.

**$H_a$:** American citizenship has a significant effect on the labor market outcomes of the ACS participants.

RQ5: Does occupation type based on a specific career-cluster have a significant effect on the labor market outcomes (employment rate and annual income) among the associate degree holders?

**$H_0$:** Occupation type based on a specific career-cluster does not have a significant effect on labor market outcomes among the associate degree holders

$H_a$**:** Occupation type based on a specific career-cluster does have a significant effect on labor market outcomes among the associate degree holders.

## Data Collection

The American Community Survey data came from the website of the United States Census Bureau for the year 2016. Below are the steps used to organize the data. An original CSV file downloaded from ACS's website and converted into SPSS format. The researcher only kept the values for individuals with an associate degree and omitted other educational credentials.

### Construction of the Data Set

Once the file for all ACS 2016 data downloaded from the U.S. Census Bureau's website, the process to make the data meaningful for this research study began. Excluded from the study were all the cases where survey participants did not have an associate degree. Next, the exclusion of survey participants that were not in the labor force. These included individuals that were younger than 16 years of age and individuals institutionalized in prisons, retired, or not seeking active employment. Once the researcher removed the extraneous participants, the dataset went into separate categories for binary logistic and multiple linear regression analysis. For the binary logistic regression analysis, the survey included participants with no annual wages (unemployed individuals) in the model since it was essential to compare them with the employed individuals. For multiple linear regression analysis, the researcher excluded the survey participants with no annual wages from the dataset since the variable of interest was annual salary differences between the employed individuals in certain career-clusters.

**Recoding Variables**

A code of the dependent variables seen in Tables 2 was such that ESR will be a binary variable EMP_Status with only two options including either employed or unemployed. Inclusion in the data set included individuals who were 16 years of age or older were in the recoded variable EMP_Status; with all other cases, such as, not in the labor force or under 16 years of individuals were omitted from the analysis. The variable CIT showing American citizenship recoded into CIT_ST with only two options including either an American citizen or not. In this study, age will be divided to determine any statistical significance in labor market outcomes based on five different age categories, which are defined in the third chapter of this study. In Tables 2 and 3, the variable AGEP is recoded into five categories represented by the five distinct age groups which are 18-24, 25-34, 35-44, 45-54, and 55 and above. As shown in Table 1 below, the variable OCCP is recoded into 15 different career clusters per the model used by the National Career Cluster Framework.

As found by Folkers (2011), National Career Cluster Framework gives vital knowledge and skills for the 16 distinct types of career pathways. Apart from government and public administration due to a limited sample size, this study used all the other 15 career clusters defined by the National Career Cluster Framework. The career clusters as defined by the National Career Cluster Framework are in Table 3.

**Table 1.** *Classification of Career Clusters Based on National Career Clusters Framework.*

| Cluster Name | Cluster | Cluster Definition | *N* |
|---|---|---|---|
| Agriculture/Food | OCCP_AGRI | Agriculture and food industry related | 1426 |
| Construction | OCCP_CONS | Construction laborers and equipment operators | 2721 |
| A/V Tech and Communication | OCCP_COM | Broadcasting, communication/editing | 1523 |
| Business Mgt Adm | OCCP_BUS | Business management and administration | 8195 |
| Ed and Training | OCCP_EDUC | Teacher and instructors from pre-school to post-secondary institutions | 2420 |
| Finance | OCCP_FIN | Financial advisors, loan officers, credit counselors, and financial analysts | 3240 |
| Health Sciences | OCCP_HSCI | Healthcare support workers, occupational therapy assistants and aides, physical therapy assistants and aides, and massage therapists' assistants and aides | 8030 |
| Hospitality/Tourism | OCCP_TOU | Lodging, food services, and travel agency | 3643 |
| Human Services | OCCP_HMSV | Community and social services included | 3577 |
| Information Technology | OCCP_IT | Information technology includes programmers, software developers, network specialists, and systems analysts | 1584 |
| Law and Public Safety | OCCP_LAW | Lawyers, magistrates, judicial workers, paralegals, legal support staff, and police officers | 2160 |
| Manufacturing | OCCP_MFG | Production workers and machine operators | 3742 |
| Marketing | OCCP_MKT | Marketing managers and market research analysts | 5883 |
| Science and Technology | OCCP_STEM | Mathematicians, engineers, and technology | 973 |
| Transportation | OCCP_TRAN | Transportation and logistics | 3570 |

*Note.* Business Mgt Adm = Business Management and Administration, Ed and training = Education and Training.

**Table 2.** *Abbreviation, Type, and Coding of Employment, Demographics, and Type of Occupation Variables Used in Logistic Regression for the Associate Degree Holders.*

| Dependent | Independent | Coding |
|---|---|---|
| Employed (ESR) | | 1 = Yes 0 = No |
| EMP_Status | | 1 = Yes 0 = No |
| | Race | |
| | Black | 1 = Yes 0 = No |
| | Asian | 1 = Yes 0 = No |
| | American Indian or Alaskan | 1 = Yes 0 = No |
| | Other | 1 = Yes 0 = No |
| | Age_ | |
| | Category 1 | 1 = 18-24 0 = All other values |
| | Category 2 | 1 = 25-34 0 = All other values |
| | Category 3 | 1 = 35-44 0 = All other values |
| | Category 4 | 1 = 45-54 0 = All other values |
| | Gender | 1= Male 2 = Female |
| | Citizenship Status | 1 = Yes 0 = No |
| | Occupation Type | |
| | Agriculture and Food | 1 = Yes 0 = All other values |
| | Construction | 1 = Yes 0 = All other values |
| | Communication | 1 = Yes 0 = All other values |
| | Business Management | 1 = Yes 0 = All other values |
| | Education | 1 = Yes 0 = All other values |
| | Finance | 1 = Yes 0 = All other values |
| | Health Sciences | 1 = Yes 0 = All other values |
| | Tourism | 1 = Yes 0 = All other values |
| | Human Services | 1 = Yes 0 = All other values |
| | Information Technology | 1 = Yes 0 = All other values |
| | Law | 1 = Yes 0 = All other values |
| | Manufacturing | 1 = Yes 0 = All other values |
| | Marketing | 1 = Yes 0 = All other values |
| | Science and Technology | 1 = Yes 0 = All other values |
| | Transportation | 1 = Yes 0 = All other values |

*Note.* All variables are dummy variables. Recoded name for ESR is EMP Status; Age of Respondents = Age. Original Variable name is AGEP.

**Table 3.** *Abbreviation, Type, and Coding of Employment, Demographics, and Type of Occupation Variables Used in Multiple Linear Regression for the Associate Degree Holders.*

| Dependent | Type | Independent | Coding |
|---|---|---|---|
| Annual Income | Continuous | | 1 = Yes 0 = No |
| | Dummy | Race | 1 = Yes 0 = No |
| | | Black | |
| | Dummy | Asian | 1 = Yes 0 = No |
| | Dummy | American Indian or Alaskan | 1 = Yes 0 = No |
| | Dummy | Other | 1 = Yes 0 = No |
| | Dummy | Age_ | |
| | Dummy | Category 1 | 1 = 18-24 0 = All other values |
| | Dummy | Category 2 | 1 = 25-34 0 = All other values |
| | Dummy | Category 3 | 1 = 35-44 0 = All other values |
| | Dummy | Category 4 | 1 = 45-54 0 = All other values |
| | Dummy | Gender | 1= Male 2 = Female |
| | Dummy | Citizenship Status | 1 = Yes 0 = No |
| | Dummy | Occupation Type | |
| | Dummy | Agriculture and Food | 1 = Yes 0 = All other values |
| | Dummy | Construction | 1 = Yes 0 = All other values |
| | Dummy | Communication | 1 = Yes 0 = All other values |
| | Dummy | Business Management | 1 = Yes 0 = All other values |
| | Dummy | Education | 1 = Yes 0 = All other values |
| | Dummy | Finance | 1 = Yes 0 = All other values |
| | Dummy | Health Sciences | 1 = Yes 0 = All other values |
| | Dummy | Tourism | 1 = Yes 0 = All other values |
| | Dummy | Human Services | 1 = Yes 0 = All other values |
| | Dummy | Information Technology | 1 = Yes 0 = All other values |
| | Dummy | Law | 1 = Yes 0 = All other values |
| | Dummy | Manufacturing | 1 = Yes 0 = All other values |
| | Dummy | Marketing | 1 = Yes 0 = All other values |
| | Dummy | Science and Technology | 1 = Yes 0 = All other values |
| | Dummy | Transportation | 1 = Yes 0 = All other values |

**Table 4.** *Regression Methods Used to Examine the Research Questions*.

| Question | Analysis and Variable |
|---|---|
| 1. Do demographics (age, race, gender, citizenship status) have any significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential? | Binary Linear Regression for employment rate<br>Multiple Linear Regression for annual income |
| 2. Does occupation type based on specific career-cluster have a significant effect on the labor market outcomes (employment rate and annual income) among the associate degree holders? | Binary Linear Regression for employment rate<br>Multiple Linear Regression for annual income |

## Pre-data Analysis

For the purposes of accurately reporting the outcomes of the data analysis, it is vital to have the pre-screening of the main variables that are part of the data analysis (Mertler & Vannatta, 2010). The dataset was examined for any missing values and outliers. By using the "select cases" option, data was filtered to include only the cases that were within the +/-3.29 standard deviations from the mean in terms of annual income. It is vital to examine and address any missing data as well as outliers. To determine outliers, the researcher used z scores for all the variables. As shown by Tabachnick and Fidell (2013), the researcher excluded any z scores beyond +/-3.29 standard deviations from the mean. Only complete and valid data are in this study without using any possibility to calculate the missing values. Annual income is the only continuous variable in this study and therefore was the only one that was evaluated for outliers.

## Data Analysis

The American Community Survey (ACS) for the year 2016 was available through the United States Census Bureau's website. The sample size in this study includes an initial dataset of 66,986 individuals who had completed an associate degree and were in the labor force. Using the National Career Clusters framework as defined by the website of careertech.org, this study

has divided the occupation-type into 15 different career clusters. After omitting for missing variables a final dataset of 46,850 individuals was used

Once the researcher screened the data for outliers as indicated in the data pre-screening section above, multiple linear regression analysis and logistic regression analysis would occur separately. To determine the differences in annual wages among the associate's degree holders based on demographics and occupation type, the researcher conducted a multiple linear regression analysis. To determine the level of employment among the associate degree holders, binary logistic regression analysis would occur.

As shown in Table 2, the dependent variable (DV) for logistic regression analysis is employed where yes = 1 or no = 0. The independent variables will include race, age, gender, and occupation type based on career-clusters. The independent variable race organized into four distinct categories. The race category White was used as the reference category because of a large sample size as compared to other races in the dataset. Race categories such as Black, American Indian and Alaskan Native, and Asian received a value of 1 and compared with "Other" race category assigned with a value of 0. The "Other" race category includes race categories are indicated not unknown in the American Community Survey data. The researcher omitted other races such as Native Hawaiian and Pacific Islander from this study since their sample size is significantly small. The independent variable age was recoded from a continuous to four distinct dummy variables as shown in Tables 1 and 2. The age category 55+ was used as the reference category because of a large sample size as compared to other age categories. The independent variables gender, citizenship_status and type of occupation-cluster are included as dummy variables. For gender, the value of 1 represents the male gender and value of 2 represent the female gender. For citizenship status, the value of 1 represents the US citizen and 0

represents, citizenship of another country. For the independent variable occupation_type, business management was used as the reference category in logistic regression because of a high level of unemployment as compared to other occupation categories. In the linear regression where wage was the dependent variable, tourism was used as a reference category since it has the lowest annual income level among all career clusters.

Per Table 3, multiple linear regression model is useful to determine the effect of student demographics and occupation-type on annual income. In Table 3, annual income is the dependent variable under evaluation. All the independent variables in Table 3 are in the same way as they were in Table 2.

Once the researcher determined the DV and IVs, the next step is to screen the data for any missing values and outliers. After completing the first process of examining and addressing the missing data and outliers, the next step is to conduct a test for multicollinearity to understand the effect of multicollinearity on the regression model. Multicollinearity occurs when there is a linear relationship between two or more variables (Alin, 2010). It is essential to understand any effects of multicollinearity on the regression analyses. As shown in Tables 5 and 6, variables that caused high multicollinearity were excluded based on the variance inflation factor (VIF). As shown by Robinson & Schumacker (2009), the VIF is a measure of the impact of multicollinearity among the independent variables on the precision of estimation. The expectation is that the VIF value should not exceed 10 for the independent variable to remain as a predictor in a regression model (Belsley, Kuh, & Welsch, 2010). By choosing the collinearity diagnostic option in SPSS, the program determined the VIF values for all the independent variables in the model. As shown above, if the VIF value is less than 10, then inclusion of the independent variable in the regression model is appropriate.

After performing the multicollinearity test, moderator analysis test determined the interaction effect between the three demographic variables, which are age, race, and gender. As shown by Ai & Norton (2003), interaction effect determines the effect of an independent variable on the dependent variable depending on the magnitude of some other independent variable. Once there is the determination that interaction effect exists between two or more independent variables, then exclusion of those variables occur from the regression analysis.

The researcher used binary logistic regression to examine the rate of employment among various occupation-clusters and demographics. The independent variables such as the 4 age categories, the 4 race categories, the 2 gender types, the 2 options for American citizenship, and 14-different occupation-type by clusters are in the independent variable box. Race White, age group of 55+ individuals was used as the reference categories due to a large sample size from each of these independent variables. For occupation type, business management related occupations were used as a reference categories due to a higher level of unemployment among this group as compared to the other career clusters. For dependent variable, the employment rate went into the dependent variable box. Finally, the researcher selected the analysis option to run the binary logistic regression.

Multiple linear regression examined the annual income among various occupation-clusters and demographics. The independent variables such as the 4 age categories, the 4 race categories, the 2 gender types, the 2 options for American citizenship, and 14-different occupation-type by clusters are in the independent variable box. The dependent variable, annual income went into the dependent variable box. Finally, the researcher selected the appropriate option to run the multiple linear regression. All independent variables were entered into the equation in blocks.

RQ1: Does age have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential?

To answer the first research question, both multiple linear and binary logistic regression analysis were performed. In the multiple linear regression analysis, annual income was used as a dependent variable. All the age categories, except for the reference age category 55 and above, were placed along with other independent variables to determine its role on annual income and unemployment. In the binary logistic regression, employment level was used as a dependent variable. All age categories, except for the reference age category, 55 and above category, were placed along with other independent variables to determine its role on the employment level.

RQ2: Does race have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential?

To answer the second research question, both multiple linear and binary logistic regression analysis were performed. In the multiple linear regression analysis, annual income was used as a dependent variable. All race categories, except for the reference race category White, were placed along with other independent variables to determine its role on annual income and unemployment. In the binary logistic regression, employment level was used as a dependent variable. All race categories, except for the reference race White, were placed along with other independent variables to determine its role on the employment level.

RQ3: Does gender have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential?

To answer the third research question, both multiple linear and binary logistic regression analysis were performed. In the multiple linear regression analysis, annual income was used as a dependent variable. In the binary logistic regression, employment level was used as a dependent variable.

RQ4: Does American citizenship have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential?

To answer the fourth research question, both multiple linear and binary logistic regression analysis were performed. In the multiple linear regression analysis, annual income was used as a dependent variable. In the binary logistic regression, employment level was used as a dependent variable.

RQ5: Does occupation type based on specific career-cluster have a significant effect on the labor market outcomes (employment rate and annual income) among the associate degree holders?

To answer the fifth research question, both multiple linear and binary logistic regression analysis were performed. In the multiple linear regression analysis, annual income was used as a dependent variable. All occupation categories, except for the tourism category, were placed along with other demographics to determine its role on annual income. In the binary logistic regression, employment level was used as a dependent variable. All occupation categories, except for the reference occupation-type category, business management, were placed along with other independent variables to determine its role on the employment level.

## Reliability and Validity

Any research method should provide the same results if used by different researchers (Roberts & Traynor, 2006). In this research study, two dependent variables were used to study the general labor market outcomes in terms of annual income and employment rate among various demographics and occupation-types. All measurement procedures involve some form of error. Though, it is the amount of error that can be used to determine the reliability of a measurement procedure (Biemer, 2010). By using the ANOVA, the data was tested for differences. As indicated in the ANOVA test, it can be seen that the regression models were statistically significant due to statistically significant differences between the group mean values which were below 0.05.

Validity is the extent to which a variable is accurately accessed in a quantitative study (Heale & Twycross, 2015). The internal validity of this relationship based quantitative study is determined by the ability of the independent variables to justify that it causes the dependent variable (Meyer, 2001). Almost all the independent variables produced statistically significant results and explained the causal relationship between the independent and dependent variables based on the expected results from the literature review of this research study. The findings of the study are generalizable since most of the literature had also indicated that certain demographics and occupation-type provides better outcomes than others (Abel & Deitz, 2017; Britt, 2015; McDonald et al., 2009; Peters & Belkin, 2014).

## Summary

The purpose of this chapter is to describe the method that was used to conduct this study. The purpose of this study is to explore the differences between the labor market outcomes among different demographics when they achieve same level of educational credentials, i.e., an

associate degree program. The researcher used the American Community Survey (ACS) data for the year 2016 from the US Census Bureau's website to conduct this study.

Logistic regression analysis and multiple linear regression analysis gave the researcher a better understand of the effect of demographics and occupation-type on the labor market outcomes. The steps that were included in pre-data analysis as well as the data analysis were also highlighted in this section. Once the data was pre-screened for any missing values and outliers, the tests for multi-collinearity and interaction effect were conducted. The logistic regression and multiple linear regression occurred with the inclusion of all the independent variables in blocks to determine any significant changes in the R-square which represents the proportion of variance for a dependent variable that is explained by the independent variable.

# CHAPTER 4: RESULTS

This chapter presents the results for the study by research question. The study seeks to understand the relationship of demographics and occupation-type, by career cluster, on the labor market outcomes. To explore this relationship, the researcher used multiple linear regression and binary logistic regression analysis and separated the results into two models. The construction of model 1 was to determine the differences in wages based on demographics and occupation-type. For the first model multiple linear regression determined the effect of demographics and occupation-type on the annual income. Multiple linear regression was used because it is a technique used in finding the linear combination of a set of predictors which gives the most accurate estimates of a dependent variable from a set of available data (Mason & Perrault, 1991). The construction of model 2 was to predict the employment status (employed or unemployed) based on demographics and occupation-type. For this model, the researcher used the logistic regression technique to determine the effect of demographics and occupation-type on the employment rate of the ACS survey participants in 2016. Logistic regression analysis was used because it is a technique which explains the relationship between an independent variable and a binary dependent variable (Tripepi, Jager, Dekker, & Zoccali, 2008).

In this chapter, a descriptive overview of this study followed by a description of the data analysis and a summary of the findings pertaining to the role of demographics and occupation-type on labor market outcomes. The chapter includes data screening, descriptive statistics of the participants and variables under study, results of research question 1, and results of research question 2.

## Data Screening

The data analyses began with an omission of missing values and outliers. There was a total of 20,207 missing values and 463 outliers. This makes up a total of 20,670 missing values and outliers combined. After accounting for missing and omitted values, the researcher analyzed the sample of approximately 46,850 values. The next step was to determine any multicollinearity in the model. After conducting the diagnostic test for multicollinearity using annual income as an independent variable, it was determined that none of the variables had high level of multicollinearity as can be seen in Table 5. The researcher conducted another test for multicollinearity for the second model using employment status as a dependent variable. Results of the second multicollinearity test were like the first test for multicollinearity using a different dependent variable. As can be seen in Table 6, none of the variables had high level of multicollinearity.

After conducting the test for multicollinearity for the dependent variable employment status, the researcher conducted moderator analysis using binary logistic regression to determine if there is any interaction between the three demographic independent variables in the regression model. Results of the moderator analysis using binary logistic regression indicated showed that the interaction between the demographic variables is insignificant overall with the few exceptions indicated below. The researcher created variables including citizenship status by all race categories, citizenship status by all age categories, gender by all age categories, and gender by all race categories in order to determine the interaction effect on demographics on the overall model. Table 7 shows that among the variables included in the moderator analysis using the binary logistic regression, only the interaction between citizenship status and sex, citizenship

status and race category defined as “Other”, age group between 35-44 and sex, and age group between 45-54 and sex produced significant interaction effects.

After conducting the test for multicollinearity for the dependent variable annual income, the researcher conducted moderator analysis using multiple linear regression to determine if there is any interaction between the three demographic independent variables in the regression model. The researcher created variables including citizenship status by all race categories, citizenship status by all age categories, gender by all age categories, and gender by all race categories in order to determine the interaction effect on demographics on the overall model. Results of the moderator analysis using multiple linear regression indicated that the interaction between the above-indicated demographic variables is insignificant with the exception of all the gender and all race categories as well as gender and all age groups as well as the citizenship status. Table 8 shows that among the variables included in the moderator analysis using the multiple-linear regression, none of these variables produced any significant change in the regression output.

For all the variables that have an interaction effect, the interaction graphs in figures 1 through 5 provide a good visual on how the mean of each combination of groups can be seen in terms of non-parallel lines. In terms of a graphical illustration, figures 1-7 represent the interaction effect among the independent variables that were used in the multiple linear regression model. Figures 8-11 represents the interaction effect among the independent variables that were used in the binary logistic regression model. The non-parallel lines indicates that the two independent variables in each of the figures had some interaction.

Results of the moderator analysis in binary logistic regression indicated that the gender and all race categories had a significant interaction with the exception of American Indian race

category. Results also indicated that all age groups had a statistically significant interaction with gender.

**Table 5.** *Multicollinearity Test: Annual Income and Employment Status as Dependent Variables.*

| Variable | VIF ES |
|---|---|
| Race | |
| Black | 1.01 |
| Asian | 2.25 |
| American Indian or Alaskan | 1.35 |
| Other | 1.89 |
| Age | 1.23 |
| Age_Category_1 | |
| Age_Category_2 | 1.43 |
| Age_Category_3 | 1.43 |
| Age_Category_4 | 1.45 |
| Gender | 1.41 |
| Sex | |
| Citizenship Status | 1.06 |
| Occupation Type | |
| Agriculture | 2.71 |
| Construction | 4.20 |
| Communications | 2.83 |
| Business | 1.53 |
| Education | 3.91 |
| Finance | 4.85 |
| Tourism | 5.22 |
| Human Services | 5.17 |
| Information Technology | 2.90 |
| Law | 3.56 |
| Manufacturing | 5.30 |
| Marketing | 7.46 |
| Science and Technology | 2.18 |
| Transportation | 5.11 |

**Table 6.** *Multicollinearity Test using Employment Status as a Dependent Variable.*

| Variable | VIF |
|---|---|
| Race | |
| Black | 1.01 |
| Asian | 2.25 |
| American Indian or Alaskan | 1.35 |
| Other | 1.89 |
| Age | |
| Age_Category_1 | 1.23 |
| Age_Category_2 | 1.43 |
| Age_Category_3 | 1.43 |
| Age_Category_4 | 1.45 |
| Gender | 1.41 |
| Citizenship Status | 1.06 |
| Occupation Type | |
| Agriculture | 2.71 |
| Construction | 4.20 |
| Communications | 2.83 |
| Business | 1.53 |
| Education | 3.91 |
| Finance | 4.85 |
| Tourism | 5.22 |
| Human Services | 5.17 |
| Information Technology | 2.90 |
| Law | 3.56 |
| Manufacturing | 5.30 |
| Marketing | 7.46 |
| Science and Technology | 2.18 |
| Transportation | 5.11 |

**Table 7.** *Moderator Analysis with Employment Status as a Dependent Variable.*

| Variable | Exp (B) | *p*. |
|---|---|---|
| American Indian_Sex | 1.34 | 0.27 |
| Asian_Sex | 1.54 | 0.09 |
| Black_Sex | 1.05 | 0.71 |
| Other race_Sex | 0.81 | 0.44 |
| Age 18-24_Sex | 0.85 | 0.32 |
| Age 25-34_Sex | 0.08 | 0.07 |
| Age 35-44_Sex | 0.61 | 0.00 |
| Age 45-54 _Sex | 0.59 | 0.00 |
| RAC1P_AGEP | 1.00 | 0.10 |
| Citizenship_Sex | 2.69 | 0.00 |
| Citizenship_Black | 0.59 | 0.11 |
| Citizenship_Asian | 0.87 | 0.69 |
| Citizenship_American_Indian | 0.70 | 0.73 |
| Citizenship_Other | 0.36 | 0.03 |
| Citizenship_Age 18-24 | 0.61 | 0.36 |
| Citizenship_Age 25-34 | 1.30 | 0.55 |
| Citizenship_Age 35-44 | 1.57 | 0.30 |
| Citizenship_Age 45-54 | 0.71 | 0.50 |

**Table 8.** *Moderator Analysis with Wage as a Dependent Variable*.

| Variable | *F* | *p* |
|---|---|---|
| American Indian Sex | 3.63 | 0.06 |
| Asian_Sex | 13.92 | 0.00 |
| Black_Sex | 64.78 | 0.00 |
| Other race_Sex | 4.61 | 0.03 |
| Age 18-24_Sex | 3618.29 | 0.00 |
| Age 25-34_Sex | 38.26 | 0.00 |
| Age 35-44_Sex | 146.70 | 0.00 |
| Age 45-54 _Sex | 160.37 | 0.00 |
| RAC1P_AGEP | 0.94 | 0.77 |
| Citizenship_Sex | 0.19 | 0.66 |
| Citizenship_Black | 0.35 | 0.55 |
| Citizenship_Asian | 0.06 | 0.81 |
| Citizenship_American_Indian | 0.22 | 0.64 |
| Citizenship_Other | 0.16 | 0.69 |
| Citizenship_Age 18-24 | 1.99 | 0.16 |
| Citizenship_Age 25-34 | 0.11 | 0.74 |
| Citizenship_Age 35-44 | 2.25 | 0.13 |
| Citizenship_Age 45-54 | 1.03 | 0.30 |

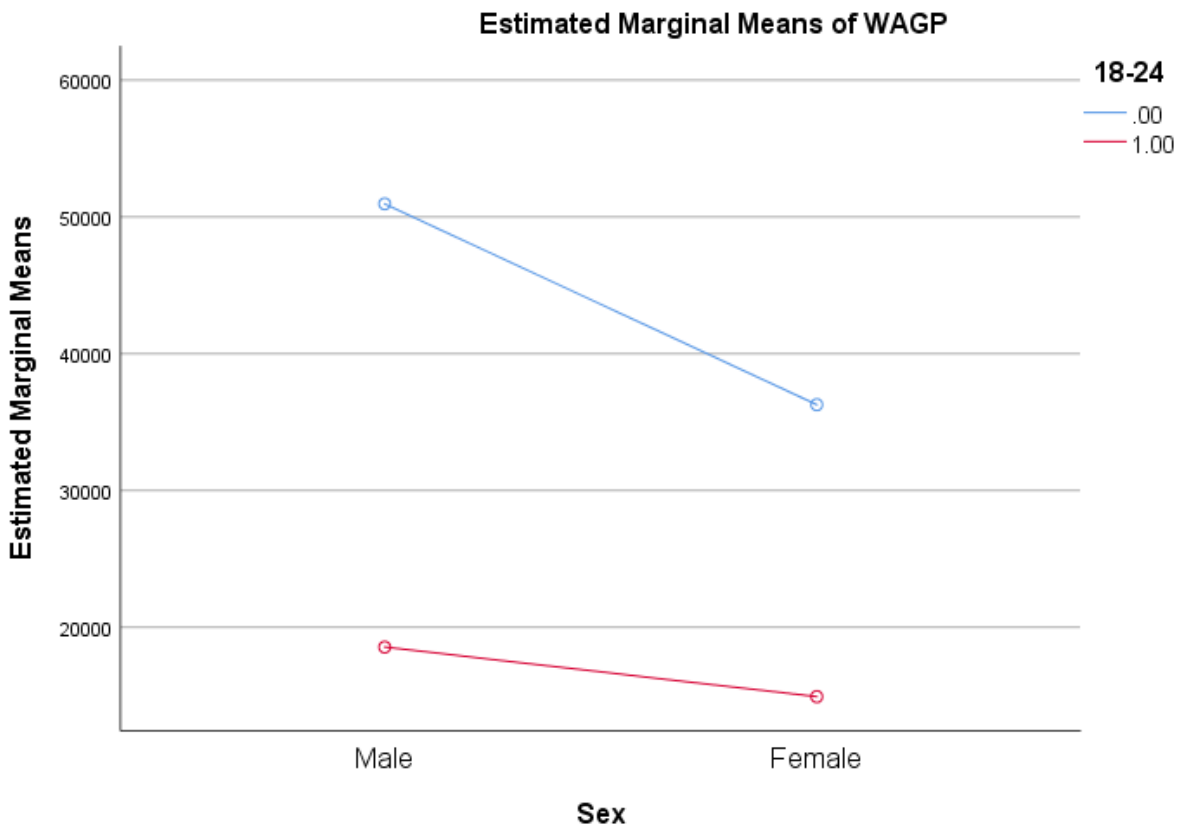


***Figure 2***. Sex and Age 18-24 Interaction in linear model.

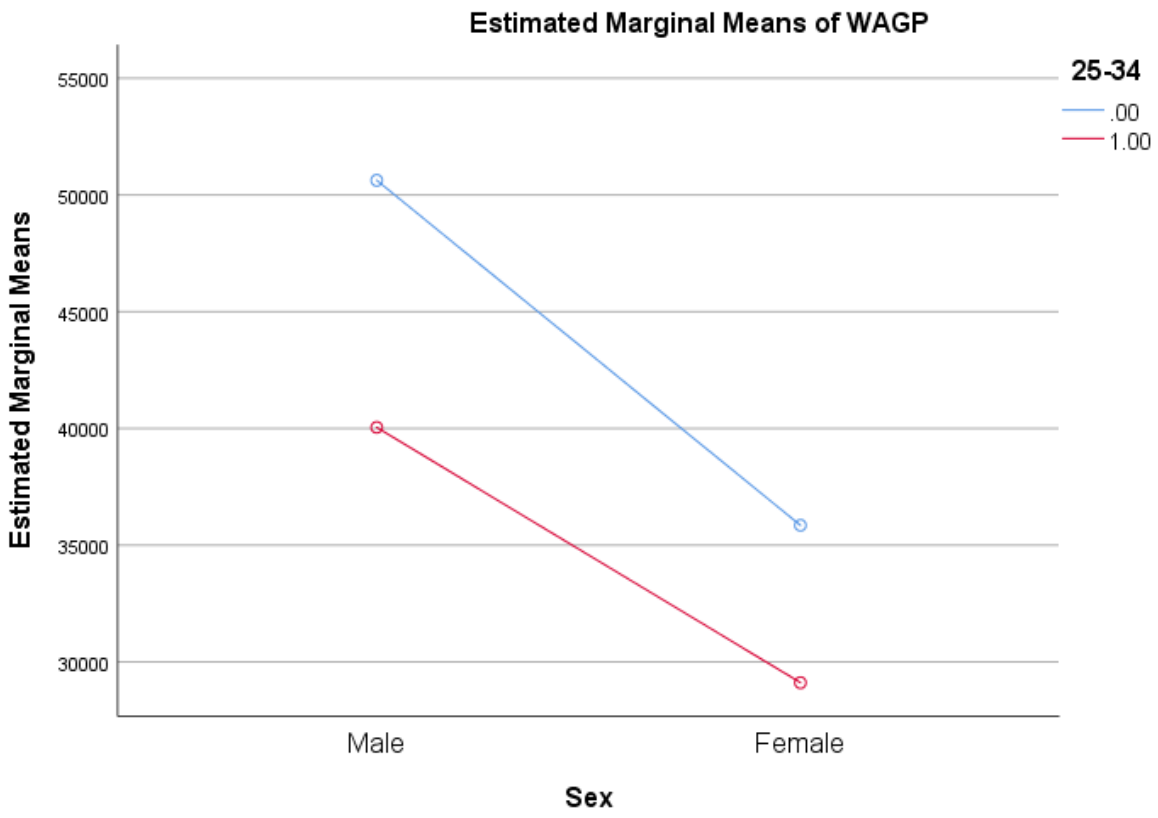


***Figure 3***. Sex and Age 25-34 Interaction in linear model

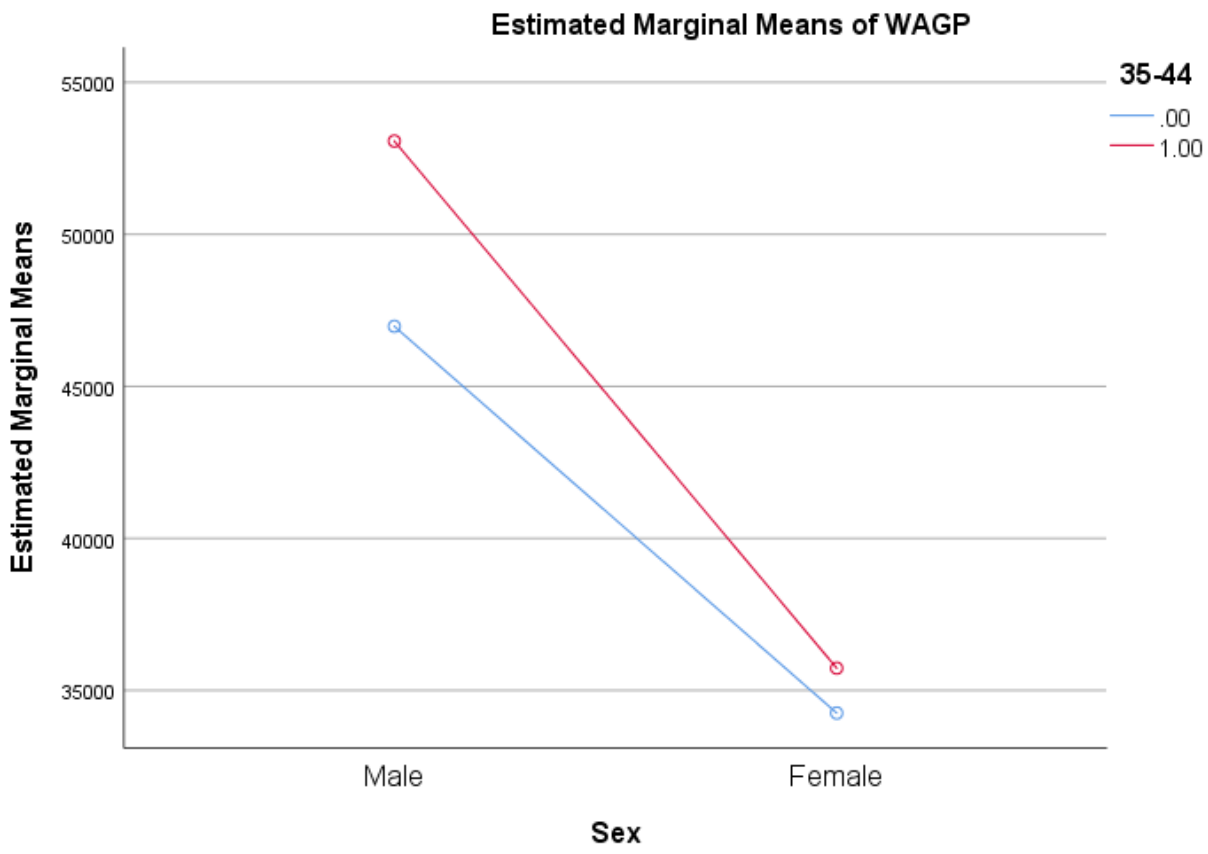


***Figure 4.*** Sex and Age 35-44 Interaction in linear model,

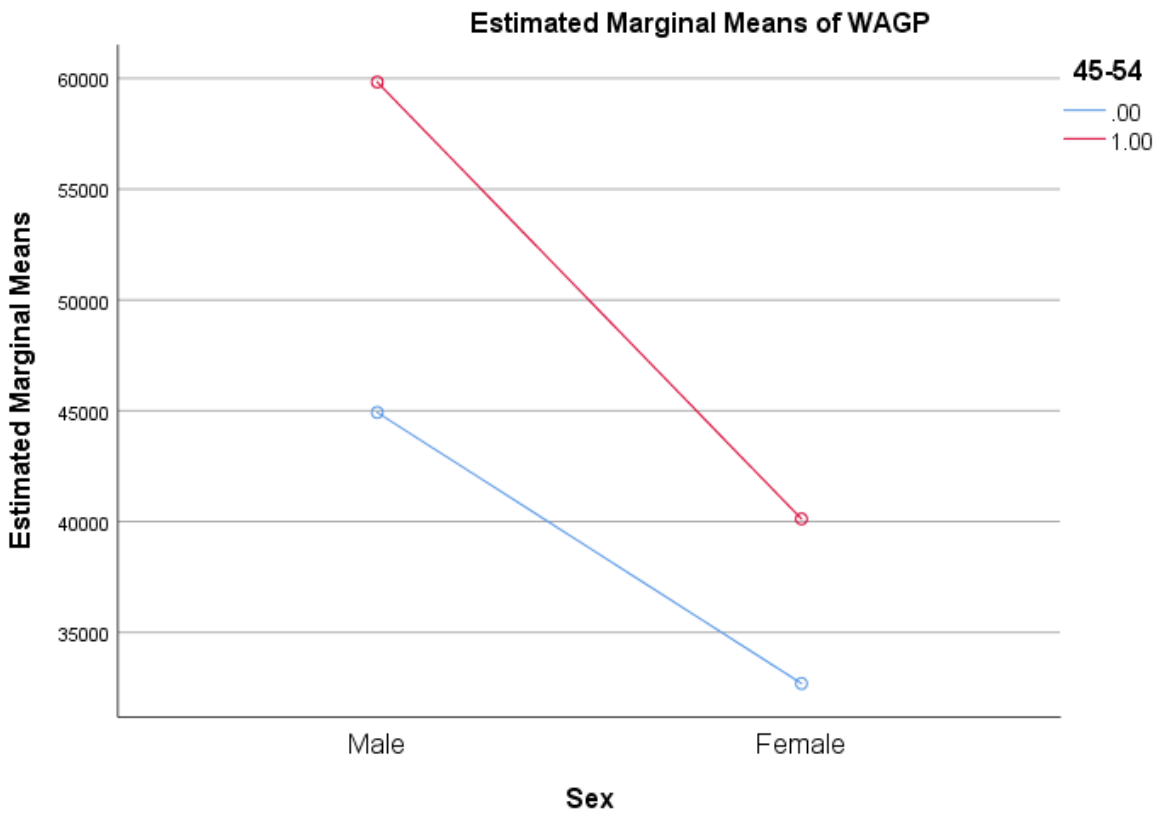


***Figure 5***. Sex and age 45-54 Interaction in linear model

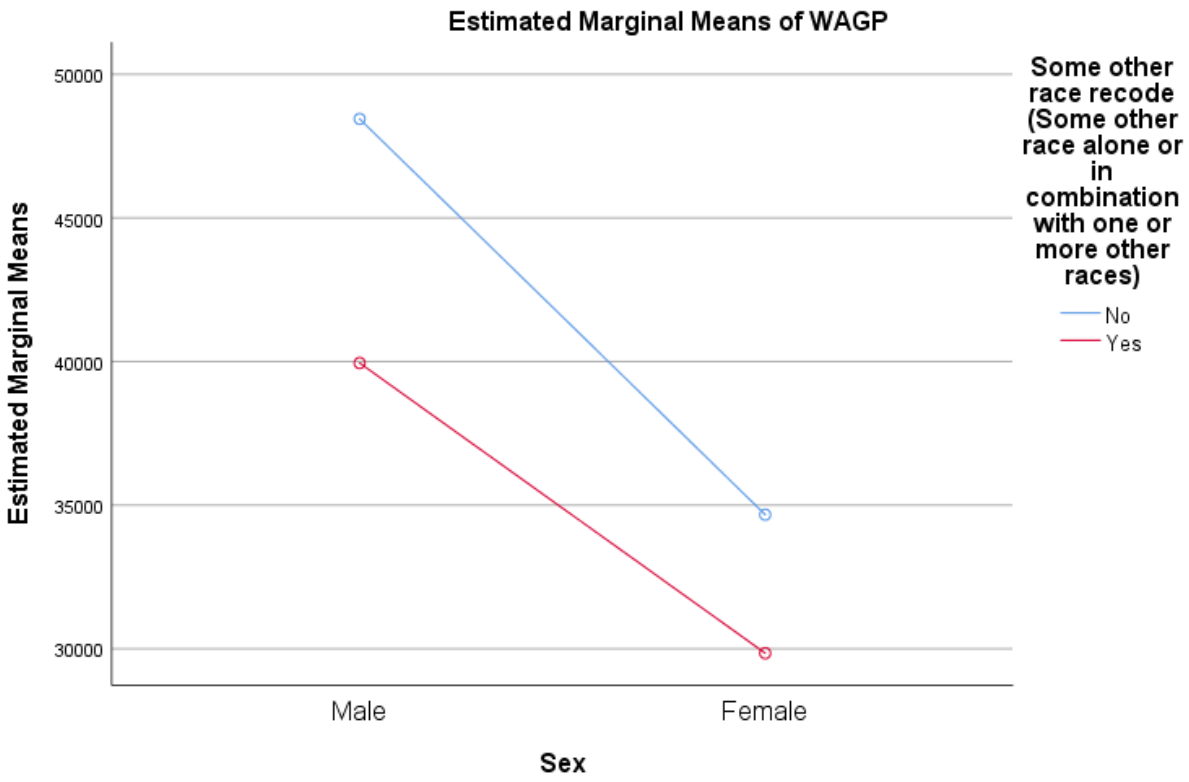


***Figure 6.*** Sex and Some Other Race Interaction in linear model

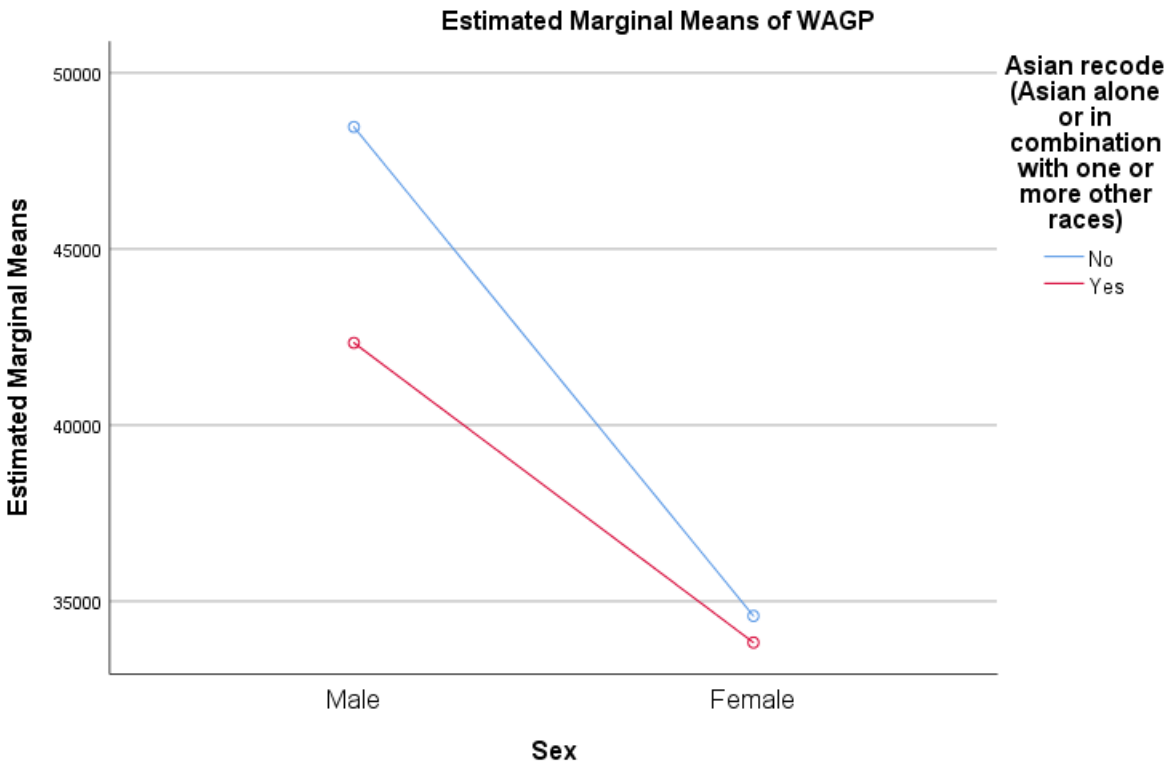


***Figure 7***. Sex and Asian Race Interaction in linear model

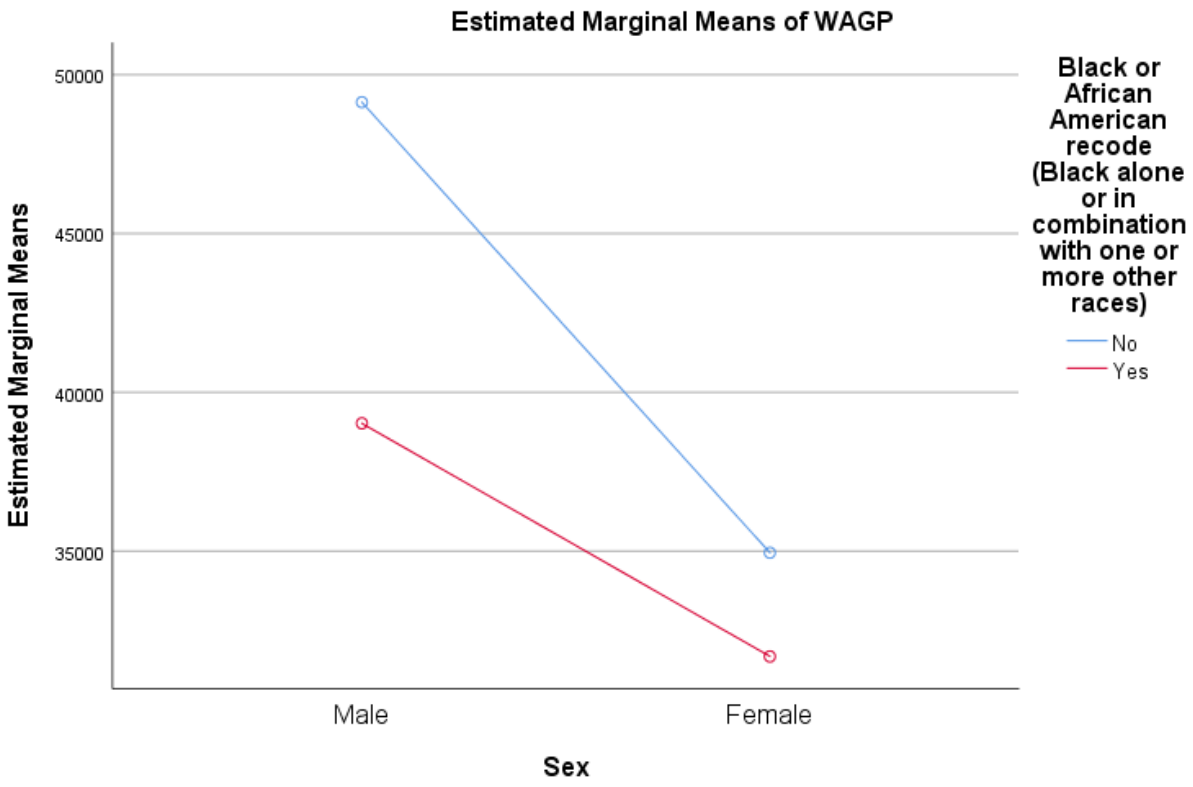


***Figure 8.*** Sex and Black Race Interaction in linear model

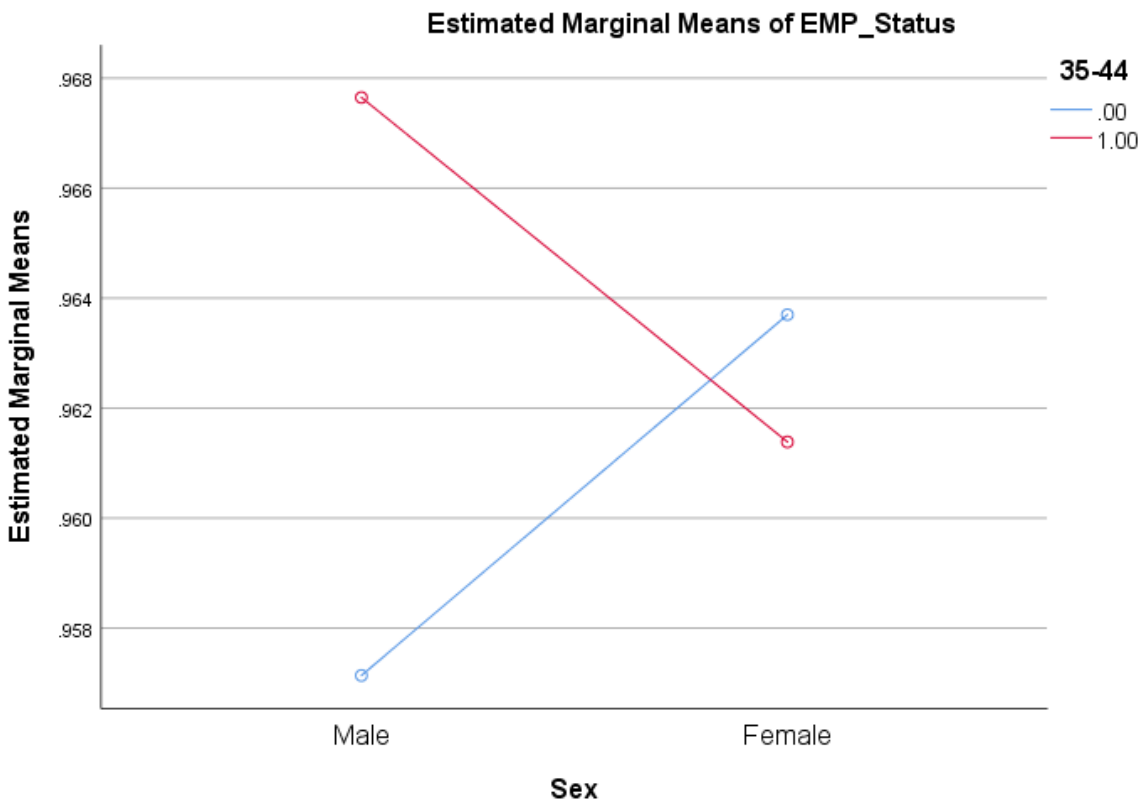


***Figure 9***. Sex and Age 35-44 Interaction in logistic model

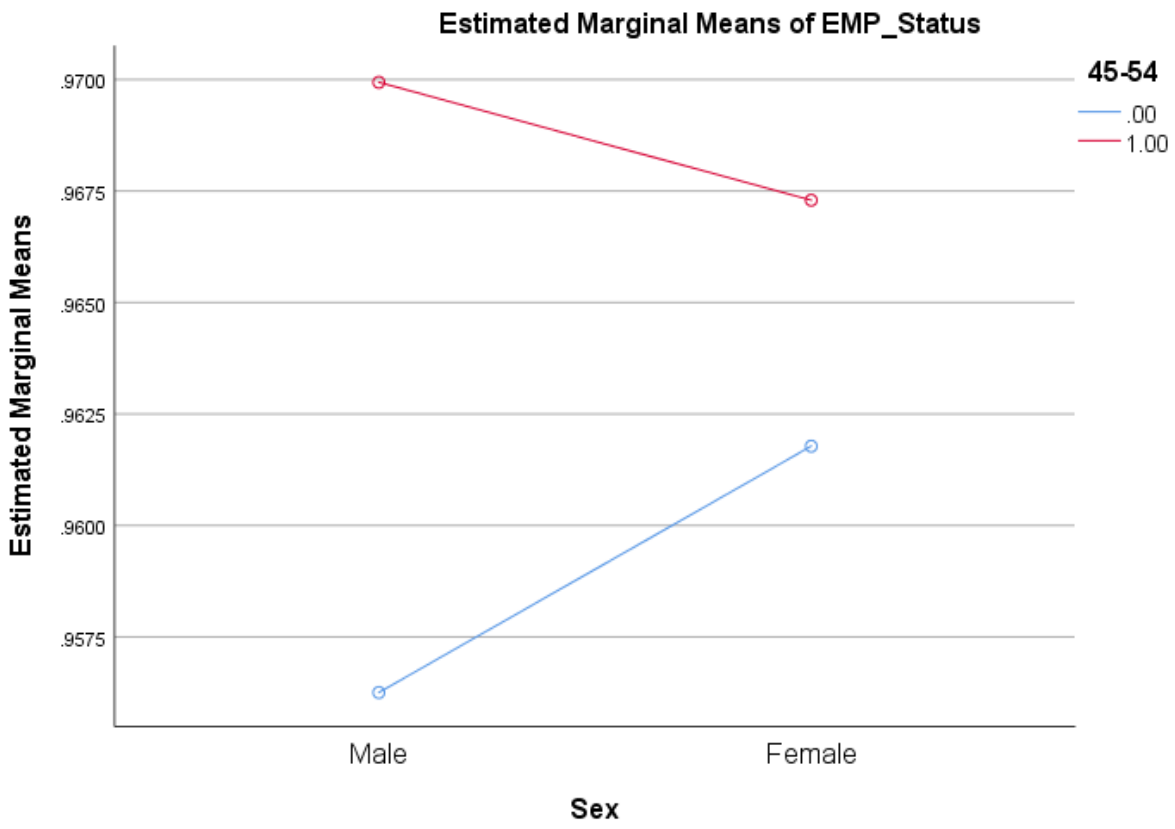


***Figure 10.*** Sex and Age 45-54 Interaction in logistic model

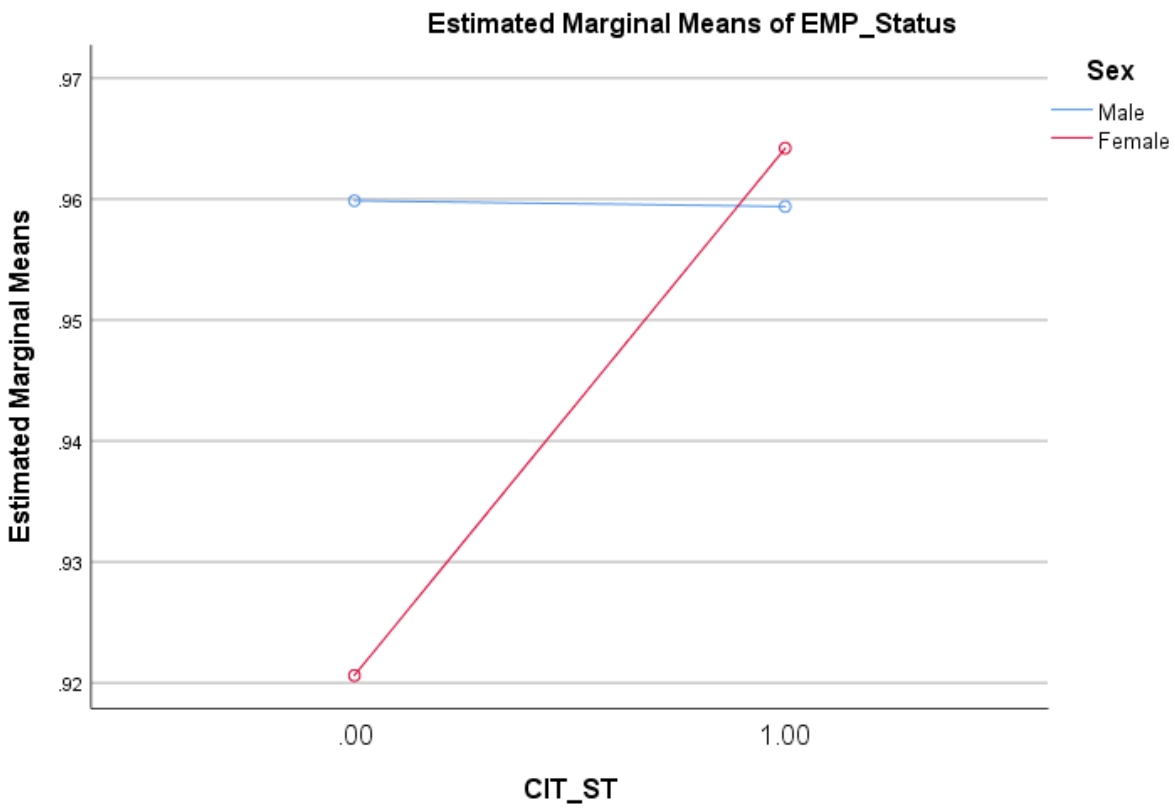


***Figure 11***. Sex and Citizenship Status Interaction in logistic model

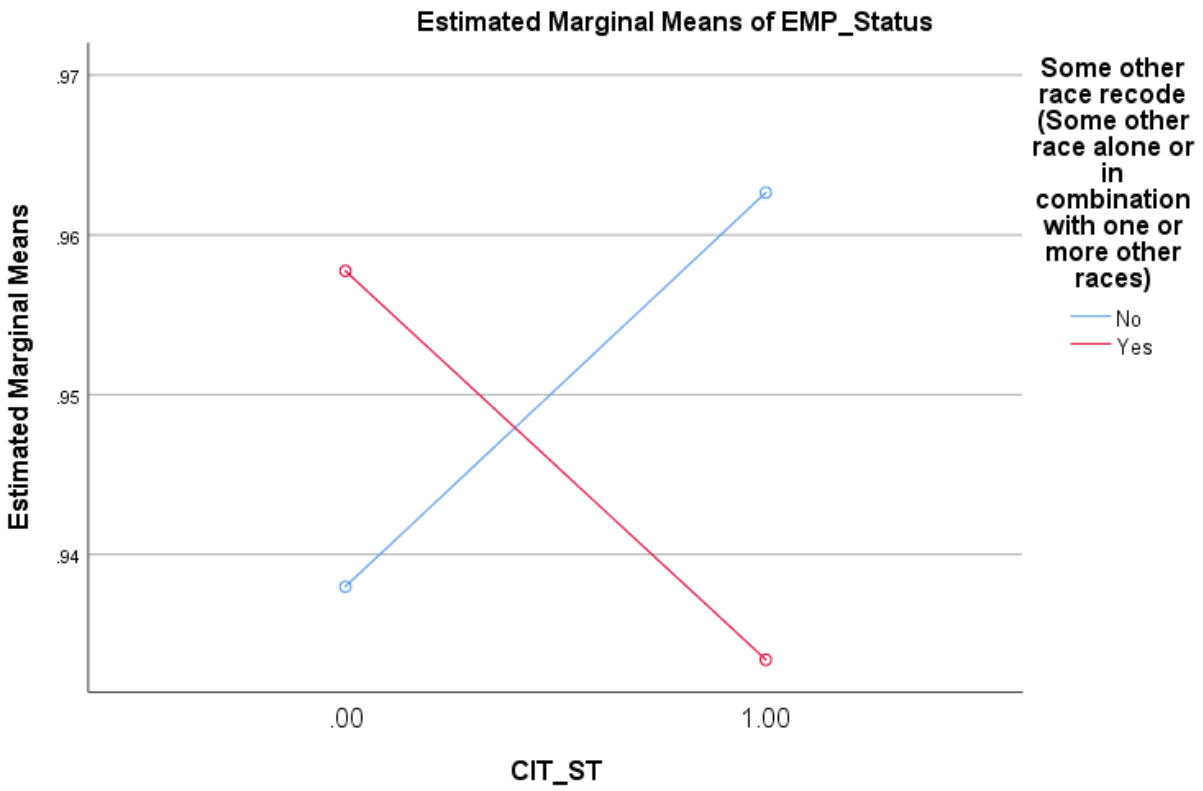


***Figure 12***. Other race and Citizenship Status Interaction in logistic model

**Descriptive Statistics**

After excluding the missing values and outliers, the data set included approximately 46,850 survey responses from the ACS survey. Table 8 depicts the frequency of all variables for binary regression purposes. The two most prevalent race/ethnicity are White/Caucasian (84%, n = 39,314) and Black/African American (10%, n = 4908) out of the n = 46,850 in the data set. The majority of participants (26%, n = 12,404) were 55+ years of age. Followed by Age_Category_4 where the subjects are between 45-54 years of age (24%, n = 11,208). Subjects in the Age_Category_1 where the age is between 18 through 24, were the least represented in the sample (8%, n = 3,818). For gender, female associate degree holders (56%, n = 26,287) were proportionally larger than their male counterparts (44%, n = 20,563). In terms of career-clusters,

there were higher proportions of Business (15%, n = 7056) and Marketing (10%, n = 4843) related career-clusters than the rest of the career-clusters.

Table 9 depicts the frequency of all variables for binary regression purposes. The two most prevalent race/ethnicity are White/Caucasian (84%, n = 39,151) and Black/African American (10%, n = 4,856) of the n = 46,684 in the data set. The majority in the Age_Category_5 represented people who were 55+ years of age (26%, n = 12,160). This was followed Age_Category_4 where the subjects are between 45-54 years of age (24%, n = 11,436). Subjects in the Age_Category_1 where the age is between 18 through 24, were the least represented in the sample (7%, n = 3,496). For gender, female associate degree holders (58%, n = 38,625) were proportionally larger than their male counterparts (42%, n = 28,432). In terms of career-clusters, Business (15%, n = 6,788) and Marketing (10%, n = 4,860) related career-clusters had higher proportions than the rest of the career-clusters.

## Data Screening

During the pre-screening of data, it was discovered that 20,670 records had either the missing values or were outliers. It is vital to examine and address any missing data as well as outliers. Since the variables with missing data are less than 1%, the researcher chose to exclude them in this study in addition to excluding the outliers from the regression analysis. To determine outliers, the researcher used z scores for all the variables. Only complete and valid data are in this study without using any possibility to calculate the missing values. Annual income is the only continuous variable in this study and therefore was the only one that was evaluated for outliers.

## Data Analysis

After screening the data for multicollinearity, missing values, and interaction effects, the researcher performed multiple linear regression analysis and logistic regression analysis separately. To determine the differences in annual wages among the associate degree holders based on demographics and occupation type, multiple linear regression analysis was conducted. For multiple linear regression, the researcher moved the dependent variable (annual wage) to the dependent variable box. The researcher moved all independent variables in Table 3 to the independent variable box. The regression was significant as (F-Statistics = 395.934, $p < 0.05$) and adjusted $R^2 = 0.10$. The $R^2$ value for the overall model was 0.10 and the adjusted $R^2$ was 0.10 as well, a small size effect according to Green and Salkind (2013).

**Table 9.** *Frequencies of All Variables for Multiple Linear Regression*.

| Variable | Cases |
|---|---|
| White | 39314 |
| Black | 4908 |
| Asian | 1487 |
| American Indian or Alaskan | 1026 |
| Other | 1048 |
| Age 18-24 | 3818 |
| Age 25-34 | 9648 |
| Age 35-44 | 9763 |
| Age 45-54 | 11208 |
| Sex (Male) | 20563 |
| Sex (Female) | 26287 |
| Citizenship Status (US Citizen) | 45698 |
| Citizenship Status (Non US Citizen) | 1152 |
| Agriculture | 998 |
| Construction | 2219 |
| Communications | 1176 |
| Business | 7056 |
| Education | 2107 |
| Finance | 2783 |
| Tourism | 3099 |
| Human Services | 2789 |
| Information Technology | 1458 |
| Law | 1931 |
| Manufacturing | 3267 |
| Marketing | 4843 |
| Science, Technology, Engineering, and Mathematics | 891 |
| Transportation | 3026 |
| Annual Yearly Gross Income | 46850 |

**Table 10.** *Frequencies of All Variables during Binary Logistic Regression.*

| Variable | Cases |
|---|---|
| White | 39151 |
| Black | 4856 |
| Asian | 1516 |
| American Indian or Alaskan | 1023 |
| Other | 1058 |
| Age 18-24 | 3496 |
| Age 25-34 | 9560 |
| Age 35-44 | 9972 |
| Age 45-54 | 11436 |
| Sex (Male) | 20837 |
| Sex (Female) | 25847 |
| Citizenship Status (US Citizen) | 45494 |
| Citizenship Status (Non US Citizen) | 1190 |
| Agriculture | 1190 |
| Construction | 2320 |
| Communications | 1278 |
| Business | 6788 |
| Education | 1903 |
| Finance | 2753 |
| Tourism | 2996 |
| Human Services | 2972 |
| Information Technology | 1464 |
| Law | 2160 |
| Manufacturing | 3220 |
| Marketing | 4860 |
| Science Technology, Engineering, and Mathematics | 860 |
| Transportation | 3022 |
| Employment Status (Employed) | 44887 |
| Employment Status (Unemployed) | 1797 |

The model included a total of 46,684 independent variables and explained 10% of the variance in annual income. Regression coefficients are in Table 9. Results of the *t*-test showed that all the variables were significant at the 95% significance level except for the race variable Asian. For the race Asian, the annual salary was higher than the other three races, but was not a significant predictor of the annual income.

For gender, the annual income gap was astronomical as females made less than $14,000 in annual income than their male counterparts prior to the inclusion of interaction terms in the regression model. However, due to the interaction between gender and other independent variables, gender as a single variable was omitted from the final regression analysis. American citizens made approximately $6,000 more in annual wages than individuals without an American citizenship. For occupation-type, associate degree holders in the STEM and IT related fields made at-least $34,000 more in annual wages than individuals in the tourism related field. All the below-indicated differences in annual income by career clusters were statistically significant at the 95-% significance level. Results of the ANOVA test as indicated in Table 11 are statistically significant, so the null hypothesis can be rejected. The true means between the independent variables were different.

Binary logistic regression analysis determined the employment rate among the associate degree holders based on demographics and occupation type. Using SPSS, the researcher moved dependent variable employed to the dependent variable box. The researcher also moved independent variables as shown in Table 2 to the independent variable box. The goodness of fit test determined if the model fits the data. The Hosmer and Lemeshow (2013) goodness of fit test showed $p = 0.069$. Since the probability was greater than 0.05, the conclusion was that the model is a good fit (Hosmer & Lemeshow, 2013). The regression was significant (-2 Log Liklihood = 14982.54, $X^2 = 248.06$, $p < 0.001$) and Nagelkerke $R^2 = 0.046$. The regression model correctly classified 96.2% of the cases but explained only 5% of variance between the different groups. It was observed that there was a statistically significant interaction between a few variables as indicated in tables 7 and 8.

Table 11. *Multiple Linear Regression Analysis using Annual Income as a Dependent Variable*.

| | Model I | | | Model II | | | Model III | | | Model IV | | | Model V | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Covariates | *B* | *SE* | *β* | *B* | *SE* | *β* | *B* | *SE* | *β* | *B* | *SE* | *β* | *B* | *SE* | *β* |
| American Indian or Alaskan | -5527.54* | 888.44 | -0.03 | -5617.07* | 887.64 | -0.03 | -4310.67* | 845.25 | -0.02 | -4291.20* | 844.92 | -0.02 | -4326.26* | 842.59 | -0.02 |
| Citizenship Status | | | | 8002.48* | 838.85 | 0.04 | 6041.78* | 799.76 | 0.03 | 5899.20* | 797.77 | 0.03 | 5962.86* | 797.77 | 0.03 |
| Agri & Food | | | | | | | 8168.83* | 959.04 | 0.04 | 8023.20* | 959.04 | 0.04 | 8168.89* | 959.04 | 0.04 |
| Construction | | | | | | | 26942.35* | 724.59 | 0.20 | 26758.91* | 722.97 | 0.20 | 26590.64* | 722.97 | 0.20 |
| Communication | | | | | | | 16221.99* | 900.68 | 0.04 | 16139.92* | 900.40 | 0.04 | 16028.44* | 959.04 | 0.09 |
| Business Mgt | | | | | | | 10222.63* | 551.41 | 0.12 | 10178.72* | 551.30 | 0.12 | 10258.69* | 959.04 | 0.13 |
| Ed & Training | | | | | | | -2655.40* | 736.36 | -0.02 | -2719.39* | 736.04 | -0.02 | -2557.16* | 959.04 | -0.02 |
| Finance | | | | | | | 14568.83* | 678.29 | 0.04 | 14537.68* | 678.02 | 0.04 | 14785.42* | 959.04 | 0.12 |
| Health Sciences | | | | | | | 18670.01* | 533.39 | 0.26 | 18676.99* | 531.92 | 0.26 | 18703.19* | 531.92 | 0.26 |
| Human Services | | | | | | | 11206.87* | 677.53 | 0.09 | 11104.27* | 675.78 | 0.04 | 10924.75* | 675.78 | 0.09 |
| Information Tech | | | | | | | 34252.55* | 832.97 | 0.21 | 34135.46* | 830.73 | 0.21 | 34019.10* | 830.73 | 0.21 |
| Law & Pub Safe | | | | | | | 25766.92* | 757.54 | 0.18 | 25723.39* | 755.30 | 0.18 | 25678.25* | 755.30 | 0.18 |
| Manufacturing | | | | | | | 19592.05* | 649.42 | 0.18 | 19458.14* | 647.74 | 0.18 | 19357.53* | 647.74 | 0.18 |
| Marketing | | | | | | | 11825.47* | 591.77 | 0.13 | 11753.56* | 590.13 | 0.13 | 11628.23* | 590.13 | 0.13 |
| Science & Tech | | | | | | | 37921.40* | 1003.05 | 0.18 | 37742.08* | 1000.00 | 0.18 | 37323.21* | 1000.00 | 0.18 |
| Transportation | | | | | | | 11730.86* | 662.49 | 0.10 | 11671.39* | 662.28 | 0.10 | 11808.46* | 660.46 | 0.10 |
| Asian_Sex | | | | | | | | | | 4384.90* | 1406.64 | 0.01 | 4176.87* | 1406.64 | 0.01 |
| Black_Sex | | | | | | | | | | 4685.04* | 828.56 | 0.08 | 4823.26* | 828.56 | 0.03 |
| Other race_sex | | | | | | | | | | 3125.83* | 1679.80 | 0.06 | 2222.58 | 679.80 | 0.06 |
| Age 18-24_Sex | | | | | | | | | | | | | 9173.66* | 997.75 | 0.04 |
| Age 25-34_Sex | | | | | | | | | | | | | 2401.13* | 729.30 | 0.01 |
| Age 35-44_Sex | | | | | | | | | | | | | -4414.00* | 729.59 | -0.04 |
| Age 45-54_Sex | | | | | | | | | | | | | -4681.90* | 704.66 | -0.04 |

*Note.* Ed & Training = Education & Training, Law & Pub Safe= Law and Public Safety, Agri & Food = Agriculture and Food, ,B is the unstandardized coefficient, *β* is the standardized coefficient, *SE* is the standard error, * indicates $p < .050$,

Table 12. *ANOVA Analysis using Wage as a Dependent Variable.*

| Source | *df* | *SS* | *MS* | *F* | *p* |
|---|---|---|---|---|---|
| Model 1 - Between groups | 1 | 3.08E+11 | 7.70E+10 | 38.00 | .000 |
| Within Groups | 46845 | 3.68E+13 | 786245741 | | |
| Total | 46849 | 3.71E+13 | | | |
| Model 2 - Between groups | 2 | 3.69E+12 | 4.62E+11 | 64.09 | .000 |
| Within Groups | 46841 | 3.34E+13 | 713986029 | | |
| Total | 48849 | 3.71E+13 | | | |
| Model 3 - Between groups | 16 | 5.97E+12 | 6.63E+11 | 314.35 | .000 |
| Within Groups | 46840 | 3.12E+13 | 7.666E+09 | | |
| Total | 48849 | 3.71E+13 | | | |
| Model 4 - Between groups | 19 | 6.00E+12 | 6.00E+11 | 267.99 | .000 |
| Within Groups | 46839 | 3.11E+13 | 664649148 | | |
| Total | 48849 | 3.71E+13 | | | |
| Model 5 - Between groups | 23 | 8.53E+12 | 3.55E+11 | 233.53 | .000 |
| Within Groups | 46825 | 2.86E+13 | 611036505 | | |
| Total | 48849 | 3.71E+13 | | | |

Table 13. *$R^2$ by Block using Wage as a Dependent Variable.*

| Model | *R* | $R^2$ | Adjusted $R^2$ | *SE* |
|---|---|---|---|---|
| 1 | 0.03 | 0.00 | 0.00 | 28144.63 |
| 2 | 0.05 | 0.00 | 0.00 | 28117.68 |
| 3 | 0.31 | 0.10 | 0.10 | 26758.72 |
| 4 | 0.31 | 0.10 | 0.10 | 26747.50 |
| 5 | 0.32 | 0.10 | 0.10 | 26671.88 |

As can be seen in Table 12, the overall regression model was significant since the p value is below 0.05 for all 5 models in the block regression. In Table 13, it can be observed that the r-square had the highest level of improvement when career clusters (model 3) were added in the regression.

Table 14 shows the results of the binary logistic regression for all covariates of this study. Results of the binary logistic regression had also showed that Blacks, and American Indians have a lower probability to be employed than other races by more than 40%. In comparison, Asian Americans at least 15-percent higher probability than Blacks and American Indian to be

employed. In terms of gender, being female with an associate degree has a slight advantage on the employability as compared to males as the results are statistically significant. Females are 1.2 times more likely than males to be employed with an associate degree. Individuals from the age groups 35-44 and 45-54 made higher annual wages than other age groups that were in the sample. Prior to including the interaction terms in the multilinear regression, the results of the regression analysis revealed that the age group between 18 to 24 earned $24,000 less than the referenced age category. Results also revealed that the same age group was more than 50-percent less likely to be employed as compared to the referenced aged category. However due to the interaction effect, when age 18-24 and gender were included as an interaction term, it was determined that both females and males between the age group 18-24 would earn significantly less incomes than the other age groups. The annual income disparity by gender also exist among other age groups but the differences are less significant than the 18-24 age group. The age category between 35-44 has the lowest income disparity than any other race category per the results of figure 4.

For occupation-type, associate degree holders in the fields related to law, STEM, IT, finance, health sciences, human services, and law have a higher probability of being employed than the associate degree holders in other career-clusters, particularly the reference occupation category of business management. On the contrary, people associated with business and education have a much lower probability of being employed than individuals in the other career clusters.

In Table 15, it can be observed that the addition of career clusters (model 3) and citizenship status (model 4) significantly increased the predictability of the dependent variable.

**Table 14.** *Binary Logistic Regression Analysis using Employment Status as a Dependent Variable*.

| | Model I | | | | Model II | | | | Model III | | | | Model IV | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Covariates | B | *SE* | Wald | Exp (B) | B | *SE* | Wald | Exp (B) | B | *SE* | Wald | Exp (B) | B | *SE* | Wald | Exp (B) |
| Black | -0.60* | 0.07 | 85.07 | 0.55 | -0.60* | 0.07 | 118.78 | 0.55 | -0.59* | 0.00 | 80.88 | 0.55 | -0.60* | 0.07 | 82.45 | 0.55 |
| Asian | -0.38* | 0.12 | 9.92 | 0.69 | -0.35* | 0.12 | 8.29 | 0.71 | -0.32* | 0.12 | 7.15 | 0.72 | -0.27* | 0.12 | 4.94 | 0.76 |
| American Indian or Alaskan | -0.55* | 0.13 | 17.90 | 0.58 | -0.55* | 0.13 | 17.40 | 0.58 | -0.55* | 0.13 | 17.18 | 0.58 | -0.55* | 0.13 | 17.34 | 0.58 |
| Age 18-24 | | | | | -0.80* | 0.07 | 118.80 | 0.45 | -0.71* | 0.07 | 118.80 | 0.45 | -0.77* | 0.07 | 84.47 | 0.46 |
| Age 25-34 | | | | | -0.33* | 0.06 | 32.87 | 0.72 | -0.34* | 0.06 | 32.87 | 0.72 | -0.40* | 0.06 | 33.20 | 0.67 |
| Agri and Food | | | | | | | | | 0.43* | 0.15 | 8.22 | 1.54 | 0.47* | 0.15 | 9.63 | 1.61 |
| Construction | | | | | | | | | 0.54* | 0.12 | 20.41 | 1.71 | 0.61* | 0.12 | 24.83 | 1.84 |
| Communication | | | | | | | | | 0.49* | 0.15 | 10.70 | 1.63 | 0.52* | 0.15 | 11.91 | 1.68 |
| Ed and Training | | | | | | | | | 0.53* | 0.10 | 17.98 | 1.69 | 0.52* | 0.12 | 17.17 | 1.68 |
| Finance | | | | | | | | | 1.07* | 0.14 | 61.76 | 2.91 | 1.05* | 0.00 | 59.65 | 2.86 |
| Health Sciences | | | | | | | | | 1.43* | 0.10 | 216.33 | 4.20 | 1.41* | 0.10 | 206.44 | 4.09 |
| Human Services | | | | | | | | | 0.88* | 0.12 | 55.41 | 2.42 | 0.89* | 0.12 | 55.78 | 2.43 |
| Information Technology | | | | | | | | | 1.08* | 0.18 | 35.18 | 2.95 | 1.13* | 0.18 | 38.07 | 2.75 |
| Law and Pub Safe | | | | | | | | | 1.31* | 0.18 | 56.28 | 3.71 | 1.36* | 0.18 | 59.50 | 3.88 |
| Manufacturing | | | | | | | | | 0.54* | 0.10 | 27.68 | 1.72 | 0.59* | 0.10 | 31.52 | 1.80 |
| Marketing | | | | | | | | | 0.33* | 0.08 | 16.73 | 1.39 | 0.35* | 0.08 | 18.09 | 1.42 |
| Science and Tech | | | | | | | | | 0.97* | 0.23 | 18.29 | 2.63 | 1.01* | 0.23 | 19.92 | 2.77 |
| Transportation | | | | | | | | | 0.64* | 0.11 | 36.52 | 1.91 | 0.71* | 0.11 | 9.17 | 2.03 |
| Tourism | | | | | | | | | 0.26* | 0.09 | 7.63 | 1.29 | 0.28* | 0.09 | 7.63 | 1.29 |
| Age 35-44_Sex | | | | | | | | | | | | | -0.12* | 0.05 | 7.45 | 0.89 |
| Age 45-54_Sex | | | | | | | | | | | | | -0.05 | 0.04 | 1.09 | 0.96 |
| Citizenship Status_Sex | | | | | | | | | | | | | 0.15* | 0.05 | 9.99 | 1.17 |
| Citizenship Otherrace | | | | | | | | | | | | | -0.50* | 0.14 | 13.30 | 0.61 |

*Note.* $*p < 0.05$

**Table 15.** *$R^2$ by Block using Employment Status as Dependent Variable.*

| Model | Cox and Snell $R^2$ | Nagelkerke $R^2$ |
|---|---|---|
| 1 | 0.002 | 0.007 |
| 2 | 0.005 | 0.016 |
| 3 | 0.012 | 0.044 |
| 4 | 0.013 | 0.046 |

## Summary

This chapter presented the results of multiple linear and binary logistic regression models. Linear regression model studied the effect of demographics and occupation-type on the annual income among the ACS survey respondents from the year 2016. Binary regression model explored the effect of demographics and occupation-type on the employment rate.

Results from the multiple linear regression model gave evidence that certain race groups and occupation-type have a higher annual salary than others. Table 11 shows the results of the multiple linear regression for all covariates of this study. Prior to including the interaction terms in the multilinear regression, results of multiple linear regression analysis showed that Blacks, American Indians, and the Other race categories made at-least $2,000 less in annual wages than Asian Americans. Results from the binary logistic regression analysis supplied evidence that certain race groups and occupation-type have a higher probability of being employed than others. Based on the regression analysis the conclusion was that gender plays a key role in determining the annual salaries. Another important finding of this study concerns specific career clusters showing better labor market outcomes than others among the associate degree holders. Occupations related to law, STEM, IT, finance, health sciences, human services, and law have a higher probability of being employed than the associate degree holders in other career-clusters. On the contrary, people associated with marketing and tourism have a much lower probability of being employed than individuals in the other career clusters. In terms of age, prior to including

the interaction terms in the multilinear regression, associate's degree holders between the 45-54 age group made at least $4,500 more in annual income than other age groups. In terms of nationality, American citizens made more than $6,000 in annual income than individuals who did not have American citizenship.

# CHAPTER 5: DISCUSSION

This chapter includes a discussion of conclusions, findings, and recommendations for future research. Also included is a discussion of limitations and delimitations in this chapter. There is an abundance of literature on discrimination in the labor market based on demographics and occupation-type. However, there is a lack of research studies available to provide a historical perspective on the organization of career clusters and how they have evolved with the emergence of new technological and socio-economic trends.

The need to explore current trends in labor market outcomes based on demographics was the impetus for this study. Among the implications of differences in labor market outcomes are discrimination and variability in the economic demand of certain occupation-types over others.

This chapter includes the results of the research questions framing this study:

RQ1. Does age have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential?

$H_0$: Age has no significant effect on the labor market outcomes of the ACS participants

$H_a$: Age has a significant effect on the labor market outcomes of the ACS participants

Result: The null hypothesis can be rejected.

Research Question 1 sought to describe the impact of age on the labor market outcomes. Records of 46,850 survey participants were used in this study. Age group 55 was the most represented in the study followed by 45-54 and 35-44 age groups. Due to this reason the age group of 55 and above was used as a reference category for the regression analysis. The age

group 18-24 was least represented than any other age group possibly because many individuals in that age group are in the transition phase to finish their studies in order to join the labor market. Individuals from the age groups 35-44 and 45-54 made higher annual wages than other age groups that were in the sample. Prior to including the interaction terms in the multilinear regression, the results of the regression analysis revealed that the age group between 18 to 24 earned $24,000 less than the referenced age category. Results also revealed that the same age group was more than 50-percent less likely to be employed as compared to the referenced aged category. However due to the interaction effect, when age 18-24 and gender were included as an interaction term, it was determined that both females and males between the age group 18-24 would earn significantly less incomes than the other age groups as can be seen in figures 2 and 3. The annual income disparity by gender also exist among other age groups but the differences are less significant than the 18-24 age group. The age category between 35-44 has the lowest income disparity than any other age category per the results of figure 4.

RQ 2. Does race have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential?

$H_0$: Race has no significant effect on the labor market outcomes of the ACS participants

$H_a$: Race has a significant effect on the labor market outcomes of the ACS participants

Result: The null hypothesis can be rejected.

Research question 2 sought to describe the impact of race on the labor market outcomes. White/Caucasian population were the most represented group in this study followed by African American and Asians. Due to this, White was used as a reference category in the regression analysis. Race group from the other race category represented the smallest number of

individuals in this study. Prior to including the interaction terms in the multilinear regression, the results of the regression analysis revealed that American Indians and Other races made $2,000 less in annual wages than Asians. Blacks made approximately $5,000 less in annual salary than Whites. Blacks also had less than 50-percent probability of being employed than Whites. However, due to the interaction between all race categories and gender, interaction variables for race and gender were simultaneously entered in the regression model. As can be observed in figure 7, the wage difference between Asian females and females from other races is significantly smaller than the difference between Asian males and other males. Asian males made significantly less income than Whites. However, as can be seen in figure 8, income disparity by race between genders is highest among the black males and the reference race category as compared to the differences in gender pay among other race categories indicated in prior figures.

RQ 3. Does gender have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential?

The hypotheses were as follows:

$H_0$: Gender has no significant effect on the labor market outcomes of the ACS participants.

$H_a$: Gender has a significant effect on the labor market outcomes of the ACS participants.

Result**:** The null hypothesis can be rejected.

Research question 3 sought to describe the impact of gender on the labor market outcomes. There were approximately 25% more females represented than males in this study. Prior to

including the interaction terms in the multilinear regression it is noteworthy to consider that women with an associate degree were making more than $14,000 less in annual wages than their male counterparts with the same credentials. However, an interesting fact that came out of this study is that prior to including the interaction terms in the multilinear regression, the results had indicated that women are approximately 20% more likely to be employed than their male counterpart despite the fact that their annual wages were significantly less than males.

In terms of genders interaction with age and race, women made less annual income than males. However, the income disparity between males from different races or age groups is much higher than females from different race or age groups. As can be seen in figures 9 and 10, the level of employment is also significantly higher for males in the 35-44 and 45-54 age groups than their female counterparts.

RQ4. Does American Citizenship have a significant impact on the labor market outcome (employment rate and annual income) of ACS participants who possess an associate degree as their terminal credential?

$H_0$: American citizenship has no significant effect on the labor market outcomes of the ACS participants.

$H_a$: American citizenship has a significant effect on the labor market outcomes of the ACS participants.

Result: The null hypothesis can be rejected.

Research question 4 sought to describe the impact of American citizenship on the labor market. More than 97% of the populations were American citizens. After comparing the American citizens with the individuals without an American citizenship, American citizens were 25% more likely to be employed and made more than $6,000 in annual income than their

counterparts. As far as the level of employment, citizenship status had a significant level of interaction with gender and the other race categories, and was included as an interaction variable with gender and the other race. Per figure 11, females tend to be twice as likely to be unemployed than their male counterparts if they are not a US citizen. Figure 12 illustrates that the other race category is more likely to be unemployed as US citizens versus races such as whites, blacks, Asians, and American Indians.

RQ5. Does occupation type based on a specific career-cluster have a significant effect on the labor market outcomes (employment rate and annual income) among the associate degree holders?

$H_0$: Occupation type based on a specific career-cluster does not have a significant effect on labor market outcomes among the associate degree holders.

$H_a$: Occupation type based on a specific career-cluster does have significant effect on labor market outcomes among the associate degree holders.

Result: The null hypothesis can be rejected.

Research question 5 sought to describe the impact of specific career-clusters on the labor market outcomes. Career clusters associated with business related field was the most represented followed by manufacturing and marketing sectors. For occupation-type, associate degree holders in the fields related to law, STEM and IT related career-clusters made more in annual income than other career-clusters which can be seen in table 11. On the contrary, people associated with agriculture, education, and transportation related disciplines made significantly less annual income than individuals in the other career clusters per the results in table 14. It is worth mentioning that occupation-types associated with tourism had the lowest wage level among all the career clusters.

For occupation-type, associate degree holders in the fields related to law, STEM, IT, finance, health sciences, human services, and law have a higher probability of being employed than the associate degree holders in other career-clusters, particularly the reference occupation category of business management. On the contrary, people associated with tourism and transportation have a much lower probability of being employed than individuals in the other career clusters.

## Summary of Findings

To evaluate the role of demographics and occupation type on the labor market, this study disaggregated the data collected from the 2016 American Community Survey. The results of this study showed that demographics and occupation-type does play a significant role in determining the labor market outcomes.

The results of this study are consistent with the existing literature about the role of demographics and occupation-type on determining the labor market outcomes. Analysis conducted in this study showed that certain race groups and occupation-type have a higher annual salary than others. Findings of this study also support evidence that certain race groups and occupation-type have a higher probability of being employed than others.

Based on the regression analysis, the conclusion is that gender plays a significant role in determining the annual salaries. Females had lower annual income and employment level than their male counterparts across all age and race categories. Black males have a lower annual income and employment level than other males in other race categories. Results of the regression analysis had also showed that Blacks, American Indians, and the category defined as "Other" in the dataset, have a lower probability to be employed than the reference race category. The "Other" race category includes race categories are indicated not unknown in the American

Community Survey data. Another noteworthy piece of evidence uncovered in this research is that certain minorities such as Blacks, American Indians, and the race category defined as "Other" in the dataset, made at least $2,000 less in annual wages than Asian Americans. There was also a strong evidence which suggests that females who are American citizens with an associate degree have a significantly higher probability of employment than non-US citizen females though the difference is minimal among the male US citizens versus the male non-US citizens.

## Limitations

Limitations in the research study may occur when there are many variables measured simultaneously in a survey format. There is the potential to reduce the validity of a study (Coughlan, Cronin, & Ryan, 2009). This study only relies on self-reported data by the ACS survey participants for the year 2016. There is no control over how the subjects have reported their age, race, gender, citizenship status, occupation-type, income, and employment status. Also, White/Caucasian race was more prevalent within the dataset as compared to a lower sample size among the other race categories that are in the dataset. This is due to the fact that the effect size in terms of r-square values are impacted when the sample size differences exist between two variables of comparison (Kotrlik, Williams, & Jabor, 2011). Due to the fact that race White is significantly higher in proportion than other races, it can be considered as a limitation since a smaller sample size tend to increase the level of uncertainty and vice versa.

## Delimitations

When sampling of a population is narrow to explore the targeted research question, the validity of a research study is jeopardized (Nenty, 2009). The researcher eliminated the educational attainment level that was either above or below an associate degree level. The career clusters as defined by the National Career Cluster Framework are used in this study to arrange

specific fields of study. Cases in the career cluster government and public administration are dropped due to a small sample size. An original dataset of more than one million records was reduced to only about 46,850 cases to concentrate on the labor market outcomes for associate degree holders.

## Recommendations for Policy, Research, and Practice

Because population demographics as well as labor market demands are evolving at a rapid pace, it is vital to understand the future direction of labor market based on these developments. Research suggested that there is an increase in the influx of migrant workers in the workforce in the last ten years (Lichter, 2012; Parrado, 2011; Poon, 2014). There is also a tendency among certain races to have more offspring than others (Parrado, 2011). An increased focus on equity in American society in recent years have contributed to an increased racial diversity in the American workforce. There have been a number of research studies looking at the role of equity and their impact on the society's socioeconomic conditions (Azier, 2010; Horwitz & Jain 2011; Oosthuizen & Naidoo 2010). All these factors are reshaping the society as well as the labor market with the evolving job markets and populations.

The researcher had determined that race, gender, immigration status, and occupation-type can strongly influence the labor market outcome for associate degree holders. Overall, the results of this study are consistent with the literature available on this topic. However, there were findings not found in any reviewed literature. For instance, female survey participants had a lower annual salary than males yet the unemployment rate among the female associate degree holders was lower than that of their male counterparts with a similar educational background. Results of this study have a potential to support a solid context on the role of student demographics and occupation-type on the labor market. Individuals affiliated with a school

system, higher education, community development, and legislative branch of the government can certainly use this study to advance their knowledge of an evolving and increasingly diversifying populations in the community colleges as well as in the workforce.

**Recommendations for Policy**

From an equity standpoint, this study can promote a dialogue between various stakeholders in the realm of student development and labor market outcomes. There is an availability of both positive and negative literature showing the impact of equity-mindedness on the labor market and society (Azier 2010; Oosthizen & Naidoo 2010; Horwitz & Jain 2011). Generally, the current research on equity either supports this concept in terms of equal opportunity for all or it criticizes equity on the basis that it allows certain individuals to pursue opportunities that they would not necessarily qualify for based on the general criteria for a specific type of employment (Azier 2010; Horwitz & Jain 2011; Oosthuizen & Naidoo 2010).

Corporations can use the findings of this study, to compare the labor market outcomes of employees from various demographics. Businesses would find it to their benefit to invest in diversification of their workforce since a well-represented workforce can impact the organizational strategy to target a diverse population demographics (Ozeren, 2014). Utilizing data to address equity and equality in workforce would allow the corporations to make well-informed and conscious decisions which would save them the cost of employee discrimination lawsuits and other equity related arbitrations which are common in today's era.

The results of this study can guide the community college leadership and legislative branch of the government to strategically address the growing need of implementing equitable and equal safeguards to ensure that the American dream of pursuing labor market gains are attainable for not only the privileged individuals in the society but for all.

State legislators and department of education affiliated with their respected states can utilize this study to make policy decision as it pertains to funding. With an increase focus on performance-based funding in American society, the results of this study can assist state legislators in determining which programs to consider when making critical decisions for performance-based funding. Performance-based funding is a funding model which relies on an improved quality and performance-based approach to make funding related decisions in higher education (Kettunen, 2016).

**Recommendations for Research**

Job seekers and students can use this study to guide them in making informed decisions in pursuing their career goals.

Recommendation for Research #1: There is a potential to further this study by including the four-year institutions to understand the changes in labor market outcomes based on the type of a higher education institution. Researchers in the higher education should further expand this research study to include other post-secondary institutions for similar analysis. It would be interesting to know if there is a correlation between the results of this study in comparison with the labor market returns among the bachelor, master's, and doctoral degree holders.

As shown in the literature review of this study, there is a plethora of research, which demonstrates certain benefits of post-secondary credentials on the labor market. Research by Liu, Belfield, and Trimble (2015) showed that the quarterly earnings increased significantly for individuals who completed an associate degree program. The same research study also found that quarterly earnings increases were higher for bachelor's degree holders than associate degree holders.

This research, while providing evidence on certain demographics and career-clusters having improved labor-market returns at the community college level, does not offer any insight on the role of demographics or certain career-pathways having any impact at the baccalaureate, master's, or doctoral levels. Further research needs to determine if there are any significance of these results at post-secondary credential levels beyond the associate degree.

Recommendation for Research #2: The literature review and findings of this study emphasizes the need to further explore the evolving population demographics and careers. Demographic factors, such as race, gender, and citizenship status had a significant impact on the labor market outcomes for marginalized populations such as women, minorities, and non-US citizens. Further exploration on this topic will create a better understanding on how to address these issues in a comprehensive way. Disaggregated data in this study should promote dialogue among various stakeholders in the academia and in the labor market to inclusively design educational and hiring policies to help the various population demographics in achieving equitable labor market outcomes. Specifically, the community college leadership and legislative branch of the government can use these results to address the evolving workforce needs. Career advising related areas may benefit from the findings of this study. From an equity standpoint, this study has the potential to provoke the community leaders, educators, employers, job-seekers, and students to engage in a dialogue and come up with strategies which will promote an equitable and economically sustainable society.

Recommendation for Research #3: This research only included self-reported results from the American Community Survey participants. Collecting data with self-reporting might have disadvantages. There are studies, which showed that self-reported data is prone to carelessness on part of the subjects of the survey (Kurtz & Parish, 2001; Huang et al., 2012; Meade & Craig,

2012). Future researchers might want to use other sources of data collection since self-reporting has its own limitations as discussed in the limitations section of this research study.

Recommendation for Research #4: Another noteworthy variable of interest from this research study would be to explore employers' perspective on how they see the role of demographics in influencing the labor market returns, where applicable.

Are employers more likely to choose a candidate from a certain demographic characteristic? Does a recent focus on equity have any impact on employer's perception towards prospective employees from certain demographics?

As indicated in the literature review section of this study, research showed that employer preferences in choosing candidates based on the type of institution also plays a significant role in determining the labor market outcomes (Deming, Yuchtman, Abulafi, Goldin, & Katz, 2016). Current research in the field of student demographics and labor market outcomes suggested that lower socioeconomic status can lead to poor cognitive development, lower level of educational attainment and lower labor market and health-related outcomes in adulthood (Johnson & Schoeni, 2011). The literature included in the literature review section implied a direct correlation between lack of resources and its impact on labor market returns. For instance, a study by Lacour and Tissington (2011) showed that due to poverty, students will have fewer resources available at their disposal, which will negatively affect their labor market outcomes as compared to students not living below the poverty level. Other literature discovered during the literature review process emphasized food insecurities and poor academic performance among the school-aged and college-aged populations (Cady, 2014; Dubick Matthews, & Cady, 2016; Jyoti, Frongillo, & Jones, 2005).

Current research around equity from an employer's perspective is limited. With a recent focus on equity, there is a need to conduct research on employer's perception on equity to determine whether it is realistic to expect that the future workforce will carefully consider equity as one of the key variable when there are hiring decisions being made.

**Recommendations for Practice**

Recommendation for Practice # 1: With more women and minorities in the labor market in the United States and decreases in gender gaps in education, it makes sense to carefully evaluate the variables that are influencing the labor market inequalities based on demographics such as race and gender. All the appropriate stakeholders such as Human Resource office, employers, and community leaders should be involved in making sure that equal and equitable initiatives are introduced to elevate the living standard of all population demographics.

Recommendation for Practice # 2: Research in this study presents an opportunity for institutions to offer training programs for academic advisors and career counselors based on the based on the evolving nature of labor market returns as indicated in this research study. Informed decision making should provide more current information to prospective job seekers. Utilizing a data driven approach to advise students can have many benefits for job-seekers as well as the US economy. On the contrary, ill-informed advising in post-secondary institutions can prevent the maximization of human talents and resources, jeopardize the nation's economic future, and perhaps threaten the economic sustainability of the post-secondary institution in the long-run.

Recommendation for Practice # 3: The final recommendation for this study is to develop and utilize a database for collecting and tracking labor market outcomes which would allow for a consistent assessment of any improvements in narrowing the gaps in labor market outcomes for

various demographics that exist in the American society. Developing a nation-wide database for labor-market outcomes based on demographics would provide an easier way of gathering data for researchers who wish to pursue research similar to this study on a larger magnitude.

## Conclusion

This research analysis contributed to the body of research on the role of demographics and occupation-type on the labor market outcomes. Continuing to emphasize and demonstrate the role that demographics and occupation-type plays on labor market outcomes will allow the community college administrators and policymakers to address the challenges faced by a diverse and evolving workforce in America. The results of this study are consistent with the literature included in this study which has implied that race, gender, and occupation-type does have a significant effect on the labor-market outcomes (Gaddis, 2014; Goldin, 2014; Sheehy, 2014).

The biggest findings of the study are that gender, age, race, citizenship status and occupation type, continue to play a vital role in determining the labor market outcomes among the associate degree holders despite all the recent efforts that are being employed in the realm of equity and equality. There is a disparity of annual income and employment level between the two genders and the disparity tend to grow as the race variable is added to the gender related labor market outcomes. Some other key findings of this research study are that occupations related to law, STEM, IT, finance, health sciences human services, and law have a higher probability of being employed than the associate degree holders in other career-clusters. On the contrary, people associated with marketing, tourism, transportation, and business have a much lower probability of being employed than individuals in the other career clusters.

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