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The Impact of Sub-baccalaureate Educational Attainment of Post-graduation Employment

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Walden University
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Abstract

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by

Freda Scott

JD, Florida Coastal School of Law, 2015

MEd, University of South Florida, 2002

BA, Florida State University, 1984

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

While level of education predicts life income, the problem for this study was to determine the extent to which educational attainment predicts level of employment. The purpose of this quantitative study of archival data was to determine whether educational attainment predicts level of post-graduation employment for sub-baccalaureate associate degree and certificate holders. The covariates for this study were age, gender, race, and field of study. Human capital theory, the theoretical framework for this study, posits that students invest their time and resources in achieving educational credentials to obtain the economic benefits associated with those credentials. The two research questions that guided this study sought to determine if higher educational attainment at sub-baccalaureate levels predicts either involuntary underemployment or voluntary underemployment. Logistic regression was used to conduct a quantitative analysis of a secondary data sample (N = 583) obtained from the Adult Technical Education (ATES 2016) Survey. For research question one, the null hypothesis was rejected because the findings showed a statistically significant relationship between involuntary underemployment and five predictor variables: sub-baccalaureate certificates, associate degrees, field of study (other fields), race/ethnicity (Hispanics), and gender (female). For research question two, the null hypothesis was not rejected because gender was the only statistically significant variable associated with voluntary underemployment. This study contributes to social change by providing recent research findings from a nationally representative sample to inform key stakeholders about the association between higher educational attainment and post-graduation employment at sub-baccalaureate levels.

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Dedication

This dissertation is dedicated to my parents, Elouise McRae Scott and Hersey Scott. My parents' respect for and pursuit of higher education taught me, and my siblings, to pursue the American Dream through hard work and higher education. This dissertation is also dedicated to my brothers and sisters whose good examples of applying my parents' advice on hard work inspired me to pursue the American Dream through higher education.

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Chapter 1: Introduction to the Study

Introduction

Historically, higher education in America is valued as a pathway for middle-income and lower-income Americans to obtain the economic benefits of the American Dream (Palmadessa, 2017; Stevens et al., 2019). Since their establishment, community colleges in America have played a role in making it possible for Americans to pursue economic advancement through higher education (Baber et al., 2019). According to the 2018 American Freshman Survey, 59% of respondents reported that one of the long-term benefits of attending college was that graduates get good jobs (Stolzenberg et al., 2019).

Although many Americans pursue higher education to improve their economic opportunities, the link between educational attainment and post-graduation employment is not always clear. For some college graduates educational attainment is associated with underemployment (Cunningham, 2016a; Rosenbaum et al., 2017; Steffy, 2017). In this study, I focused on the under-researched subject of involuntary underemployment (working part-time but seeking full-time employment), and voluntary underemployment (working part-time, but not seeking full-time employment) for graduates with post-secondary credentials up to the level of an associate degree. I analyzed the employment outcomes by age, gender, race, and field of study.

Several research studies on higher education in general, and community college in particular, link educational attainment to higher earnings. Perna and Leigh (2017) noted that from a human capital perspective prospective, students decide to attend community college (or four-year colleges) when the benefits, such as increased earnings, outweigh

the costs. When analyzing the benefits of sub-baccalaureate credentials using nationally representative data from the 2004 and 2008 Survey of Income and Program Participation Program (SIPP) to investigate the association between sub-baccalaureate credentials and earnings, Kim and Tamborini (2019) found that the 20-year cumulative earnings for persons with sub-baccalaureate credentials varied by field of study. Similarly, using data from 1992 to 2011 on Career and Technical Education (CTE) in the California Community College Systems, Stevens et al. (2019) found that earning associate degrees and short-term certificates were associated with increased earnings.

In contrast to the research showing a positive link between post-secondary credentials and earnings (Gandara & Toutkoushian, 2017), other researchers pointed to negative outcomes for college graduates in general. Cunningham (2016b) found that many graduates with bachelors, masters, or doctoral degrees who were overqualified for their position or working only part-time, described their status as "problematic" (pp. 3,7). According to Cunningham, these graduates could expect their underemployment problem to last months or years. Similarly, in a study of graduates (level of degree not specified) from a large mid-western university (not named) from 2011-2013, Steffy (2017) found that many working-class college graduates described themselves as struggling with overqualification. Using emerging adulthood theory and Schlossberg's transition theory, Rosemond (2019) found that some underemployed college graduates (bachelors, masters, doctorate not specified) needed mentoring or counseling to cope with the stress of underemployment based on overqualification or part-time employment status.

Critics of the college for all movement and vocationalism in higher education resist the idea that earning a sub-baccalaureate credential predicts post-graduation employment. As Grubb and Lazerson (2004) explained in their seminal work, *The Education Gospel*, community colleges promote inequality when sub-baccalaureate programs produce graduates who are overeducated for the unskilled jobs that they obtain (p. 204). From this viewpoint, the community college experience serves to limit, rather than expand, a student's access to the American Dream. In an earlier seminal work, Freeman posited that in the 1970s, in contrast to the 1950's and 1960, the number of community college graduates obtaining employment aligned with their level of education decreased dramatically (Freeman, 1976). However, supporters of vocationalism in higher education argue that career-oriented sub-baccalaureate certificates and associate degrees provide students with a choice of pathways rather than a limitation (Kim & Tamborini., 2019; Perna & Leigh, 2017). On the issue of choice, Arvan et al. (2019) reported that graduates who are satisfied with employment that does not match their level of education are less likely to perceive themselves as overqualified.

The tension between liberal arts education and vocationalism is part of a larger social concern for reducing unemployment and underemployment for Americans. Without identifying the levels of education, Barnichon and Yanos (2019), reported the number of underemployed college graduates, in general, increased from 38.5% in 2008 to 41.5% in 2012. Underemployment refers to workers who are in positions for which they are overqualified (Barnichon & Yanos, 2019) as well as to workers who are involuntarily working in part-time or temporary positions (Cunningham, 2016a, 2016b). Part-time

workers or graduates seeking full-time or permanent positions are referred to as involuntarily underemployed workers, and those who are not seeking full-time or permanent positions are referred to as voluntary workers (Cunningham, 2016a, 2016b).

The distinction between overqualification and underemployment is important because workers and college graduates who are underemployed in terms of part-time status typically earn less than full-time workers and are not eligible for benefits. In 2018, the uninsured rate for full-time workers was 9% while in comparison, the uninsured rate for part-time workers was 15% (Kaiser, n.d.). Underemployment, and the resulting economic consequences, is a social issue that affects college graduates as well as workers (Cunningham, 2016a).

In this study, I addressed the economic issues of involuntary and voluntary underemployment for sub-baccalaureate certificate holders and community college graduates. I used employment data from the Adult Technical Education Survey (ATES 2016) to evaluate whether sub-baccalaureate educational attainment predicted post-graduation employment by age, gender, race, and field of study. In contrast to other recent studies, which used data from 2012 and 2013, I evaluated more recent data from the ATES 2016 survey. Additionally, although the recent study by Hudson and Isenberg (2019) focused on the relationship between high school diplomas and associate degrees to post-graduation employment, the researchers did not include the sub-baccalaureate certificate level.

Chapter 1 includes the introduction and historical perspective to my study. The background section includes a discussion of current research on access, retention,

graduation, and labor market outcomes for college graduates as well as the limitations of evaluating labor market outcomes only in terms of earnings or wages. The problem statement includes a discussion of a gap in the literature by focusing on the under-researched topics of *involuntary underemployment* (working part-time and seeking full-time) and *voluntary underemployment* (working part-time and not seeking full-time employment) for graduates whose highest level of educational attainment is a sub-baccalaureate certificate or an associate degree. The purpose section includes an explanation that the purpose of this quantitative study was to evaluate archival data to determine the relationship, if any, between educational attainment and post-graduation employment. The research question and hypotheses sections list the two research questions related to involuntary underemployment and voluntary employment. This section also includes the ordinal independent variable (educational credential at the associate's level or below) used to evaluate each of the two ordinal dependent variables (involuntary underemployment, and voluntary underemployment). The theoretical framework section includes a discussion of how the human capital theory was used to guide the inquiry in my study. According to this theory, individual investment in higher education leads to economic benefits for the individual as well as society. I relied on data obtained from the ATES 2016 survey and this is a delimitation of my study. A different survey might contain different questions and provide different information.

Background of the Study

Beginning with the establishment of Jolliet Community college in 1901, community colleges have increased lower and middle-income Americans' access to the

economic benefits associated with higher education. As the number of community colleges increased in the United States the dual role of the community college also expanded (Grubb & Lazerson, 2004; Jurgen, 2010). In the early 1900s, as the Industrial Revolution reshaped American society, community colleges responded by offering vocational and workforce training designed to prepare graduates for in-demand jobs in business and industry (O'Banion, 2019). In 1947, The contributors to the Truman Commission Report recommended expanding the role of community colleges. The commission's recommendations influenced the development of community colleges in America (Gilbert & Heller, 2013). Today, community colleges offer sub-baccalaureate certificates and degrees, that upon completion, are designed to equip students for positions associated with higher wages (Kim & Tamborini, 2019).

Students may pursue certificates or associate degrees that are related to specific careers, or they may elect to take courses or earn degrees that prepare them to transfer to colleges or universities that offer 4-year degrees as well as masters, doctoral, or professional degrees (Carlson & McChesney, 2015; Kim et al., 2015). Researchers that provide data on whether sub-baccalaureate credentials are related to involuntary underemployment or voluntary underemployment also provide data to clarify whether community colleges are fulling the part of their mission related to offering sub-baccalaureate credentials that lead to stable careers. In this study, I focused on the return on investment for students who earn post-secondary credentials offered at community colleges.

In much of the literature on higher education, educational attainment is positively associated with post-graduation employment (Mahatanankoon et al., 2018; Millea, et al., 2018; Reader & Atamturktur, 2018). In the literature on community colleges, researchers who conducted a study of graduates from California community colleges found that earning a sub-baccalaureate credential was positively associated with increased wages (Stevens et al., 2019). Similarly, on a study of graduates from a Washington State community college researchers reported that community college certificates and associate degrees were positively associated with increased earnings (Dadgar &Trimble, 2015).

Several recent studies associate access to higher education with underemployment. According to Roth (2019), based on data obtained from the National Center for Educations Statistics (NCES), for institutions granting associate degrees or higher from 1990 to 2016, the 40% increase in college enrollment parallels the percentage of graduates likely to become underemployed. Additionally, using data from the U.S. Department of Education, Roth explained that in school year 2015-2016 one million graduates received associate degrees and 2.9 million graduates received a bachelor's degree or higher. However, in 2016 only 2.6 million jobs were created. Therefore, the one million associate degree graduates competed with the 2.9 million graduates receiving bachelor's degrees or higher, which according to Roth, creates the economic environment for underemployment.

A similar situation existed in 2017 for the 2.2 million available jobs and in 2018 for the 2.6 million jobs because in both these years the number of jobs created was less than the 3.9 million graduates (including one million community college graduates)

seeking employment (Roth, 2019, p. 90). Rios et al. (2018) noted that the positive association between sub-baccalaureate credentials and an increase in wages varies based on gender. For men, the positive association between educational credentials and increased earnings occurred in fields such as engineering and computer specializations. For women, the most positive association occurred in the health-related fields. The literature that I reviewed for this study, and summarized in this section, revealed that only three studies (two peer-reviewed) used data from 2016 to analyze underemployment for individuals with post-secondary credentials (Hudson & Isenberg, 2019; Rios, 2018; Roth, 2019). From those studies, the one focusing on underemployment did not include sub-baccalaureate certificates (Hudson & Isenberg, 2019). The data on employment outcomes for sub-baccalaureate certificate holders is needed to obtain a comprehensive picture of post-graduation employment at the community college level. I did not find any studies using recent data to analyze involuntary and voluntary underemployment for graduates with sub-baccalaureate certificates in conjunction with associate degrees. I filled the gap on this under-researched topic by using 2016 data to examine whether obtaining sub-baccalaureate credentials is associated with involuntary underemployment or voluntary underemployment.

Involuntary underemployment is an under-researched topic in the literature on higher education in general and community colleges in particular (Arvan et al., 2019; Cunningham, 2016b; Steffy, 2017). The recent literature on underemployment focused on four-year degrees and graduate degrees. For example, using Marxist theory to analyze employment outcomes for college graduates after the 2008 recession, Cunningham

(2016a) found that the increase in *deskilled* labor aligned with a trend toward technical automation in the modern workforce resulted in many college graduates working in part-time employment that did not match their levels of education. When categorizing survey participants as *No College*, *Some College*, *Four-Year Degree*, and *More-Than Four-Year Degree*" Horowitz (2018) found that those with 4-year degrees or higher are more likely to work in positions below their level of training or in part-time positions (while preferring full-time work) when there is a large supply of college graduates competing for jobs requiring college-level cognitive skills (pp.785-786). Conversely, when the supply of college graduates is low, there is less competition for jobs requiring college-level cognitive skills so the likelihood of underemployment for graduates with four-year degrees or higher decreases. Horowitz did not distinguish associate degree graduates from those in the *Some College* category. In my study, I built upon the existing literature and provided currently unavailable research that focuses on the association between sub-baccalaureate credentials and involuntary underemployment, and voluntary underemployment for sub-baccalaureate certificate holders and graduates with associate degrees. I examined the association using four major subcategories for post-secondary graduates: age, gender, race, and field of study.

As Palmadessa (2017) explained, community college is often the only higher education option for many Americans who are hindered by the cost of higher education. In response, many federal policies, including America's College Promise (ACP) Act of 2015, focused on two primary areas: access and economic development. The purpose of ACP is to increase access to higher education at the community college level by

expanding existing funding for promise scholarships from states and private funding to include federal funding (America's College, 2015; Palmadessa, 2017; Pierce, 2015). Supporters of ACP argue that expanding access through promise scholarships allows students to obtain the skills needed to pursue financially rewarding careers. However, the literature on overqualification and part-time underemployment questions the assumption that college credentials lead to better career opportunities.

The federal and state governments' role in funding higher education aligns with the human capital perspective that investing in higher education leads to economic benefits for individuals and society (Dept of Education, n.d.). At the federal and state government levels, traditional scholarships, promise scholarships, grants, and student loans are offered to make higher education affordable for students (Gershen et al., 2019; Palmadessa, 2016; Ritter & Ash, 2016). In 2017, federal spending on major higher education programs totaled $74.8 billion, state investments amounted to $87.1 billion, and local funding was $10.5 billion. These figures exclude student loans as well as other higher education related tax deductions and credits taken by students and their families (PEW, 2019). The extensive investment of federal and state funds into higher education provided a strong reason to research whether educational attainment is associated with underemployment.

Involuntary underemployment and voluntary underemployment are areas of concern for many college graduates (Roth, 2019). Underemployment presents a challenge to many community-college graduates because it reduces the economic benefits associated with investing in sub-baccalaureate credentials (Barnichorn & Yanos, 2019;

Cunningham, 2016a; Cunningham, 2016b). My research contributes to the literature on underemployment for college graduates by addressing the under-researched topics of involuntary and voluntary underemployment for graduates whose highest level of educational attainment is a sub-baccalaureate certificate or an associate degree. I evaluated four covariates related to educational attainment and post-graduation employment: age, gender, race, and field of study. The results of my study provide data to inform decisions of prospective students and other key stakeholders, including policy makers.

Problem Statement

The problem that I addressed in this study is whether educational attainment predicts involuntary underemployment (working part-time but seeking full-time employment) and voluntary underemployment (working part-time but not seeking full-time) for graduates whose highest level of educational attainment is a sub-baccalaureate certificate or an associate degree. I used SPSS software to sort the data set for involuntary underemployment and voluntary underemployment by the highest level of credential earned. Although overall unemployment is low for college graduates, the problem of underemployment is a social issue discussed in recent research (Arvan et al., 2019; Cunningham, 2016b; Steffy, 2017). As provided in the evidence that follows, the problem of underemployment for sub-baccalaureate certificate holders and those with associate degrees is current, relevant, and significant.

In 2018, most respondents to the Freshman Survey indicated that a primary reason for attending college was to obtain employment (Stolzenberg et al., 2019). However, only

a few studies focused on the association between educational credentials and underemployment for sub-baccalaureate certificate holders and those with associate degrees. In line with most of the current research on underemployment, Cunningham (2016b) used qualitative interviews to focus on underemployment as a mismatch between a graduate's level of education and his or her employment. In interviews conducted in 2013 with 20 college graduates from the Cincinnati area, Cunningham found that many of the graduates viewed their underemployment as problematic. In another qualitative study of 2011 and 2013 graduates of a midwestern university, the results of 36 interviews revealed that the majority of the respondents who were dissatisfied with their underemployment status (involuntarily underemployed) were from families classified as working class because no parent had a college degree or a professional position (Steffy, 2017). Also, based on an online survey of 588 employees of a public southeastern university, Arvan et al. (2019) found that employees' employment satisfaction predicts whether they perceived themselves as underemployed. These studies, like the majority of literature on underemployment, are limited because they are based on data prior to 2016, focused on overqualification, and are not generalizable because they focused on state or regional level data.

My study filled a gap in the literature because I focused on involuntary and voluntary part-time underemployment using generalizable data from the ATES 2016 survey. The 2016 survey represents a time after the Great Recession and before the unemployment crisis created by the 2020 Coronavirus pandemic. I analyzed ATES 2016 underemployment data for sub-baccalaureate certificate holders and graduates with

associate degrees. An analysis of underemployment begins with an understanding of the unemployment rate and the labor participation rate.

To provide more details on the labor market outcomes for workers in general as well as college graduates, the Bureau of Labor Statistics (BLS) calculates the labor participation rate in addition to the unemployment rate. According to the BLS traditional definition, the unemployment rate represents the number of unemployed people as a percentage of the labor force. The labor force is the sum of the employed and unemployed (Labor Force, 2020). In contrast, the labor participation rate represents the number of people in the labor force as a percentage of the civilian noninstitutional population. In other words, the participation rate is the percentage of the population, other than military personnel or other government employees, that is either working or actively looking for work. (Labor Force, 2020, para. 5)

Neither the unemployment rate nor the labor participation rate includes those persons who are not seeking employment. To provide a more comprehensive picture, the BLS uses the U-6 employment rate to include persons who are working part-time but prefer full-time work (also called involuntary part-time workers) as well as persons who say they want to work but are not seeking work (Labor Force, 2020).

For example, according to data from BLS, in 2019, the overall unemployment rate in the United States was 3.6% (Economics Daily, n.d.). The labor participation rate was 62.9% and the U-6 employment rate was 6.7% (Alternative Measures, 2020). In this example, the U-6 rate, which is more comprehensive than the unemployment rate, is twice as high as the traditional unemployment rate. In 2019, for those with some college

or an associate degree, the labor participation rate was 64.7%, which reflects the percentage of those with some college or an associate degree who were either working or actively looking for work (Bureau of Labor, 2019). Conversely, if 64.75% were working or actively looking for work, then approximately 35% of those with some college or an associate degree were either not working or not looking for work (Bureau of Labor, 2019). The labor participation rate looks at unemployment in terms of the percentage of the population that is working or looking for work. The traditional unemployment rate looks at the percentage of the population that is not working. However, the labor participation rate is like the U-4, U-5, and U-6 unemployment rates because the labor participation rate, like the U-4, U-5, and U-6 rates, includes those who are not working or looking for work in their calculations.

I examined involuntary and voluntary underemployment, but not unemployment. I used data from the ATES 2016 survey, a nationally representative sample, to evaluate the problem of involuntary underemployment (seeking full-time work) and voluntary underemployment (not seeking full-time work) for respondents to the ATES 2016 survey with a sub-baccalaureate certificate or an associate degree as their highest level of educational attainment. Because the data for my study are based on a nationally representative sample, the findings of my study are generalizable to students and policymakers in the United States.

Additionally, I expanded upon the research on persons who are not seeking work, such as discouraged workers, by examining involuntary and voluntary underemployment for those who obtained sub-baccalaureate certificate and associate degrees. In the ATES

2016 survey, voluntary underemployment refers to participants who were not working full-time and not seeking full-time work as well as participants who were working in temporary positions and not seeking full-time positions. It is important for students and policy makers to note that approximately 52% of the respondents to the ATES 2016 survey were working full-time, 13% were involuntarily underemployed, and 35% were voluntarily underemployed (NCES, 2018). I used ATES 2016 survey data to fill a gap in the literature by examining involuntary underemployment and voluntary underemployment for two levels of educational attainment: (a) sub-baccalaureate certificates and (b) associate degrees. The covariates studied were age, gender, race, and field of study.

Underemployed workers are included in the calculation of the U-6 employment rate because they are working part-time, although they prefer full-time employment (Bureau, 2020a, Bureau of Labor, 2020b). While employed, the problem for underemployed workers is that they are working in positions for which they are overqualified based on their education and/or only working part-time positions. The BLS includes underemployed workers in the U-6 calculation to obtain a more comprehensive picture of the unemployment rate. In contrast, the ATES 2016 survey is useful for studying underemployment because it provides separate data for involuntary underemployment and voluntary underemployment for graduates with sub-baccalaureate certificate certificates and associate degrees (ATES, 2016). For example, to evaluate underemployment, researchers from (NCES) used the ATES 2016 survey to gather data showing whether the participants were working full-time (at least 35 hours per week) or

underemployed (less than 35 hours per week). In the ATES 2016 survey approximately 52% of all the respondents, slightly more than half, reported working full-time (NCES, 2016a). Although the ATES 2016 researchers defined underemployment in terms of full-time or part-time status, many scholarly studies of underemployment focus on overqualification (Cunningham, 2016b; Harari et al., 2017).

The literature review for this study revealed three recent studies by researchers that examined college graduates' perceptions of their underemployment status rather than the economic aspects of part-time status (Arvan et al., 2019; Cunningham, 2016b; Steffy, 2017). Steffy (2017) identified the participants as graduates of a large mid-western university. The findings in these studies revealed that some respondents are voluntarily underemployed for work-life balance reasons and other are voluntarily underemployed because they are pessimistic about obtaining full-time employment. The arguments of these authors highlight the need for surveys that ask more in-depth follow up questions or qualitative studies that allow interviewers to ask clarifying questions. However, these studies have their own limitations because neither Cunningham, Arvan, nor Steffy included post-secondary certificate holders or community college graduates in their studies. Hudson and Isenberg (2019) examined underemployment data on high school graduates and graduates with associate degrees, but did not include data on sub-baccalaureate certificate holders.

My study isolated and evaluated the underemployment data for those respondents with sub-baccalaureate certificates or associate degrees as their highest level of educational attainment. Applying the employment predictions of Barnichon and Yanos

(2019) to the 47,744 respondents of the ATES 2016 survey means that the underemployed high school graduates, sub-baccalaureate certificate holders, and associate degree graduates who participated in the ATES 2016 study could anticipate that their underemployment status would last at least 1 year (NCES, 2016a). Moreover, based on the national representative sample in the ATES 2016 survey, it is possible to generalize that graduates with sub-baccalaureate credentials can expect their underemployment to last at least 1 year. According to my review of the literature, only one recent, but not peer-reviewed, study, Hudson and Isenberg (2019), used data from 2016, to examines whether educational attainment predicts involuntary underemployment (working part-time but seeking full-time employment) and voluntary employment (working part-time but not seeking full-time) for graduates whose highest level of educational attainment is a high school diploma or an associate degree. However, Hudson and Isenberg (2019) did not provide data on sub-baccalaureate certificates.

A discussion of educational overqualification for a job provides a limited view because graduates may be working full-time in a position for which they are overqualified. The distinction between overqualification and part-time employment is important because part-time workers usually earn less than full-time workers. Also, they typically do not have health insurance or other economic benefits of full-time employment. The problem my study addressed is whether educational attainment predicts involuntary underemployment (working part-time but seeking full-time employment) and voluntary underemployment (working part-time but not seeking full-time) for graduates

whose highest level of educational attainment is a sub-baccalaureate certificate, or an associate degree.

Purpose of the Study

The purpose of this quantitative study was to analyze whether educational attainment predicts post-graduation involuntary underemployment and voluntary underemployment for sub-baccalaureate certificate holders and associate degree holders. The independent variable for educational attainment is a derived variable referred to as "educational credential." The educational credential variable was created by combining data from the high school and associate degree levels of the ATES 2016 Educational Attainment with data from the ATES 2016 variable for sub-baccalaureate certificates (see Appendix B). For the associate degree level, the ATES 2016 data set combines data on Associate Arts (AA) and Associate Science (AS) degrees. The educational attainment variable does not include data on Associate of Applied Science (AAS) degrees because the ATES 2016 questionnaire was sent to householders and the data set based on the responses to the questionnaire did not include AAS degrees in the definition of associate degrees. For the dependent variable, post-graduation employment, the two levels of employment are involuntary underemployment and voluntary underemployment. The variable for voluntary underemployment is a derived variable created from the respondents' answers to the ATES 2016 survey questions asking if the respondent was seeking full-time or permanent employment. My study used a nationally representative sample from the United States. The covariates in my study are age, race, gender, and field of study. The study was designed to provide data that prospective students and

policymakers may use to evaluate the association between educational credentials and post-graduation employment.

Research Question(s) and Hypotheses

The research questions and hypotheses for my study follow. Data was sorted by the two levels of educational attainment: sub-baccalaureate certificate and associate degree.

Research Question 1 (RQ1): Does educational attainment (sub-baccalaureate certificate or associate degree) predict post-graduation involuntary underemployment when controlling for the influence of age, race, gender, and field of study?

Null Hypothesis ($H_0$1): Educational attainment does not predict post-graduation involuntary underemployment when controlling for the influence of age, race, gender, and field of study.

Alternative Hypothesis (H_a1): Educational attainment does predict post-graduation involuntary underemployment when controlling for the influence of age, race, gender, and field of study.

Research Question 2 (RQ2): Does educational attainment (sub-baccalaureate certificate or associate degree) predict post-graduation voluntary underemployment when controlling for the influence of age, race, gender, and field of study?

Null Hypothesis ($H_0$2): Educational attainment does not predict post-graduation voluntary underemployment when controlling for the influence of age, race, gender, and field of study.

Alternative Hypothesis (H_a2): Educational attainment does predict post-graduation voluntary underemployment when controlling for the influence of age, race, gender, and field of study.

Theoretical Framework

Schultz, Becker, and Mincer developed human capital theory based on the economic tenets of Adam Smith (Becker, 1994; Mincer, 1974; Schultz, 1961). As Smith explained, a worker's wages are determined, in part, by the level of training and skill needed to perform the job (Smith, 1776, as cited in Stigler, 2014). Smith's line of reasoning is considered by many scholars to be the foundation of human capital theory. The application of Smith's ideas to human capital theory reasons that investing in education will increase the skills, productivity, and wages of the worker (Holden & Biddle, 2016, p. 4). As Becker (1994) explained, according to human capital theory, the time and money that students, institutional leaders, and government leaders invest in higher education translate into better trained workers for society in general and improved wages for graduates in particular. Using human capital theory as a framework, my study expanded upon the literature on wages and examined whether educational attainment is associated with involuntary underemployment and voluntary underemployment.

In early writings on the benefits of investing in education, Schultz (1961) developed the idea that investing in knowledge improves productivity, and as Becker (1994) explained, human capital theory serves as the basis for research at the college and community college levels. Becker and Schultz helped to develop human capital theory while teaching at the Chicago School of Economics (Tan, 2014). Becker focused on

developing a general theory of investment in human capital (Holden & Biddle, 2017) and in 1964 Becker published the first edition of *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. Schultz's research focused on the relationship between human capital and growth, which aligns to individuals using their knowledge to improve their economic situations (Holden & Biddle, 2017, p. 547).

Mincer, a colleague of Becker at Columbia University, focused his research on the impact of education on wages over the life span of an individual (Grossbard, 2006). Using a line of reasoning similar to Schultz and Becker, Mincer's writings focused on the rate of return for investment in education to improve worker productivity (Mincer, 1974). Mincer's work included an analysis of the relationship between investing in human capital and personal income (Holden & Biddle, 2017, p. 545). A detailed discussion on human capital theory is included in Chapter 2.

Nature of the Study

In this quantitative study, educational credentials and post-graduation employment were examined using data from the ATES 2016 survey. The ATES 2016 survey used a descriptive design to gather data from respondents about the status of their post-graduation employment. The survey used a large nationally representative sample, so the results of the study are generalizable to the larger population (Creswell 2009; Given, 2012; Williams, 2007). I selected the ATES 2016 data set because the descriptive data were obtained from graduates with the educational credentials and the post-graduation experiences identified for evaluation in my study. There are no other data sets available that matched my research questions.

In addition, I selected the ATES 2016 data set for this study because the nationally representative sample makes the results of my study generalizable to a larger population of graduates and other stakeholders. The association between the two variables for educational credentials and the two variables for post-graduation employment was examined using data obtained from the portion of the 47,744 respondents to the ATES 2016 survey who reported a sub-baccalaureate certificate or an associate degree as their highest credential.

The derived variable for voluntary underemployment was created using data from the ATES 2016 variable for underemployment. Specifically, voluntary underemployed was derived by distinguishing respondents who were not seeking full-time or permanent employment from those who responded to the survey indicating that they were seeking full-time or permanent employment. Logistic regression was used to examine the association between the independent variable, educational credential, and the two binary (dichotomous) dependent variables for post-graduation employment. The association between the variables was examined to answer the research questions (Egerton, 2018).

A quantitative study using a secondary data set was used to answer the research questions in my study. My research topic could be explored through a qualitative design, but the small sample size would not provide enough data for me to generalize the findings to a larger population (Burrell & Gross, 2018). A quantitative study is a better fit for my study because underemployment, as it relates to education level, is a social and research problem that is not restricted to a small group of people.

Definitions

The following terms informed my study:

Derived Variable: variables that are derived from other variables (Gott & Duggan, 2003). An example is the variable for underemployment in the ATES 2016 survey. The variable was derived by combining respondents' answers to question 55 and question 50 from the ATES 2016 survey to determine whether the respondent would be classified as underemployed. The covariate for race is a derived variable created by combining respondents' answers to questions about race and ethnicity.

Educational Credential: the independent variable created by combing the high school level and associate degree level from the ATES 2016 variable for educational attainment with the ATES variable for sub-baccalaureate certificates (NCES, 2016a).

Full-time employment: working 35 hours or more per week (NCES, 2016a). My study is based on the ATES 2016 survey which was administered by NCES. My study used the definition used by the ATES 2016 study.

Involuntary Underemployment: refers to overqualification based on a mismatch between educational attainment where the worker or graduate is seeking matching their qualifications as well a as having part-time employment status but seeking full-time (Collins & Long, 2015). The ATES 2016 survey defines involuntary underemployment as working part-time but is seeking full-time employment or working a temporary position and seeking a permanent position (McPhee et al., 2018).

Raking: a post-stratification procedure for adjusting sample weights in a survey so that the adjusted weights add up to known population totals for the post-stratified classifications when only the marginal population totals are known (Cohen, 2011).

Sub-baccalaureate certificate (derived variable): an educational credential below the four-year degree level in the form of a short-term (less than one year to complete) or long-term certificate (Dadgar & Trimble, 2014). The two sub-baccalaureate credentials that are evaluated in my study are sub-baccalaureate certificates and associate degrees.

Underemployment: participants in the ATES 2016 survey who were working part-time (less than 35 hours per week) but seeking full-time work or who were working a temporary position and seeking a permanent position. Voluntary underemployment refers to participants in the ATES 2016 survey who were not working full-time and not seeking full-time work or working a temporary position and not seeking a permanent position (McPhee et al., 2018).

Voluntary underemployment: workers who are voluntarily working part-time hours (Steffy, 2017).

Assumptions

One assumption of this study, which is typical of all survey-based studies, is that the respondents answered truthfully. The data set used in this study is compiled based on the respondents' answers to 83 questions on the ATES 2016 survey. The data set is publicly available. In my study, it is assumed that the respondents truthfully answered the survey questions about their highest level of educational attainment as well as their post-graduation employment status. Another assumption in this study is that administering the

survey restricted to the English and Spanish languages met the language needs of all respondents to the survey (McPhee et al., 2018; National Household: Part A, 2015). Additionally, in my study it is assumed that the survey instrument produced reliable and valid data because the questions for the ATES 2016 survey were developed by a panel of experts, was pilot tested, and were revised as needed prior to administering the survey (McPhee et al., 2018; National Household: Part A, 2015).

Scope and Delimitations

The scope of the ATES 2016 survey is respondents selected to receive the survey because they were noninstitutionalized adults, 16 to 65 years of age, who were not enrolled in grades 12 or below and were not being homeschooled for equivalent grades. These participants were selected using a screening questionnaire that asked questions about three separate surveys. Based on the responses to the questionnaire, only one individual in each household was selected to respond to one of the surveys. If the householder received an ATES 2016 survey, he/she did not receive one of the two child-related studies (McPhee et al., 2018). The scope of the subset of respondents included in my study were respondents to the ATES 2016 survey who answered the questions related to underemployment on the survey. This subset consisted of noninstitutionalized adults, 17-66 years of age, who were not enrolled in grades 12 or below and were not being homeschooled for equivalent grades.

The ATES 2016 survey, sent to householders who met the criteria, asked questions about the respondent's highest level of educational attainment based on a list of ten categories. The respondents selected one of the 10 levels of educational attainment as

their highest level of educational attainment. The first delimitation in my study was to use three of the 10 educational levels listed for the educational attainment from the data set created based on the ATES 2016 survey. Due to the gap in the literature, my study focused on the problem of underemployment for graduates with high sub-baccalaureate certificates and associate degrees. Another delimitation in my study, also used in the ATES 2016 survey, was to define full-time employment as working 35 hours or more per week and underemployment as working less than 35 hours per week. My study, like the ATES 2016 survey, used the same definition for full-time employment as the one used by the Bureau of Labor Statistics. The association between educational credential and post-graduation employment was examined using involuntary underemployment and voluntary underemployment as post-graduation employment outcomes rather than focusing on earnings outcomes. The nationally representative sample in the ATES 2016, and the subset used in my study, means that the results of the ATES 2016 as well as the results of my study, are generalizable to a larger population.

Human capital theory was used as the framework for my study. Human capital theory espouses that students invest time and money in higher education to receive economic benefits for their increased knowledge and skill. Other theories were considered to frame the study, such as critical theory (and the related philosophy of critical pedagogy) but were rejected. In critical theory, the current conditions in society are examined as well as the social and political actions necessary to achieve the desired level in all areas of society-including education (Given, 2012a). Using a critical theory approach would have influenced generalizability and external validity because my study

focuses on individual attainment and individual outcomes and not on the social and political forces hindering students' educational attainment and post-graduation employment at the community college level. When using critical theory instead of human capital theory, the purpose of my study would change from examining individual post-graduation employment outcomes to examining identifying the social and political forces that improve educational attainment and post-graduation in community colleges as social institutions.

Limitations

The representative sample used to conduct the ATES 2016 survey means that the results are generalizable to American students who attended community colleges similar to the colleges included in this study and who earned credentials similar to the sub-baccalaureate credentials evaluated in this study. Although the results of five of the predictor variables are generalizable, there are limitations to this study. First, the target population for this study was obtained from a list of all the available addresses in the United States known to the United States Postal Service. It is possible that some individuals with educational credentials relevant to this study have addresses that are not included in the postal database. Also, some individuals may not have a postal address. This omission could have an impact on the outcome of the study because graduates who cannot afford to maintain a postal address would not be included in the study although their post-graduation employment status is relevant to this study.

Second, the ATES 2016 researchers used paper-based or email surveys to obtain data for the ATES 2016 survey. The question stems were designed to put related

questions together, however, the survey design did not allow an interviewer to ask the respondent clarifying questions about his or her response. Similarly, my study reported on involuntary and voluntary underemployment but does not include interviews with respondents to ask clarifying questions. For example, the data obtained from the ATES 2016 survey for my study does not distinguish between respondents who are not seeking full-time employment because they are satisfied with their level of employment, those not seeking full-time employment because they are currently in school and/or managing family responsibilities, or those not seeking full-time employment because they believe no work is available.

Supporters of state and private funding for higher education to fund grants, scholarships, and loans argue that funding higher education is needed to equalize access and leads to higher earnings for graduates. However, critics question findings on earnings that are based on responses from respondents because some respondents may not disclose favorable facts about themselves (Radwin & Horn, 2014). As Carkin and Tracy (2015) explained, the problem of non-response bias in survey research includes lack of response from those who are eligible to participate in a survey, but who refuse to be interviewed. Similarly, Standish (2019) discussed institutional level strategies for reducing non-response bias and improving the validity of findings by increasing responses to surveys.

Significance

My study contributes new knowledge to an under-researched area on sub-baccalaureate credentials by analyzing post-graduation employment data sub-baccalaureate certificate holders and graduates with an associate degree. The covariates

include age, gender, race, and field of study. In a study focusing on certificates and associate degrees. Lowry and Thomas (2017) found that sub-baccalaureate credentials obtained through Career and Technical Education as well as STEM training were productive investments for students because they provide the economic rewards associated with in-demand careers. However, Lowry and Thomas (2017) did not evaluate whether graduates were working full-time, involuntarily underemployed, or voluntarily underemployed. Moreover, although Hicks et al. (2014), Burns and Slack (2015), and Plutha and Penny (2013) found a positive correlation between post-secondary education and post-graduation employment, they did not evaluate whether graduates were employed full-time, involuntarily underemployed, or voluntarily underemployed. My study filled the gap in the literature on whether sub-baccalaureate credentials predict post-graduation employment (careers) by building upon existing research to examine the association between sub-baccalaureate credentials and involuntary underemployment and voluntary underemployment. The data for this study are timely because there are no other known studies using NHES 2016 data to analyze the employment outcomes for sub-baccalaureate certificate holders (NCES, 2016a).

My research contributes to positive social change by informing key stakeholders of my study findings to help clarify whether sub-baccalaureate credentials benefit individuals and society by decreasing underemployment for sub-baccalaureate certificate holders and community college graduates. The current research on earnings provides a limited view of a student's return on investment because graduates who are working and reporting wages may be involuntarily or voluntarily underemployed. My study provides a

more comprehensive look at post-graduation underemployment than is found in the existing literature focused on earnings. In doing so, my study addresses the arguments of critics who claim sub-baccalaureate credentials (vocationalism in higher education) predict post-graduation underemployment. Along those lines, in a study of simulated applicants for 2010 graduates with bachelor's degrees, Nunley (2017) found that underemployed applicants with internship experience while completing their bachelor's degree had a call back rate from employers that was 17% higher than for underemployed graduates with no internship experience on their application.

Building upon Nunley's findings, community college administrators may be able to promote positive social change by creating or expanding existing internships and college/business partnerships to decrease the impact of underemployment on graduates with sub-baccalaureate credentials. Partnerships between colleges and businesses allow students to gain real-world work experience related to their program of study while they are still in school. In college-business partnerships, there is a clear connection between college and a student's choice of career (Morgan et al., 2018; Murray, 2014; Yarnall et al., 2016). In one study, based on a quantitative analysis of five case studies, researchers developed a framework with resources for higher education leaders to successfully design, implement, and track the progress of college/industry partnerships (Yarnall et al., 2016). In a similar case study, on steel workers graduating from college college/workforce industry partnerships programs, Murray (2014) found that students tended to graduate with $50,000.00 per year jobs rather than $50,000.00 in student loan debt. A case study of a small midwestern business school found that hiring a Career

Services Director and building a Career Center resulted in a 98% placement rate for four years (Morgan et al., 2018). The results of my study help prospective students, counselors, college administrators, college/industry partners, lawmakers, and politicians evaluate whether sub-baccalaureate credentials predict involuntary underemployment, or voluntary underemployment.

Summary

The purpose of the study and the problem statement outlines how my study used employment outcomes, rather than earnings, to address the issue of post-graduation employment more fully for individuals with sub-baccalaureate credentials. Additionally, in Chapter 1, I introduced human capital theory, which states that individual investment in higher education leads to improved economic outcomes for graduates. I used human capital theory to frame the relationship between educational credential and post-graduation employment. In Chapter 2, I discuss the major themes in the literature related to educational credentials and post-graduation employment: access and retention/persistence. Two other topics related to post-graduation employment that I discuss in Chapter 2 are the types of sub-baccalaureate credentials available and the types of funding available to obtain sub-baccalaureate credentials.

Chapter 2: Literature Review

Introduction

Students and policy makers who invest time and resources in community college programs need accurate information about the employment outcomes for graduates of these programs. Most research on educational credentials for those with sub-baccalaureate certificates or associate degrees focus on the relationship between educational credentials and earnings. However, there is a gap in the literature concerning post-graduation employment for graduates with sub-baccalaureate certificates and associate degrees. College graduates might earn wages but could be involuntarily underemployed (working part-time but seeking full-time) or voluntarily underemployed (working part-time, but not seeking full-time).

In the literature reviewed for this study, I distinguished involuntary underemployment and voluntary underemployment from the perspective of unemployment. I discuss the distinction between unemployment and underemployment as well as job overqualification in this literature review. Additionally, the ATES 2016 survey, which provided the data for this study, distinguished underemployment from unemployment. For example, if a respondent to the ATES 2016 survey indicated that he/she was unemployed, which includes respondents who were not working because they planned to transfer to 4-year schools, then that respondent was not included in the ATES 2016 study or my study. The problem that I addressed in my study was whether educational attainment predicts involuntary underemployment (working part-time but seeking full-time employment) and voluntary underemployment (working part-time but

not seeking full-time) for graduates whose highest level of educational attainment is a sub-baccalaureate certificate or an associate degree. The covariates include age, gender, race, and field of study. My study expands upon the research on discouraged workers by examining involuntary and voluntary underemployment for those who obtain sub-baccalaureate certificates and associate degrees. The purpose of my study was to determine whether educational attainment predicts post-graduation involuntary underemployment and voluntary underemployment for sub-baccalaureate certificate holders and associate degree holders.

The literature review is divided into four major sections. First, I review the search process used was to obtain information related to educational credential and post-graduation employment. In the section on theoretical foundation, I explain human capital theory and discuss how this theory helps to frame my study and the research questions on post-graduation employment. In the literature review section, I evaluate publications on educational attainment and post-graduation employment outcomes. I focus on the relationship between sub-baccalaureate educational attainment and post-graduation earnings. Finally, in the summary and conclusion, I highlight what is known and what is not known about the association between sub-baccalaureate educational credentials and post-graduation employment to shed light on a gap in the literature that I helped to fill with my study.

Literature Search Strategies

The literature reviewed in this study resulted from searching Education Source, Education Resources Information's Center (ERIC), Inter-University Consortium for

Political and Social Research data sets (ICPSR), National Center for Educations Statistics (NCES) publications, ProQuest Central, SAGE Journals, and Taylor Francis. The search terms used in these databases involved combining *higher education, college*, and *community college* with terms such as *job placement*, *post-graduate employment, labor market outcomes, earnings,* and *type of employment*. The terms "*degree completion*," "*academic degree*," and "*educational attainment*" were used in connection with the term "*underemployment*." The terms *community college* and *sub-baccalaureate* were used in connection with c*redential* and *qualifications*. Also, the terms "*community college*," "*2-year college*", and "*associate degree*" were used in connection with "*sub-baccalaureate*" and "*underemployment*." The search for this literature review was limited to the last 5 years to obtain current information related to employment outcomes for graduates. If not enough current information was found related to involuntary and voluntary underemployment for individuals with sub-baccalaureate credentials, with the exception of seminal works, the review was expanded to include older publications.

Theoretical Foundation

Many researchers use human capital theory to analyze the benefits of pursing higher education in the United States (Dadgar & Trimble, 2015; Matheny et al., 2015; Palmadessa, 2017; Yarnall et al., 2016). In early writings on the benefits of investing in education, Schultz (1961) promoted the idea that investing in knowledge improves human capital. Becker (1991) explained that human capital theory serves as the basis for research at the college and community college levels. Mincer's writings on the rate of return for investment in education to improve worker productivity also evidenced the use

of human capital theory as a foundation for analyzing the benefits of investing in higher education (Mincer, 1974).

The idea of human capital as developed by Schultz, Becker, and Mincer, are based on the economic teachings of Adam Smith. As Smith explained in *Wealth of Nations*, a worker's wages are determined, in part, by the level of training and skill needed to perform the job. According to Smith, a mechanic earns more than common laborers because more education and skill is needed to perform the work of a mechanic. Similarly, physicians and attorneys tend to earn more than mechanics and laborers because of the demanding nature of the work and the level of education needed to perform the job (Stigler, 2014). This line of reasoning is considered by many scholars to be the foundation of human capital theory (Becker, 1994). The extension of Smith's claim to human capital is that investing in education will increase the skills, productivity, and the wages of the worker. As Becker explained (1994), in general, an individual's earnings increase in relationship to the individual's level of education. Both the individual and society benefit from investing in human capital.

Literature Review

I used the tenets of human capital theory as the framework for my study, in which I used the existing data on educational certificates, and associate degrees to evaluate whether there is a positive association between involuntary underemployment, or voluntary underemployment, and attainment of a sub-baccalaureate certificate or associate degree. Human capital theory frames the argument for the benefits of obtaining college credentials at all levels of post-secondary education.

Post-secondary Education and Earnings

The literature on educational attainment and post-graduation employment contains contrasting viewpoints. For example, a study of 29,556 adult welfare recipients conducted by Turner (2016) between the years 2004 and 2007 found that those who earned a college-level certificate experienced earning increases. Several other research studies on higher education in general, and community college in particular, linked educational attainment to higher earnings (Kim & Tamborini, 2019; Perna & Leigh, 2017; Stevens et al., 2019).

In their analysis of the labor market outcomes for college certificate and associate degree holders, Jepsen et al. (2014) explained that community colleges help students to develop their human capital by providing the resources for them to obtain the knowledge, training, and skill needed to earn higher wages in the work force. Using administrative data from Kentucky Community and Technical College System**,** Jepsen et al. (2014) concluded the human capital investment that students make in obtaining certificates and associate degrees lead to higher earnings; however, the earnings varied substantially when analyzed by field of study (p. 96). Perna and Leigh (2017) explained that students make decisions about whether to attend college based on their understanding of expected benefits in comparison to the expected costs of attending college.

Kim and Tamborini (2019) expanded on the work of Jepsen et al. (2014) by examining the effects of attaining college certificates and associate degrees on earnings over a 20-year time period. Using a nationally representative sample of participants selected from administrative data obtained from the Social Security Administration and

the Internal Revenue Service, Kim and Tamborini concluded that in certain fields of study, sub-baccalaureate certificates and associate degrees are related to higher earning as compared to bachelor's degrees in social science, liberal arts, and education. The research of Kim and Tambourine (2019) examined earning but did not discuss levels of employment.

To obtain a better view of the employment status of Americans, the Bureau of Labor Statistics uses the labor participation rate to compare those who are eligible to work full-time to those who are working full-time or seeking full-time work. Using this formula, those who are eligible for work, but who are not actively looking for work, are classified as discouraged workers. Discouraged workers include those who believe no work is available as well as those who do not have the skills or training needed to find employment (Labor Force, 2020).

In the ATES 2016 survey, voluntary underemployment refers to participants who are not working full-time and not seeking full-time work as well as participants who are working temporary positions and not seeking full-time positions. Human capital theory, which I used to frame my study, aligns to the information in the ATES 2016 codebook concerning full-time employment and underemployment for the 47,744 respondents to the ATES 2016 survey. As shown in Table 1, the information presented in the codebook demonstrates that slightly over half of the respondents to the ATES 2016 survey reported working full-time. The remaining respondents are classified as underemployed (involuntarily) if they were working part-time but seeking full-time. For my study, I created a derived variable (voluntarily underemployed) for the remaining respondents

who indicated that they are working part-time but were not seeking full-time employment.

Table 1

Sub-baccalaureate Education and Underemployment

Respondent's Employment Status	Percentage
Employed Full-Time	51.69
Involuntarily Underemployed	13.18
Voluntarily Underemployed	35.13

Note: Adapted from National Household Education Surveys Program of 2016 [Data file and code book], NCES, 2018. https://nces.ed.gov/OnlineCodebook

In my study, I filled a gap in the literature by examining data from a nationally representative sample from 2016 aligned to the current literature on sub-baccalaureate credentials. The few existing studies in the recent literature of sub-baccalaureate credentials focus on data prior to 2016. For example, in their study of the long-term earning for persons with sub-baccalaureate credentials, Kim and Tamborini (2019) focused on data from 1992 and earlier. My study is also distinguished from other studies on sub-baccalaureate credentials that focus on post-graduation outcomes for a particular state (Dadgar & Trimble, 2015; Liu et al., 2015; Pham et al., 2020; Stevens et al., 2019).

In a study examining lifetime earnings of graduates of 4-year public institutions, Webber (2016) found that 4-year degree completion was a solid financial investment for most students (p. 308). According to Webber, some students realize a return on their investment later in life. However, for some students, the investment never pays off. A

similar study based on graduates form the North Carolina community college system found that most graduates with associate degrees earn more than graduates with high school diplomas, and those with bachelor's degrees earn more than graduates with associate degrees (Liu et al., 2015). Jepsen et al. (2014), reported increased wages for graduates with associate degrees in their study of students from The Kentucky Community and Technical College System. Additionally, in a study based on graduates form the North Carolina Community College System Liu et al. (2015) found that most graduates with associate degrees earned more than graduates with high school diplomas, and those with bachelor's degrees earned more than graduates with associate degrees

Using a human capital perspective to examine SIPP data and tax records from 2004 to 2008, Kim and Tamborini (2019) found that certificates, vocational diplomas, and associate degrees (sub-baccalaureate credentials) related to increased annual earnings and twenty-year cumulative earnings in comparison to high school graduates. Similarly, data from the Kentucky Community and Technical College System showed that licensed practical nurse (LPN) graduates typically found employment in the region where they completed their schooling system (Kelly & Whitfield, 2014). In a study of graduates receiving Career and Technical Education (CTE) certificates in the California Community College System between 2003 and 2007, Sevens et al. (2015) found that earning an associate degree produced a return up to 45% and earning a short-term certificate produced returns of approximately 14%.

Most of the researchers studying higher education argue that college certificates and college degrees translate into higher earnings for graduates. One limitation in the

literature on educational attainment and post-graduation employment is the focus on earnings without much attention to involuntary or voluntary underemployment. This limitation contrasts with studies on STEM scholarship programs and college-based apprenticeship programs that report on the number of graduates obtaining employment related to their training (Mahatanankoon et al., 2018; Morgan et al., 2018).

Additionally, the data on earnings based on self-reports by respondents or data obtained from unemployment records does not provide a full picture of the relationship between access to higher education and higher earnings. Although a 30% response rate on a voluntary survey is not a bad rate, conclusions about educational attainment and increased earnings that are based on a 30% response rate raise questions about the lack of response from the remaining 70%. The majority that elected not to participate might have chosen not to respond because attending college did not lead to higher earnings (Radwin & Horn, 2014).

Overqualification and Underemployment

The literature on overqualification and underemployment contains contrasting definitions. Collins and Long (2015) discussed underemployment based on overqualification or part-time employment. Cunningham (2016b) and Steffy (2017) focused on overqualification. Cunningham (2016b) found that many graduates who were overqualified for their position described their status as “problematic” (p. 3). According to Cunningham, graduates could expect their underemployment problem to last months or years (p. 3). Steffy (2017) found that many working-class college graduates described themselves as struggling with overqualification (p. 470). Similarly, in a study based on

resumes submitted to prospective employers, Nunley (2017) found that colleges graduates who were underemployed in term of overqualification had call back rates that were 30% lower in comparison to call back rates for applicants who were not underemployed.

Barnichon and Yanos (2019) found that 70% of the graduates classified as underemployed based on a mismatch between education and employment are underemployed for at least one year. Collins and Long (2015) found that graduates classified as underemployed based on overqualification are more likely to work towards improving their employment status in contrast to graduates classified as underemployed based on part-time status. The distinction in Collins and Long is important to my study because participants who are underemployed based on part-time status but who are not seeking employment would be classified as voluntarily underemployed.

Involuntary Underemployment

Involuntary underemployment is an under-researched topic in the literature focusing on the association between educational attainment and post-graduation employment. Collins and Long (2015), in one of the few studies to discuss involuntary underemployment, used data from 2012 to show that the Bureau of Labor and Statistics classified 8.9 million American workers as involuntary part-time workers. They reported that workers classified as underemployed, based on a mismatch between their education and their employment, engaged in volunteering. In contrast, those classified as underemployed, based on part-time status, did not participate as much in volunteering (Collins & Long, 2015). Collins and Long did not critique why the workers they studied

in the part-time category did not volunteer but they did provide important distinctions and definitions, which are useful for understanding other research. For example, the ATES 2016 study, which is used as the basis of my study, focuses on underemployment based on part-time employment status rather than underemployment based on a mismatch between educational attainment and employment.

Using terms like those used by Collins and Long (2015), Barnichorn and Yanos (2019, p. 41) examined the mismatch between credentials and employment. Specifically, Barnichon and Yanos examined the cyclical nature of underemployment, based on a mismatch between educational attainment and employment, and the effects of such underemployment on wages for graduates using data from the 1983 to 2013 Current Population Surveys. These authors found workers in general, as well as college graduates who are voluntarily underemployed (mismatch) due to high job competition, oftentimes find themselves in a persistent state of underemployment. In their study, 70% of job seekers voluntarily underemployed were still unemployed 1 year later (Barnichon & Yanos, p. 41). These findings have implications for my study because the ATES 2016 data set used for my study showed that approximately 50% of the respondents were employed full-time. The remaining respondents were identified based as involuntarily underemployed or voluntarily underemployed based on whether they were seeking full-time or permanent employment or not seeking full-time or permanent employment.

Voluntary Underemployment

Voluntary underemployment refers to workers or graduates who are voluntarily working part-time as well as workers or graduates who are voluntarily working in a

position that does not match their level of education. Although most of the literature on voluntary underemployment focuses on four-year degrees or higher, the definition of voluntary underemployment applies to sub-baccalaureate credentials. In a 2015 study of graduates from a large midwestern university who graduated between 2011 and 2013, Steffy (2017), found that many respondents viewed their underemployment status, based on overqualification, as voluntary and temporary. However, as Steffy explained, the traditional definition of voluntary underemployment is limited because workers may accept their voluntary status because they are seeking work-life balance or they may accept the situation because they have become pessimistic about obtaining a better position. Horowitz (2018) found that college graduates voluntarily take positions for which they are overqualified when there is an oversupply of graduates seeking the same position. In a study of 162 students receiving bachelor's degree, Arvan et al. (2019) found that graduates who were satisfied with their employment were less likely to perceive themselves as underemployed. Although much of the literature on underemployment focuses on overqualification, Horowitz (2018) explained that part-time workers may also be voluntarily underemployed.

Types of Post-Secondary Credential and Earnings

In contrast to a few studies on underemployment and post-secondary or sub-baccalaureate credentials there are numerous studies discussing the association between various types of post-secondary credentials and post-graduate full-time employment. The literature in this section is relevant to my study because the ATES 2016 study defines post-secondary credentials as "credentials that are earned at a community or technical

college, or other school after high school" (see Appendix A). The section below reviews the literature on the types of post-secondary credentials referenced in the ATES 2016 survey: noncredit courses, apprenticeships, sub-baccalaureate certificates, and associate degrees. The literature in the next section presents a positive association between sub-baccalaureate educational credentials and wages. However, as explained in Chapter 1, the literature examining the relationship between post-secondary credentials and earnings is limited because a graduate or certificate holder can earn wages but be involuntarily or voluntarily underemployed. My study expanded upon the existing literature by examining whether sub-baccalaureate certificate holders and graduates with associate degrees are involuntarily underemployed or are voluntarily underemployed.

Nondegree Courses

When students, administrators, and lawmakers recognize the value of noncredit programs, rather than offering them as an option for those without college skills, then these programs become vital components of the learning community on community college campuses (D'Amico, 2017; Ozun, 2012). Although the literature on noncredit courses does not mention specific wages, it does focus on the link between completing noncredit courses and employability. For example, at Kirkwood Community College in Iowa, administrators created a noncredit course for 7,000 welders in the local manufacturing sector (D'Amico, 2017). In addition to preparing students for employment, the pathway program was designed so that students who completed the noncredit program could enroll in a credit-based program.

At Lenoir Community College in North Carolina, the Manufacturing Academy operates a nondegree partnership program in aerospace manufacturing. The partnerships at Kirkwood Community college and Lenoir Community college are different from apprenticeships because these partnerships are open to any students who wants to apply, rather than only those working for a particular employer (D'Amico, 2017; Jacoby, 2018). Under a different model, known as corporate universities, private businesses create corporate training institutes to meet their training needs. The McDonalds corporation created McDonalds University to provide management and leadership training to employees (Arena, 2012).

Apprenticeships

Apprenticeships are a type of noncredit training program that is increasing in popularity with community college campuses. At Piedmont Technical College in South Carolina, the noncredit computer numeric control (CNC) machine operations course is structured so that the apprentices are employed at ZF transmissions while completing their training. The apprenticeship partnership courses are designed so that they are transferrable to machine tool related associate degree programs (D'Amico, 2017). Additionally, as part of the college/corporate partnership, the ZF transmissions pays for apprentices' technical instruction (D'Amico, 2017).

At Mississippi Gulf Coast Community College (MGCCC), the shipbuilding apprenticeship program is aligned with an associate degree program in Maritime Technology. The students earn 30 of the 60 credit hours required for the degree in the apprenticeship program. The apprenticeship is aligned with a degree program so that

students have a pathway to continue their education. The apprentice program is also aligned with the high school equivalency program for students who do not have a high school diploma (Graham, 2018).

From a human capital perspective, apprenticeship to degree pathway programs are beneficial for several reasons. Apprenticeship programs connect students within demand jobs in the local and regional areas. According to Graham (2018), the benefits outweigh the costs for individual students as well as the businesses that participate in the pathway programs. At the individual level, the lifetime earnings for apprenticeship graduates are $300,000.00 more for apprenticeship graduates in comparison to peers who are not apprenticeship graduates (Graham, 2018). At the business level, pathway partners report lower turnover and improved productivity with graduates from pathway programs (Graham, 2018). Similarly, data from the Registered Apprenticeship Partners Information Data System (RAPIDS) created by the U.S. Department of Labor, showed that community college partnerships for many service occupations were associated with higher wages (Kuehn, 2019).

A positive association between apprenticeships and wages was reported in a study involving disabled youth. The results showed that offering disabled youth enrolled in a paid apprenticeship program instruction in self-determination improved employment outcomes such as earning higher wages and receiving employee benefits (Wilson et al., 2017). In contrast, researchers studying Gulf war veterans found that when holding all other variables equal, pre-employment civilian training such as an online or correspondence course as well as job search or job placement training, increased the odds

of securing employment by 39.8% and increases income by 6.6% (i.e., gainful employment). However, post-employment civilian training, such as apprenticeships, were not positively associated with gainful employment for Gulf War veterans (Flatt & Rhodes, 2019).

Sub-baccalaureate Certificates and Associate Degrees

Researchers found a positive relationship between earning certificates, associate degrees, and post-graduation earnings. Dadgar and Trimble (2015) reported that long-term certificates and associate degrees increase wages, the likelihood of being employed, and hours worked. However, they found no positive effects for short-term certificates (Dadgar & Trimble, 2015). A study of students in the North Carolina Community College System (NCCCS) conducted from the years 2002 to 2005 found that, when considering completers and non-completers in each level of educational attainment, males and females with an associate degree earn more than males and females with a high school diploma. However, when looking at certificates, men with certificates earn less than men with a high school diploma (Zeidenberg et al., 2015). In contrast, a study of 29,556 adult welfare recipients, who started college after receiving welfare, found that these graduates experienced significant earnings gains when they earned a short-term certificate after less than a year of full-time study (Turner, 2016). A graduate's field of study is one factor that could explain the variation between Turner's (2016) finding that short term certificates increase earnings and Dadgar and Trimble's (2015) finding no increase in earnings based on short term certificates.

As Dadgar and Trimble (2015) explained, most short-term certificates do not lead to improved labor market outcomes for graduates. Specifically, in the nursing field of study, positive returns were only observed for long term certificates or associate degrees, but in fields such as protective services and transportation services' short-term certificates provided positive returns for students who earned them. In short, the increased earnings reported for former welfare recipients might be attributable to the field of study chosen by these women. Kim and Tamborini (2019) found that vocational diplomas (specialized high school diplomas), certificates, and associate degrees improve the economic status of graduates by increasing annual earnings and twenty-year cumulative earnings in comparison to high school graduates. Also, for graduates with associate degrees in fields of study such as health sciences, information services, and engineering (not business and STEM), their two-year cumulative earnings were higher than bachelor's degree holders in those fields (Kim & Tamborini, 2019). These studies indicate a positive relationship between graduation and the opportunity to pursue higher earnings and full-time employment. However, individuals who are working and reporting wages could be involuntarily underemployed or voluntarily underemployed.

Two North Carolina studies discussed earnings for students who did not complete their associate or bachelor degrees. Liu et al., (2015) found that earning some college credit has low labor market value in comparison to the labor market value of long-term certificates, associates degrees, or bachelor's degrees. Zeidenberg et al. (2015) found that non-completers who are further along in their program do not have better labor market returns in comparison to students who are in the initial stages of accumulating college

credit. Moreover, when evaluating the outcomes for non-completers, upper-level courses are no more valuable than lower-level courses in terms of labor market outcomes (Zeidenberg et al., 2015).

Demographic Covariates

When discussing differences by field of study, Carnevale et al., (2013) found that graduates employed in health occupations earn more than graduates in other fields of study. However, when examining employment outcomes for Licensed Practical Nurses in Kentucky, Kelly, and Whitfield (2014) found that earnings varied based on the region of employment in Kentucky. The median annual earning in one area was $12,960 and $34,279 in another region (p. 62).

Using data from the Youth Development Study for the years 2005 to 2011, Vuolvo et al. (2016) found that graduates with associate and bachelor degrees did not experience major fluctuations in biweekly earnings. As these authors explained, the value of having a degree helps to explain why the graduates with associate and bachelor degrees were able to maintain stable earning during the great recessions in comparison to high school graduates and vocational degree recipients (i.e., certificate holders who have completed the requirements for a specific trade or career). However, Vuolvo et al. (2016) also noted that the trend toward stable wages for bachelor's degree holders includes wages based on bachelor's degree holders taking jobs that traditionally do not require a bachelor's degree (p. 235).

A study of the long-term effects of educational credentials on earnings produced results similar to (Vuolvo et al., 2011). Based on administrative earnings records, Kim

and Tamborini (2019) found that median twenty-year cumulative earnings since high school graduation for a typical man with a vocational diploma or certificate was eight percent higher than a typical male high school graduate. For male associate degree holders, the earnings differential was 24% higher than male high school graduates. And, for male bachelor's degree holders' the earnings differential was 48% higher than male high school graduates. By comparison, females' cumulative earnings were significantly lower than males (Kim & Tamborini, 2019, p. 70**).**

Summary and Conclusion

Human capital theory provided the framework for studying the association between the three levels of education credentials chosen for this study and the two levels of underemployment. Human capital theory states that individuals and society invest in higher education when the economic benefits are greater than the cost of investing time and resources (Becker, 1994). Becker's human capital theory is relevant because it makes a positive connection between individual and societal investment in higher education and improved employment outcomes. Previous studies have used human capital theory to determine a positive relationship between earning sub-baccalaureate credentials and higher wages (Perna & Leigh, 2017). However, studies that focus on wages tend to base their findings on those who have employment or are seeking employment. My study filled a gap in the existing literature by analyzing the post-graduation labor market outcomes in terms of data on involuntary underemployment and voluntary underemployment for those who invest time and resources in obtaining sub-baccalaureate certificates and associate degrees. In Chapter 3, I discuss the research design and

methodology that I used to answer the research questions that were developed for this study.

Chapter 3: Research Method

Introduction

The purpose of this quantitative study of archival data was to determine whether educational attainment predicts post-graduation involuntary underemployment (working part-time but seeking full-time employment) and voluntary underemployment (working part-time but not seeking full-time) for sub-baccalaureate certificate holders and associate degree holders. To conduct this study, I analyzed data from the 2016 Adult Education Survey (ATES 2016). ATES 2016 was one of three surveys administered as part of the 2016 National Household Education Survey (NHES) program operated by the National Center for Educational Statistics(NCES) at the U.S. Department of Education (McPhee et al., 2018). The covariates for my study include age, gender, race, and field of study.

In Chapter 3, I discuss the research design and rationale for the study and focus on the relationship of the research questions to the independent and dependent variables, the time and resource constraints related to the choice of research design, as well as how the research design advances knowledge in the field of education. I also discuss population, sampling and sampling procedures, recruitment, participation, and data collection used by NCES to conduct the 2016 survey. Additionally, I review the permissions and procedures needed to gain access to the data. The other topics I discuss in Chapter 3 are: (a) background information on the survey instrument, (b) how the instrument was developed, and (c) how the independent and dependent variable are operationalized. I describe the data analysis procedures and discuss the software and statistical tests that I used to

analyze the data from the 2016 NCES survey. Finally, I discuss threats to validity and ethical issues related to the survey.

For my study, the independent variables, from the ATES 2016 survey, educational attainment, and educational certificates, were combined to create educational credential as the independent variable for RQ1. The dependent variable is post-graduation involuntary underemployment. The independent variable for RQ2 (educational credential) is the same as for RQ1. In contrast, for RQ2, the dependent variable is post-graduation voluntary underemployment. The dependent variable for RQ2 was a derived variable that I created to classify respondents as voluntarily underemployed based on their answer to the ATES 2016 survey questions indicating that the respondent is not seeking full-time or permanent employment.

Research Design and Rationale

In my study, for RQ1 and RQ2, the independent variable for educational attainment has three levels. I created the variable for educational attainment by combining high school diploma and associate degree from the ATES 2016 variable for educational attainment with the ATES 2016 variable for certificates. The independent variable, educational attainment, is the same for RQ1 and RQ2. The dichotomous dependent variable is post-graduation employment. The two levels for post-graduation employment are involuntary underemployment and voluntary underemployment. Post-graduation employment is a derived variable that I created based on the responses to questions 55 and 70 of the ATES 2016 survey. Respondents who indicated that they were working part-time but seeking full-time employment are classified as involuntary

underemployed. Respondents who indicated that they were working temporary positions but seeking permanent position are classified as involuntarily underemployed. If a respondent indicated that they are working part-time and/or working a temporary position and are not seeking a full-time and/or permanent position, then the respondent is classified as voluntarily underemployed.

A quantitative correlational study was used to objectively evaluate the idea from human capital theory that educational attainment is positively associated with economic rewards. Applying human capital theory to sub-baccalaureate credentials means that attainment of sub-baccalaureate certificates or associate degrees is inversely related to involuntary underemployment because individuals with sub-baccalaureate credentials obtain the full-time employment they seek. Similarly, an inverse relationship between increasing levels of educational attainment and voluntary underemployment indicates those with sub-baccalaureate credentials do not prefer underemployment. Along those lines, a correlational study using archival data was chosen because this research design made it possible to objectively evaluate whether educational attainment predicts involuntary underemployment and voluntary underemployment.

The data that I analyzed were obtained from the data collected on the ATES 2016 survey from January 2016 to September 2016. The nationally representative sample in this survey provides data that is generalizable to a larger population, however, the findings are based on an eight-month window of time. The ATES 2016 researchers did not conduct follow up studies with the respondents to evaluate how long they remained involuntarily or voluntarily underemployed. According to Barnichon and Yanos (2019),

college graduates who are underemployed tend to remain underemployed for at least 1 year. The ATES 2016 survey did not contact respondents at three month, six month, or one year intervals to determine how long their involuntary or voluntary underemployment status lasted. Similarly, my study analyzed archival data from a window of time in 2016 without any contact with respondents to the ATES 2016 survey.

There were no major resource constraints related to conducting my study. As stated previously, the ATES 2016 data set, codebook, and other related documents were available in the public domain on the NCES web site. I conducted the logistic regression of the data obtained from the data set using SPSS software on a computer. The statisticians at NCES answered several questions related to the variable in the ATES 2016 survey as well as how the survey was administered.

The ATES 2016 researchers used a survey to obtain data from 47,744 respondents with various levels of post-secondary educational attainment including sub-baccalaureate certificate holders and associate degree graduates (see Appendix A). A quantitative analysis of this archival data is an appropriate design for my study because there are no other published studies using ATES 2016 data to analyze the employment outcomes for sub-baccalaureate certificate holders and associate degree graduates. Quantitative analysis of these two variables, educational attainment, and post-graduation employment, provides timely data for researchers as well as students, school leaders, lawmakers, and politicians. Hudson and Isenberg (2019) used ATES 2016 data to analyze employment outcomes for high school graduates and graduates with associate degrees, but these authors did not include data on sub-baccalaureate certificate holders. Additionally, there

are no barriers to using the data in the ATES survey because the raw data set is available in the public domain on the NCES web site.

Population (Archival Data)

The target population for the 2016 ATES survey was all adults living at residential addresses or adults with post office (P.O.) boxes in the United States and the District of Columbia. The address-based sample frame from this population contained approximately 126,115,692 addresses (National Household: Part B, 2015). The survey was conducted from January to August of 2016.

Sampling and Sampling Procedure (Archival Data)

The sample frame for the NHES 2016 study covering the three topical surveys was approximately 126,115,692 addresses and was derived from a file of residential addresses compiled by the Marketing Systems Group (MSG) based on the computerized delivery file for the United States Postal Service (USPS). This sample frame consisted of all Unites States residential addresses (including the District of Columbia) and P.O. boxes flagged by the United States Postal Service as the only way to get mail. From this total sample, an initial sample of 206,000 addresses were randomly selected to receive the screener questionnaire. One person per household was asked to complete the screener questionnaire for up to five people within the household. The respondent was asked to provide information on the household members' birth dates and school enrollment status.

Based on responses to the screener, one individual in each household was selected to complete the ATES survey or one of the other two surveys in the NHES 2016 longitudinal study. The screening process generated a target population for the ATES

survey of 63,846 households that were selected to receive the ATES 2016 survey. From the target population, the NHES researchers obtained 47,744 completed ATES surveys. There were 16,087 household members who refused to respond or did not respond and 15 household members who responded to the survey but were not eligible to participate. The weighted response rate was 73.1% (McPhee et al., 2018, p. 89; National Household: Part B, 2015). The ATES survey used random sampling (with stratification), so that the results could be generalized to the larger population (National Household: Part B, 2015).

NHES 2016 researchers oversampled African Americans and Hispanics using census data to increase the reliability of estimates of the population parameters based on the sample population surveyed. Population parameters are numerical expressions such as means or proportions that are used to summarize various aspects of the entire population (Lee, 2011). The quality of parameter estimates depends on the size of the sample and the degree to which it is representative of the population (Staufenbiel & Suck, 2011). Specifically, to obtain a representative sample, NHES 2016 researchers identified three census tracts that were likely to contain large numbers of Blacks and Hispanics. These census tracts represent three strata for the NHES 2016 survey. The strata for the survey include: (a) Tracts with 25% or more Black persons, (b) Tracts with 40% or more Hispanic persons (and not 25% or more Black persons), and (c) all other tracts. The NHES 2016 researchers sampled 20% from the black stratum, 15% from the Hispanic stratum, and 65% from the third stratum (National Household: Part B, 2015).

Calculations for Minimum Sample Size

I used G*Power software to calculate the minimum sample size for my study. Using the G*Power software to calculate the sample size involved entering data for the Test Family, Statistical Test, Type of Power Analysis, and Power. For my study, the Test Family was Z-tests, and the statistical test was logistic regression. The type of Power Analysis was Apriori-compute required sample size given alpha, power, and effect. A two-tailed test was used. The power was 0.80. As Boslaugh (2019) explained, statistical power is the probability that the null hypothesis will be rejected when the alternative hypothesis is true (p. 2). Statistical power is related to significance level. The significance level is the probability of finding a statistically significant difference by chance when it does not truly exist (Boslaugh, 2019). In my study the significance level was five percent and the power was 80%. This means that, if all assumptions are true, the study will correctly reject the null hypothesis at five percent with a significance level at 80% of all possible samples (Boslaugh, 2019, p. 4)

For logistic regression, additional parameters needed to calculate sample size involve estimating a value for the independent variable of interest (entered in G*Power software as Pr (Y=1 | X=1) H_1 and the baseline variable (entered in the G*Power software as Pr (Y=1 | X=1) H_0. Finally, the two options to input effect size are odds ratio and two probabilities (Faul et al., 2007).

For RQ1, I used .13 to represent 13.18% as the estimated value for my dependent variable of interest (involuntary underemployment) because, according to the NHES 2016 codebook, the percent of involuntarily underemployed for all 47,744 participants in

the study was 13.18% (weighted). Using 13% based on the ATES 2016 codebook statistics for underemployment provides a reasonable estimate for RQ1. My study shows whether the respondents that I selected for participation, based on their level of educational attainment, have the same or different levels of underemployment. Conversely, the 87% entered for Pr(Y=1 | X=1) H_0 represents those who are not involuntarily underemployed.

For RQ2, I used 35%, because the variable represents those participants who are not represented in RQ1. These participants are voluntarily underemployed because they were not working full-time (52%), and they are not seeking full-time or permanent employment (13%). Conversely, the 65% entered for Pr(Y=1 | X=1) H_0 represents those who are not voluntarily underemployed. Using parameters discussed above and entering the values described in this section mentioned above into the G*Power software results in a sample size for RQ2.

In G*Power, R-squared other X represents the amount of variability in the main predictor that is accounted for by the covariates. The value for the association between the covariates and the independent variable is typically estimated. First, if a covariate is expected to have a low association with the predictor (independent) variable, then 0.20 is entered. In my study, 0.20 was used for race because this covariate is expected to have a low association with educational attainment. Second, if the covariates are expected to have a moderate association with the predictor variable, then 0.50 is entered. In my study, 0.25 (0.50^2) was used for the covariates age and gender because these two covariates are expected to have a moderate association with the educational attainment. Third, if a

covariate is expected to have a strong association with the predictor variable, then 0.90 is entered. In my study, 0.90 was used for field of study because field of study is expected to have a high association with educational attainment. To derive a value for R squared other X, the first step was to determine the mean for the four covariates. For my study, the mean for the four covariates is 0.40. Next, the mean for the covariates is squared. For my study, the value entered for R squared other was .16 (.40 multiplied by .40). Using the parameters discussed above and entering the values described in this section into the G*Power software resulted in a sample size of 27 for RQ1. For RQ2 the sample size was 45.

To supplement to G*Power, some researchers recommend using a minimum sample size of 500 to improve the statistical accuracy when evaluating the parameters of a study based on a large population (Bujang et al., 2018). For my study, obtaining a sample size of 500 was not a problem because the number of responses available for each of the variables used in RQ1 and RQ2 are over 500. For RQ1, G*Power recommends a sample size of 27. The over 6,000 respondents with sub-baccalaureate certificates was well as the over 4,000 respondents with as associate degrees provided a sample size that was over 500 for these two levels of educational attainment (NCES, 2016a). According to (Bujang et al., 2018), the large sample sizes in my study (based on the ATES 2016 data set) improves the statistical accuracy of the analysis (p. 128).

Recruitment, Participation, and Data Collection (Archival Data)

The ATES survey was administered in conjunction with the Early Childhood Program Participation survey (ECPP) and Parent and Family Involvement in Education

(PFI) survey. The PFI has two versions: PFI-H for home schooled children and PFI-E for student in grades K-12. Participants for the ATES survey were recruited through regular mail using a four-phase process to review the returned screener questionnaires. If selected, the households participated in the screening process and the questionnaire process by completing and returning a self-administered questionnaire. The directions to the household member explained that the survey was voluntary and that the householder's responses would be kept confidential (NCES, 2016b).

For the screener questionnaire, in the first step of the mailing process, the householder received an introductory letter by mail or email. The researchers randomly selected the households for the mail or email survey. From the initial sample of 206,000 households, 35,000 households received an email version of the survey materials. The email version allowed the respondents to answer the questions on the screener and then proceed directly to the correct topical survey in the same session. The NHES researchers initiated the email experiment to gather data on the response rates and cost of completing the survey for the two methods. The 35,000 household that received the email version of the survey were not included in the sample.

One week after the introductory letter, the households selected for participation received a screener packet. The packet contained a cover letter, a household screener, a business reply envelope, and a prepaid cash incentive to encourage the householder to complete the questionnaire. The prepaid cash incentive was sent to only a targeted number of households that received the survey material by regular mail. For the email households the cash incentives were sent with the initial mailing. Sending incentives only

to targeted households allowed NHES researchers to evaluate the effect of the incentives on response rates (National Household: Part B, 2015, p. 9).

One week after the mailing the screener packet, the NHEs researchers mailed a thank you/reminder postcard to all sampled addresses. Two weeks after mailing the postcard, the NHES researchers sent a second screener packet containing a cover letter, a replacement household screener, and a business reply envelope. Approximately three weeks after mailing the replacement screener packet, the NHES researchers sent a third screener questionnaire (i.e., second replacement to the first screener questionnaire) to non-responding households using rush delivery (National Household: Part B, 2015, p. 9). Participants were selected to complete the ATES Survey, or one of the child related surveys, based on their responses to the questionnaire in the screener packet. If the household was selected to receive the ATES survey, the data were collected using an 82-question questionnaire (National Household: Part B, 2015, p. 9).

Based on the results of the screener questionnaire, the first phase of sampling started with sorting households as Home-schooled (PFI-H) or Other Household. A household was designated home-schooled (PFI-H) if at least one household member eligible for the PFI-H category and one member eligible for the other household category applied. If the household had members who were eligible for the PFI-H survey or one of the other surveys, the household received the home-schooled survey. The NHES researchers started the process of assigning surveys with the home-schooled category because this category has the smallest number of potential respondents and the researchers wanted to secure sufficient responses for the home-schooled category. In

contrast, if the household had members who were only eligible for the PFI-E, the other versions of the PFI, or a survey in the other household category, then the household received a survey from one of those categories. If a household was only eligible to receive a survey from one category, then the household received a survey from that category (National Household: Part B, 2015, p. 9).

In the second phase, a household was categorized as a child household or adult household. If the household had only eligible children (or a child) and no adults, then that household received one of the child related surveys. If the household had only adults and no children, then that household received an adult topical survey (i.e., ATES survey). Specifically, households in phase two categories were only sampled for the PFI-E survey, the EECP survey, or the ATES survey if they had not been sampled for the PFI-H or the ATES in phase one (National Household: Part B, 2015, p. 9).

During the third phase, the researchers determined if the household would receive a home-schooled survey (PFI-E) or a childhood education survey (EECP). Households that did not receive the PFI-H version of the home-schooled survey in phase one were eligible to receive the PFI-E version of the home-schooled survey, or the ECCP child survey in phase three. The fourth phase of the sampling process concerned individual household members. As stated previously, if any household had only one person that was eligible to receive one of the surveys in phases one through three, then that person received that survey. Additionally, in phase four, if any household had one or more persons eligible to receive a survey for one of the categories in the first three phases, then one of those persons were selected randomly to receive one of the child surveys or the

ATES survey. At the end of the four phases, if one person in a household was selected to receive the ATES survey, then no one else in the household received either of the other three surveys (National Household: Part B, 2015).

The mailing process for the ATES survey, and the other two topical surveys, was like the four-phase process to obtain responses to the screener questionnaire. In the initial ATES and childhood survey mailings, the household received a cover letter, a questionnaire, a business reply envelope, and a cash incentive. Also, a reminder/thank you postcard was sent to the household sampled for the ATES or childhood surveys. Non-responding householders received three follow-up mailings containing a cover letter, a replacement questionnaire, and business reply envelope (McPhee et al., 2018).

Instrumentation and Operationalization of Constructs

The National Council of Educational Statistics (NCES) developed the ATES 2016 survey. Several subsets of questions on the survey align to the research questions in this study. The information analyzed from the ATES is useful for evaluating highs school diplomas, sub-baccalaureate certificates, and associate degrees. The random sampling (with stratification) used to conduct the survey means that the results could be generalized to larger populations. Potential students may find the information useful for making decisions about the need to pursue post-secondary education as well as what credentials to pursue in post-secondary education. Policy makers at colleges and universities, especially those with a focus on employment outcomes for graduates, may use predictions regarding attaining a sub-baccalaureate certificate or an associate degree to make decision about what types of courses to offer or what programs of study to

emphasize. Additionally, policy makers for state and local governments may use the predictions to make decisions about the benefits of investing tax dollars in certificate programs for associate degree programs.

The ATES survey was appropriate for my study because the survey included ten levels of educational attainment from high school diploma to doctoral degree. My study focused on two levels of educational attainment from the ten levels of educational attainment. The levels used in this study were sub-baccalaureate certificate and associate degree. Logistic regression was used to determine if attainment of a sub-baccalaureate certificate or an associate degree predicts involuntary underemployment and voluntary underemployment. Permission from NCES was not needed to use the ATES survey because the data is available in the public domain of the NCES web site.

Reliability (Archival Data)

Prior to 2016, previous versions of NHES surveys contained questions about adult education but there was no separate adult education survey. Between 1991 and 2012 the NHES survey was conducted every other year (National Household: Part A, 2015). From the first NHES survey in 1991 until the 2007 survey, the NHES was conducted by telephone interviewers using automated dialing technology. From 2007 onward, the redesigned survey collected data using a self-administered questionnaire sent through the mail rather than collecting data by interviewing.

Development of the ATES survey began in 2009 when an interagency work group was created to improve federal data collection concerning certificates, certifications, and licenses. In 2012, this group was renamed the Group on Expanded Measures of

Enrollment and Attainment (GEMEnA). The transition from the interagency work group to GEMEnA involved using GEMEnA experts to assist NCES with the development of a new household survey covering certificates, certifications, and occupational licenses (National Household: Part A, 2015). From September 2010 to January 2011, GEMEnA conducted a pilot study to gather data for use in evaluating questionnaire items as well as developing survey procedures (Bielick et al., 2013). During the pilot study, survey questions were field tested to evaluate the reliability of the questions on the instrument as well as to develop recommendation for survey procedures (Bielick et al., 2013). After the pilot study, the ATES study survey questions were redesigned to eliminate respondents' from overreporting and false negatives concerning the type of credential held caused by their misunderstanding the difference between college issued certificates and state agency certifications.

The GEMEnA collaborative included experts from federal statistical agencies, the National Science Foundation, the Office of Management and Budget's Office of Statistical and Science Policy, the Council of Economic Advisors, and the Under Secretary of Education (National Household: Part A, 2015, ATES Development). In addition to GEMEnA, NCES also consulted with an outside agency to create the 2016 ATES survey. The Technical Review Panel (TRP) was composed of experts in research methodology to create the 2016 ATES survey. NCES used the experts on the TPR to design the 2012 and the 2016 field tests for the ATES (National Household: Part A, 2015, Consultations).

The NHES researchers, working with GEMEnA and TPR, used cognitive testing, pilot testing, and field testing to strengthen the reliability and validity of the 2016 NHES longitudinal study in general, as well as the ATES survey portion of the 2016 survey in particular (Sullivan, 2011). Prior to the pilot test in 2010, while the ATES survey was in development, NHES researchers used cognitive interviewing to improve the reliability of the proposed survey instrument. In 2015, NHES researchers conducted cognitive interviews in conjunction with field testing of the PFI and ECPP surveys. From March 2015 to April 2015 NHES, through the American Institute of Research (AIR), conducted cognitive interviews for the ATES survey to help revise items and eliminate ambiguity in preparation for the 2016 administration of the ATES survey as part of NHES 2016 (p. 55). Based on the results of childhood and ATES cognitive interviews, changes were made to the wording of some items as well as the design and format of the survey instruments (Cole et al., 2015).

Although cognitive interviewing is primarily done to improve validity, NHES researchers rely on cognitive testing to strengthen reliability by strengthening validity. For example, for the questions on certificates and certifications to be reliable respondents needed to consistently distinguish between the two concepts and answer the questions based on the correct definition. As Muijs (2014) explained, two factors related to the reliability of an instrument are: (a) the way an item is worded may cause confusion, and (b) the item may be too difficult for the respondent, which leads to guessing. The NHES researchers attempted to strengthen the reliability and validity of ATES survey items

through cognitive interviewing to reduce the respondent's misunderstanding of the survey items.

In addition to incorporating recommendations from the pilot test published in 2013, NHES 2016 included an opportunity sample of 1000 known educational certificate holders (certificates issued by educational institutions rather than certifications obtained from licensing agencies). The sample was obtained to assess the extent of incorrect responses to the main survey items regarding certificates. The participants in the opportunity sample received the ATES survey, but not the screener (National Household: Part A, 2015, p. 5). Those who participated in the opportunity sample are not included in the 206,000 households used in the ATES 2016 survey.

In 2014, as part of a feasibility study, NHES researchers field tested a long version and a short version of the ATES instrument. The results showed that the shorter version of the survey produced higher response rates without compromising data quality (S. Grady, personal communication, October 16, 2019). The improvements developed in the 2014 feasibility study were incorporated into the ATES 2016 study (National Household: Part A, 2015). NCES attempted to establish reliability of the ATES survey by field testing a version of the 2012 and the 2016 surveys before full implementation of the redesigned 2016 survey (National Household: Part A, 2015). Prior to implementing ATES 2016, field testing was completed on the use of incentives to improve response rates. The results of the 2011 field test showed that a $5.00 incentive produced higher response rates in comparison to a $2.00 cash incentive. In 2016, the NHES screener included a $5.00 cash incentive (for households not assigned to the control group). The

2011 field test showed that response rates could be improved by providing larger incentives to those responding to the third or fourth questionnaire. Based on obtaining improved response rates when offering $15.00 to late respondents in a subsample, NHES researchers included the $15.00 incentive in the NHES 2016 survey (National Household: Part A, 2015, p. 9). Finally, although GEMEnA used a sample to field test the questions on the ATES survey, they did not use the results of the field test to generalize to a larger population. In the 2013 pilot study, the GEMEnA included a cautionary statement to future researchers that the results of the field test were not intended for generalizing to a larger population (Bielick et al., 2013).

Pilot testing, field testing, and cognitive testing are procedures used to improve the reliability of an instrument prior to using the instrument. After data are collected using an instrument, imputation may be used to improve reliability. Imputation is a statistical process that survey researchers and other scientists use to replace data that are missing from a data set due to item nonresponse. Researchers perform imputation to improve the accuracy of their data sets (Rasseler et al., 2011). As Duricki et al. (2016) explained, when handling missing data researchers may choose to omit the missing data or use imputation to estimate the missing data outcome. NHES researchers used imputation to improve reliability by providing values for missing data. As explained in the NHES 2016 user's manual, imputation was necessary because complete responses were needed for developing sampling weights. Second, imputation was used so that users would have complete responses to aid their analysis. When encountering imputed values, future users can "delete the imputed values, use an alternative imputation procedure, or

account for the imputations in computations of the reliability of the estimates produced from the data set" (McPhee et al., p. 117).

Soysal et al. (2018) noted that missing data was a common problem encountered by researchers when using measuring instruments, which had not been studied in depth. This study examined missing data at the levels of 5%, 10%, 20%, and 30%. According to Soysal et al. (2018), when implementing achievement tests, attitude scales, and questionnaires, etc. the reliability and validity of responses was influenced by the percentage of data missing i.e., the percentage of data deleted or imputed (p. 182). NHES 2016 researchers identified imputed values in the data set so that future users could evaluate their effect on the future study (McPhee et al., 2018, p. 117).

After imputation, the raking procedure was used to improve reliability. Raking is a post-stratification procedure for adjusting the sample weights in a survey so that the adjusted weights add up to the known population totals for the post-stratified classifications when only the marginal population totals are known (Cohen, 2011). As McPhee et al. (2018) explained, the raking procedure was designed to improve reliability of the survey and correct for bias that results from persons or households not included in the survey. Future researchers can assess reliability of the instrument while taking into consideration whether they used the same sampling procedure and the same demographics in their sample. The raking procedure for ATES involved raking the nonresponse-adjusted person-level weights to national totals obtained using the number of children and adults from the 2015 annual American Community Survey (ACS) estimates. The ACS is a survey administered by the U.S. Census Bureau. The survey is

designed to collect information about occupations, educational attainment, veteran status, and housing (Census, 2019). The NHES researchers used the ACS survey rather than the Current Population survey (CPS) from the census bureau because the ACS has a larger sample size (McPhee et al., 2018, p. 139).

Overall, the ATES 2016 study used cognitive testing, field testing, pilot studies, and data cleaning procedures (raking) to establish the reliability of the ATES 2016 study. One way data reliability was maintained was avoiding errors when extracting data (Kulkarni et al., 2020). To establish reliability for my study, the survey instrument, the codebook, and the data file user's manual were reviewed to establish that my use of the variables selected from the ATES 2016 survey were consistent with the intended use in the ATES 2016 data set. The dependent and independent variables used in my study are consistent with the use in the ATES 2016. By avoiding errors in selecting variables and when conducting statistical tests my study maintains the reliability established in the ATES 2016 study (Kulkarni et al., 2020). Further, my research questions used a random sample size of 583 cases. All data uploaded to the statistical software was double checked for accuracy.

Validity (Archival Data)

As Peterson et al. (2017) explained, cognitive interviewing (CI) is used in scale development to inform item revision decisions and can provide evidence of validity based on test content as well as the thought processes and operations involved in responding to an item. In the ATES study, to increase the validity of the data obtained from respondents, ATES 2016 researchers used cognitive interviewing to design questions that

would provide more complete and accurate responses from respondents. The purpose of these interviews was to identify ambiguity and misunderstanding in item wording. The interviews were conducted by interviewers trained in cognitive interviewing techniques by a senior researcher from the American Institute of Research (AIR). The cognitive interviews lasted approximately one hour and were conducted using a "Think-Aloud" approach along with concurrent probing, when necessary (Cole et al., 2015). For example, to clarify the difference between certification and certificates, a follow-up question was added to the certification question, which asked the respondents if their certification could be suspended or revoked. In contrast, the question on college issued educational certificates only required minor changes. The researchers deleted some text in the question prompt and the options for response to make the question less of a cognitive challenge for the respondents (Cole et al., 2015).

To establish the validity of questions used on the ATES 2016 survey, the ATES researchers used cognitive testing to refine the questions on the instrument. The variables selected for my study are based on the respondent's answers to the questions on the ATES 2016 instrument. To avoid selection bias and maintain validity in my study, I used SPSS to select the respondents for my study. From the total of 47,744 respondents, SPSS extracted 1675 respondents who answered the questions on the ATES 2016 survey concerning underemployment. From this sample, 583 cases which met all the remaining criteria for my study were included in the logistic regression analysis to obtain the data to answer RQ1 and RQ2 (Frey, 2018).

Study Variables

The first research question (RQ1) is, “Does educational attainment predict involuntary underemployment?” Comparing sub-baccalaureate certificate holders and associate degree holders to high school diploma holders shows whether higher levels of educational attainment predict involuntary underemployment. The ATES survey variable “educational attainment” was combined with “educational certificates” to create the educational attainment variable used in my study. The derived educational attainment variable, which had three educational levels, is used in both research questions.

As shown in Table 2, educational credential is an ordinal variable with two levels of attainment: certificate and associate degree. The associate degree level is composed of those respondents who reported an associate of arts or associate of science degree as his or her highest level of educational attainment. Although a respondent may have more than one level of educational attainment, he or she was assigned to one of the two levels used in this study based on highest level of educational attainment. The categories related to associate degrees are combined. Similarly, as shown in Table 2, several categories were combined to create the certificate category.

Table 2

Levels of Educational Credentials

High School Diploma	Sub-baccalaureate Certificates	Associate Degrees
2000 High school diploma 3000 GED® or alternative 4000 Less than one year of college credit 5000 1 or more years of college credit, no degree	1001 No high school diploma or GED® w/certificate 3001 GED® or alternative high school credential w/certificate 4001 Less than one year of college credit w/certificate 5001 1 or more years of college credit, no degree w/certificate	6000 associate degree (for example, AA, AS) 6001 associate degree (for example, AA, AS) w/certificate

Note: Adapted from National Household Education Surveys Program of 2016 [Data file and code book], NCES, 2018. https://nces.ed.gov/OnlineCodebook

In the final educational attainment variable, the four levels of attainment (2000, 3000, 4000, 5000) for high school diploma were coded as 1. The four levels for educational certificate (1001, 3001, 4001, 5001) were coded as 2. The two levels for the associate degree variable (6000 and 6001) were coded as 3.

The first research question (RQ1) is, "Does educational attainment predict under-employment?" The independent variable (educational credential) for RQ2 is the same as for RQ1. For RQ2, the dependent variable is post-graduation underemployment. The dependent variable is the derived variable underemployment based on the respondent's answers to question 55 and 70 in the ATES 2016 survey. The derived variable for underemployment is a nominal variable. The variable for underemployment does not appear in the householder's survey because it is a derived variable. The variable appears

in the ATES data set because it was created by the survey analysts. The outcome for the underemployment variable was predicted based on the three levels for educational credential variable created for my study. The underemployment variable was recoded as: [0 = Not underemployed] [1 = Yes underemployed]. Logistic regression was used to test for the association between educational credential and underemployment.

The second research question (RQ2) is, "Does educational attainment predict post-graduation voluntary underemployment? The independent variable created for RQ2 is the same as the independent variable for RQ1 (educational credential). However, a participant who replied "no" to question #55 to indicate that he or she is part-time and not seeking full-time was treated as voluntarily underemployed in contrast to the participant who responds that he or she is part-time but prefers full-time. A participant who responded "no" to question 70 to indicate that he or she is working a temporary position and not seeking a permanent position was also treated as voluntarily underemployed rather than involuntarily underemployed. A respondent is classified as voluntarily underemployed based on a "no" response to either one of these questions or if he or she answered "no" to both questions. The two dummy codes that were used for voluntary underemployment in the logistic regression are: [0 = Not voluntarily underemployed] [1 = Yes voluntarily underemployed]. Logistic regression was used to test for the association between educational credential and voluntary underemployment.

I used educational credential and four covariates from the ATES data set to analyze the two levels of underemployment against the dependent variable for my study. The four covariates are age, gender, race, and field of study. Field of study was recoded

as a dichotomized variable. As shown in Table 3, the 24 fields of study listed in the ATES 2016 data set were recoded into the four fields of study that I selected for my study: Liberal Arts, STEM, Business, and Other. The four fields of study were transformed into four dichotomized variables. It is acknowledged that many, but not all, liberal arts students transfer to complete a baccalaureate degree, and this may impact their work decisions and job choices.

Table 3

Fields of Study

Liberal Arts	STEM	Business	Other
* Communications or journalism * English language or literature * Fine arts or music * Liberal arts * Psychology * Religious vocations or theology	* Computer science or information technology * Engineering or architecture * Healthcare Science or mathematics	*Accounting, finance, insurance, or real estate, *Administrative Support *Audio, broadcasting, multimedia, or graphic technologies, *Business management, administration, or marketing *Construction, repair, manufacturing, or transportation	*General Studies, no major, or undeclared major, *Agriculture *Cosmetology *Education * Law or legal studies * Law enforcement, security, or firefighting * Social or human services or public administration * social sciences, political science, economics, or history, other

Note: Adapted from National Household Education Surveys Program of 2016 [Data file and code book], NCES, 2018. https://nces.ed.gov/OnlineCodebook

These four fields of study were selected as main categories because the 24 fields of study in the ATES 2016 is related to one of these four fields These four dichotomized variables were used as field of study covariates in the logistic regression equation. Table 4 shows the variables and covariates that were selected from the ATES 2016 data set for use in this study.

Table 4

Selected Variables and Covariates

Variable Label	**Variable Names**
Highest degree or level of school completed	EDUATTN and CERTPROG combined to form new variable "Educational Credential"
Preferred part-time job to be full-time job	EEPREFFT
Preferred permanent position	EEPERM
D-Under-employment (derived)	UNDEREMP
Covariates	
Age	XXAGE
Sex	XXSEX
D-Detailed race-ethnicity (derived)	RACEETH2
Field of study for post-secondary certificate	PSFOS
Field of study for highest level of school completed	EDUFOS

Note: Adapted from National Household Education Surveys Program of 2016 [Data file and code book], NCES, 2018. https://nces.ed.gov/OnlineCodebook

Data Analysis Plan

I used The Statistical Program for the Social Sciences, Version 23, an updated software package designed by IBM, to analyze the data. This software was appropriate for conducting the descriptive and inferential analyses needed to answer the research questions in this study (Creswell, 2009). Because NHES 2016 and ATES used

imputation to supply missing values for the variables that I selected to include in my study, I did not have to clean the data prior to completing logistic regression using SPSS. In addition to imputation used for the ATES 2016 survey, I used SPSS to extract all the cases with complete responses to the questions on underemployment for analysis in my study.

The NHES 2016 researchers used three approaches to imputation to supply values for missing data on the ATES 2016 survey. Using logic-based imputation, values were derived from respondents' answers to topical items on surveys as well as data that the respondents provided on the household screener. When using, Unweighted Sequential Hot Deck Imputation, the last value nearest the missing value in the same cell was substituted for the respondent's missing value. Weighted Random Imputation was used for boundary variables that had missing values. Also, the NHES researchers used manual imputation to correct for inconsistent values after values had been assigned for missing data. After imputation, NHES researchers ran edit programs to make sure that imputed values were consistent with edit rules. If the values imputed were not consistent, then they used manual manipulation to impute another value (McPhee et al., 2018). The variables that I selected for my study missing values in the data set. The responses were either provided by a respondent or imputed by the NHES researcher.

The research questions and hypotheses were:

RQ1: Does educational attainment (sub-baccalaureate certificate or associate degree) predict post-graduation involuntary underemployment when controlling for the influence of age, race, gender, and field of study?

$H_0$1: Educational Attainment does not predict post-graduation involuntary underemployment when controlling for the influence of age, race, gender, and field of study.

H_a1: Educational Attainment does predict post-graduation involuntary underemployment When controlling or the influence of age, race, gender, and field of study.

RQ2: Does educational attainment (sub-baccalaureate certificate, or associate degree) predict post-graduation partial voluntary underemployment when controlling for the influence of age, race, gender, and field of study?

$H_0$2**:** Educational Attainment does not predicts post-graduation partial voluntary underemployment when controlling for the influence of age, race, gender, and field of study.

H_a2**:** Educational Attainment does predict post-graduation partial voluntary underemployment when controlling for the influence of age, race, gender, and field of study.

Age, gender, race, and field of study were selected as covariates because, in addition to the variable, educational credential, they have the potential to influence whether a respondent is involuntarily underemployed or voluntarily underemployed. Using these groups as covariates made it possible to control for the influence of these continuous predictor variables on the dependent variable and evaluate the influence of the independent variable selected for this study (educational credential) on the dependent variable.

When examining the link between age and underemployment, Vuolo and Mortimer (2016) explained youth who entered the job market during the Great Recession experienced high levels of unemployment. According to these authors, because of the Great Recession, young workers are more likely to be unemployed or underemployed in comparison to data for the labor force in general. A study of business students at Temple University found that internships and joining student professional organizations resulted in a positive correlation between level of education and full-time employment consistent with the graduate's major. The correlation was positive for all graduates in general (Blau et al., 2016). In my study, I controlled for the influence of age on involuntary and voluntary underemployment. Also, I examined the association between the independent educational credential variable and the dichotomous dependent variable for underemployment in RQ1 and RQ2.

Many authors have studied the effect of gender on employment outcomes. For example, a national study on gender and employment inequality found that institutional barriers, such as long work hours, influenced many women to leave the work force when faced with the demands of balancing family and work (Pedulla & Thebaud, 2015). According to these authors, the institutional barriers identified demonstrate that gender inequality in employment is based on more than just the social or cultural preferences for women (Pedulla & Thebaud, 2015). In contrast, Vuolo and Mortimer noted that the reduction in the hours worked for men and women were similar between 2005 and 2011 (before and during the Great Recession). Controlling for the effects of gender on

underemployment made it possible to investigate whether educational credentials predict underemployment status.

Pedulla and Thebaud (2015) reported that African American students experienced unequal treatment in practically all areas of the employment process. As Pedulla and Pager (2019) explained, “Racial labor market disparities persist across nearly all stages of the employment process, with African Americans facing disadvantages compared to their white counterparts” (p. 1008). According to the U.S. Bureau of Labor Statistics, in May 2019, the unemployment rate for Whites was 3.3% compared to 6.2 % for Blacks. The unemployment rate for African Americans was double the rate for Caucasian Americans. Controlling for the influence of race on levels of employment made it possible to examine the association between the independent variables and the dependent variables chosen for this study. The findings in my study were based on quantitative analysis of a randomly drawn sample from archival data. This process fulfilled the purpose and goal of my study to answer the two research questions and by analyzing the predictor variables and the dependent variable based on an empirical analysis of quantitative data.

Geographic area in one criteria used to analyze underemployment for Hispanic workers. For example. Slack et al. (2020) analyzed underemployment levels for Hispanics in metropolitan and nonmetropolitan areas of the United States. Using data from the March Current Population Survey, covering 1968 to 2017, Slack et al. (2020) found that Hispanics, in comparison to Whites. consistently experienced higher rates of underemployment. In rural areas Hispanics averaged a difference of 10.5 percentage points in underemployment. In urban areas, Hispanics averaged a difference of 11.1

percentage points in underemployment. My study expanded upon this study by comparing levels of underemployment for Hispanics and Whites based on two levels of educational attainment: sub-baccalaureate certificates and associate degrees.

Young and Mattingly (2016) used several factors such as educational attainment job skill, industry of employment, and occupational composition. Using data from the Current Population Survey, for 1974 to 2014, these researchers found that the level of underemployment for Hispanics was higher than the rate for Whites as well as Blacks. Additionally, Young and Mattingly noted that education decreased the gap in underemployment levels between Hispanics and Whites. The levels of education analyzed were: (a) less than high school diploma; (b) high school diploma or GED (general equivalency diploma); (b) some college, no degree; associate's degree; and (c) bachelor's degree as well as graduate or professional degree (Young & Mattingly). My study expanded on this topic by examining the impact of sub-baccalaureate certificates (rather than some college, no degree) on levels of involuntary part-time underemployment for Hispanics in comparison to Whites.

Finally, several studies have examined the association between field of study and post-graduation employment. One study of 54 students who received scholarships to pursue training in STEM fields at the university level found that 24 of the 34 who graduated by 2018 (82%) found employment in a STEM field (Mahatanankoon et al., 2018). The researchers in this study did not provide data on earnings or levels of employment (i.e. full-time, etc.) for the graduates. In contrast to Mahatanankoon et al.'s lack of data on earnings and levels of employment, a study of career and technical

education students and graduates from the California Community Colleges system, from 2014 to 2016, focused on the relationship between skills obtained (students who did not earn credentials), certificates and degrees earned from the community college system, and post-graduation earnings (Pham et al., 2020). As Pham et al. (2020) explained, the association between community college training, certificates, and degree increased earnings is related to the field of study. In my study, controlling for the field of study made it possible to analyze the association between educational credential and post-graduation involuntary underemployment and voluntary underemployment. Additionally, rather than state-specific data, my study used a data set with a nationally representative sample, which makes the results generalizable to a larger population (Given, 2012b)

Statistical Tests

For RQ1, I used binary logistic regression to investigate if educational attainment predicts involuntary underemployment when controlling for age, gender, race, and field of study. From the output generated by SPSS, the Hosmer-Lemeshow test was used to evaluate the level of fit. A *p*-value greater than 0.05 indicates that the model is statistically significant (Cohen, 2019). Nagelkerke R squared tests were used to report how much variation the model explains (Cohen, 2019). The unstandardized beta(B) was used to investigate the predicted change in the log odds of falling into the target group as compared to the reference group on the dependent variable per one unit increase on the predictor while controlling for the remaining predictors. Standard Errors (SE) is the average of the averages for repeated samplings of a population. The SE is used to evaluate the accuracy of the logistic regression output. A large SE generally leads to less

confidence in the statistical output as an accurate measure of the population studied. The Wald and Significance tests was used to test the null hypothesis that the constant equals 0 (UCLA, n.d). I used the estimated odds ratio (Exp (B)) to investigate the change in odds for each one-unit increase of an independent (predictor) variable. These tests were performed using educational credential as the independent variable. The covariates were age, race, and gender. The independent variables were involuntary underemployment and voluntary underemployment. The confidence interval (CI) was 95%. For RQ2, binary logistic regression, with the same set of statistical tests, was used to test the two hypotheses. Additionally, for RQ2, the dependent variables investigated in the tests (recoded to binary) were involuntary underemployment and voluntary underemployment.

Threats to Validity

Statistical conclusion validity refers to the degree to which conclusions about the null hypothesis are correct (Petrocelli, 2012). Several factors can threaten the validity of statistical conclusion presented in a study: sample size, violation of assumptions of a model, non-theory guided statistical tests, reliability, and random selection (Petrocelli, 2012; Heiss, 2020). First, in my study, to control for the effect not finding a relationship between the variables when one exists because of a small sample size, I used G*Power to calculate the minimum sample size. Specifically, my study used 583 cases in the logistic regression analysis which follows the recommendation to use a minimum sample size of 500 when working with large amounts of data to avoid the problem of finding a relationship where none exits based the effect of a large sample size (Bujang et al., 2018). Second, to make sure that the variables in my study were used correctly, I evaluated my

study based on all the assumptions associated with logistic regression. Third, to avoid fitting the data to my beliefs, human capital theory was used to guide the development and testing of the hypothesis in my study. Fourth, to maintain reliability between the ATES 2016 study and my study, I used SPSS to select a sample of respondents from the ATES data set who answered all the questions on the ATES survey that related to my study on underemployment. Also, when analyzing underemployment, I used the same definition of underemployment (working 35 hours or less per week) as used in the ATES 2016 survey. Fifth, to avoid problems with conclusions affected by selection bias, I used random selection to select the respondents from the ATES 2016 who answered the questions on underemployment and met the other criteria related to my study.

ATES 2016 Survey Validity

In the ATES 2016 study, one threat to validity may be selection bias. Selection bias creates a threat to external validity when a researcher cannot generalize the results of the study to individuals who do not have the characteristics of the participants because of the narrow characteristics of the participants in the study (Showalter & Mullet, 2017). In the ATES 2016 survey, stratification (oversampling of certain racial groups) was used to ensure adequate numbers from targeted groups. Through the stratification process, along with the random sampling described above, the NHES was carefully designed to avoid bias and to balance the numbers of blacks and Hispanics in participating in the survey without influencing the outcome of the study (McPhee et al., pp. 151-152).

The ATES 2016 researchers collected data for the survey from January 2016 to August 2016. This time period after the Great Recession and before the 2020 economic

crisis caused the Coronavirus pandemic. Because data collection occurred in 2016, the results may not accurately reflect to time period covered by the Great Recession or the 2020 Coronavirus pandemic. The economic recession from 2007 to 2009 included an overall decline in employment in the United States (Gertler & Gilchrist, 2018). Similarly, during the first months of the COVID-19 recession, the unemployment rate increased from 3.8% in February 2020 to 13.0% in May 2020 (Kochhar, 2020). The data from my study is timely because it examined data for employment outcomes during a time period that was not impacted by a major economic crisis.

Ethical Procedures

The major ethical issues in the ATES 2016 study involved the voluntary nature of the study as well as anonymity and confidentiality. First, the ATES survey administrators established ethical procedures by including instructions on the screener questionnaires and the survey instrument, which explained that the household had been chosen randomly and that responding to the survey was voluntary. The instructions on the voluntary nature of the survey lets the householder know that they may choose not to respond to the survey. Second, anonymity refers to collecting data, but not personal or identifying information (Coffelt, 2017). The screener questionnaire and the survey questionnaires protected the respondent's anonymity by not placing the names of household members on the envelopes. Confidentiality refers to separating or modifying any personal, identifying information provided by participants from the data (Coffelt, 2017).

The ethical procedures for my study involve preserving the anonymity of the participants in the ATES 2016 survey as well as protecting the confidentiality of

information when writing about and storing the data generated for the ATES 2016 survey. Additionally, I obtained approval from Walden's Office of Research Ethics and Compliance (OREC) before analyzing any of the statistical tests needed to answer the research questions in my study.

On the ATES survey, the researchers protected confidential information about household members by instructing the respondents to include only the first name for each member of the household identified on the survey. The instructions explained that the first names would be used to communicate with the respondent about the members of the household, but the names would not be used in the statistical analysis of the data collected. Third, if data from the data set is converted to paper format, then the documents should be kept locked files. Data on software should be kept in encrypted computer files (Kong & Xiao, 2015). The ATES study, and the other studies involved in NHES 2016, involved printing, mailing, and receiving printed copies of the screener questionnaire and the survey questionnaire. However, the data files for the NHES 2016 survey did not reveal whether the computer files for these surveys were encrypted.

Summary

In Chapter 3, I discussed the research design and rationale for the study. Under methodology, I discussed population, sampling and sampling procedures, recruitment, participation, and data collection used by NCES to conduct the 2016 ATES survey. Additionally, Chapter 3 discussed: (a) background information on the survey instrument; (b) how the instrument was developed; and (c) the independent variables, dependent variables, and covariates used for my study. Finally, I discussed reliability, threats to

validity, and ethical issues related to the survey. In Chapter 4, I present the findings my quantitative examination of the data obtained from the ATES 2016 data set.

Chapter 4: Results

Introduction

The purpose of this quantitative study was to determine whether educational attainment predicts post-graduation involuntary underemployment and voluntary underemployment for sub-baccalaureate certificate holders and associate degree holders. The two research questions that I chose for this study sought to determine if educational attainment predicts involuntary underemployment and voluntary underemployment. To answer these research questions, I used logistic regression to analyze the archival data I obtained from the ATES 2016 survey. Based on human capital theory, the theoretical framework for this study, the null hypothesis was that educational attainment does not predict involuntary or voluntary underemployment. For hypothesis 1, educational attainment was not expected to predict involuntary underemployment because being unable to obtain the desired benefits of educational credentials such as full-time employment is inconsistent with the human capital idea that educational attainment leads to economic rewards. For hypothesis 2, educational attainment was not expected to predict voluntary underemployment because voluntarily choosing to work less than full-time is inconsistent with the human capital idea that students invest their time and resources in education to receive a return on their investment.

The procedures used to collect data for the ATES 2016 survey are reviewed in Chapter 4. The next section contains the demographics for those who participated in the ATES 2016 as well as the demographics for the respondents from selected from the ATES survey for inclusion in my study. The regression analysis sections contains the

rationale for selecting regression analysis rather than univariate analysis to conduct the study. The final section contains the research findings organized by the two research questions that guided this study.

Data Collection

The data for my study came from the ATES 2016 survey which is one of the three instruments in the NHES 2016 survey. The sample for the ATES 2016 survey was 63,846 adults. There were 47,744 respondents to the ATES 2016 survey. For my study, I used SPSS software to select the respondents who answered the two questions on underemployment on the ATES 2016 survey that were related to my study. This process generated a pool of 1,675 cases for my logistic regression analysis. From this sample, 583 cases met all the remaining criteria for my study and were included in the logistic regression analysis to obtain the data to answer RQ1 and RQ2. Based the respondents' answers, I used binary logistic regression in SPSS to classify the respondents as involuntarily or voluntarily underemployed.

Demographics and Representativeness

The adults who completed the ATES 2016 survey were noninstitutionalized adults, 16 to 65 years of age, who were not enrolled in Grades 12 or below and were not being homeschooled for equivalent grades (McPhee et al., 2018). The responses from Hispanics, non-Hispanics, Black only, and other were subjected to raking. Raking is a procedure to adjust weights assigned at the person-level to national totals. As McPhee et al. (2018) explained, the raking procedure for the ATES 2016 survey involved "raking

the nonresponse-adjusted person-level weights to national totals obtained using the number of children and adults from the 2015 annual ACS estimates" (p. 139).

Selected Cases

I selected the respondents for analysis in my study based on their responses to the ATES 2016 survey questions about underemployment. The respondents to the ATES 2016 survey ranged in age from 17 to 66 years of age. Moreover, as a subset of the ATES 2016 data set, the respondents selected were not enrolled in grades 12 or below and were not being homeschooled for equivalent grades. There were 1003 females (59.9%) and 672 males (40.1%) in the subset. For my participant sample, there were 330 females (56.6%) and 253 males (43.3%). The racial/ethnic composition of the subset was: Caucasians, 1134 (67.7%); Hispanics, 202 (12.1%); African Americans, 156 (9.3%); Asians, 115, (6.9%); and Other/Mixed Races, 68 (4.1%). For my participant sample, the racial/ethnic composition of my sample was: Caucasians, 402 (68.9%); Hispanics, 64 (10.9%); African-Americans, 59 (10.1%); Asians, 30 (5.1%); Other Races/Mixed Races, 28 (4.8%). Moreover, as a subset of the 2016 data set, the risk of skewed results in my sample, based on oversampling a racial or ethnic category, decreased because the ATES 2016 researchers adjusted the ATES 2016 sample to national totals. The respondents for my study were selected from the ATES 2016 adjusted sample.

Regression Analysis

I did not select univariate analysis because my study involved more than one independent variable and more than one dependent variable. The two levels of the independent variables in my study were: sub-baccalaureate certificate and associate

degree. The two categories for the dependent variables in my study were involuntarily underemployed (yes, no) and voluntarily underemployed (yes, no). According to the research reviewed for my study, the covariates most likely to affect the outcome of the association between the independent variables and the dependent variables in my study are race, age, gender, and field of study (Mahatanankoon et al., 2018; Pedulla & Pager, 2019; Pedulla & Thebaud, 2015; Pham et al., 2020; Vuolo & Mortimer, 2016).

Results

Logistic regression is a test used to model dichotomous dependent (outcome) variables in which there are only two possible outcomes for the dependent variable based on one or more independent variables that can be continuous or dichotomous. However, before conducting a logistic regression the data must meet certain statistical assumptions. The first four assumptions relate to study design (LAERD, 2018). The seven assumptions associated with logistic regression are summarized below.

Assumptions

Assumption 1 requires that at least one of the dependent variables is dichotomous. In my study, the dichotomous dependent variables were: (a) Involuntary Underemployment (Yes or No) and (b) Voluntary Underemployment (Yes or No). My study met assumption 1.

Assumption 2 requires that the study design has one or more variables that are measured on either a continuous or nominal scale. The age variable in my study, which is measured in years, is a continuous variable. The gender variable, in my study, is a

nominal variable that has two labels for the two groups: male and female (LAERD, 2018). My study met assumption 2.

Assumption 3 requires independence of observations and the categories of the dichotomous dependent variable and all nominal independent variables should be mutually exclusive and exhaustive (LAERD, 2018). In my study, the dichotomous dependent variable involuntary underemployment met the requirement for independence of observation because the respondent is either coded "yes" or "no" for involuntarily underemployed. For the variable voluntary underemployment, the respondent met the requirement for independence of observation because the respondent is coded either "yes" or "no" for voluntary underemployed. Similarly, in my study, the nominal independent variable gender met the requirement for independence of observations and mutual exclusion because the respondent is either male or female. For the purposes of this study, a respondent cannot be both. My study met assumption 3.

Assumption 4 requires a minimum of 15 cases per independent variable (LAERD, 2018). In my study, there are two independent variables and four covariates. In logistic regression, using SPSS, the independent variables and covariates are entered into the same column for processing. In my study, the number of cases per independent variable and covariate exceeds the minimum of 15 cases because the 583 cases were used for the logistic regression. These cases were taken from a sample composed of 1,675 respondents who answered the two questions used to classify respondents as involuntarily underemployed or voluntarily underemployed. My study met this requirement because 583 cases is more than the 15 cases required per independent variable.

Assumptions 5, 6, and 7 relate to how the data in my study fits the logistic regression model so that the results are valid. These three assumptions can be tested using SPSS.

Assumption 5 requires that output for the data should have a linear relationship between the continuous independent variables and the logit transformation of the dependent variable (LAERD, 2018). The Box Tidwell Test was used to test for linearity. For my study, linearity of the continuous variable was assessed using the Box-Tidwell (1962) procedure in terms of the logit of the continuous dependent variable age. The significance value of the interaction term for age was 0.00 in the SPSS output.

If a continuous variable violates the assumption of linearity, SPSS can be used to calculate the inverse square root transformation of the continuous variable to attempt to correct the violation of the assumption of linearity. Using this procedure, the significance value for the Natural Log Transformation of "age" by the inverse square root of age was .443. Since the adjusted *p*-value of .443 is greater than 0.05, the transformed continuous variable for age is linear (LAERD, 2018). My study met assumption 5.

Assumption 6 requires that there be no multicollinearity in the data produced from the logistic regression. Multicollinearity for logistic regression can be analyzed using SPSS (Grande, 2015). Table 5 displays the correlations between the independent variables in this study. The correlations are used to determine collinearity. As explained by Grande (2015), although there is no set cut off value for determining collinearity, the popular values are .7, .8, or .9. The data in Table 5 show that all the correlations are

below .7. The data does not show collinearity between the continuous independent variables.

Table 5

SPSS Evaluation of Multicollinearity

		Gender	Age	D-Detailed race/ethnicity	Educational Attainment	Field of Study
Gender	Pearson Correlation	1	.046**	.015**	.049**	-.053**
	Sig. (2-tailed)		.000	.001	.000	.000
	N	47744	47744	47744	26287	47744
Age	Pearson Correlation	.046**	1	-.122**	.043**	.116**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	47744	47744	47744	26287	47744
Race/Ethnicity	Pearson Correlation	.015**	-.122**	1	-.008	.035**
	Sig. (2-tailed)	.001	.000		.170	.000
	N	47744	47744	47744	26287	47744
Educational Attainment	Pearson Correlation	.049**	.043**	-.008	1	-.408**
	Sig. (2-tailed)	.000	.000	.170		.000
	N	26287	26287	26287	26287	26287
Field of Study	Pearson Correlation	-.053**	.116**	.035**	-.408**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	47744	47744	47744	26287	47744

**. Correlation is significant at the 0.01 level (2-tailed).

A second method for testing multicollinearity in SPSS is to run collinearity diagnostics. Table 6 presents the multicollinearity SPSS results using this method. As Grande (2015) explained, collinearity diagnostics analyzes the variables in terms of Tolerance and Variance Inflation Factor (VIF). The VIF is the reciprocal of Tolerance (i.e., 1/VIF). As with Casewise diagnostics there is no set cut off value for VIF, however, one of the more popular values is .1. Values less than .1 indicate multicollinearity. So, to satisfy this assumption the variables' values for Tolerance should be greater than .1 (which they are) and the VIF would be less than 10. Also, if .2 is used for Tolerance, then the VIF would be less than 5. The data in Table 2 show that the VIF values for all the independent variables and covariates in this study are less than 10. This output indicates that there is no multicollinearity in the data. My study met assumption 6.

Table 6

Tolerance and Variance Inflation Factor

Model		Collinearity Statistics	
		Tolerance	VIF
1	Educational Attainment	.892	1.121
	Field of Study	.991	1.009
	Race/Ethnicity	.984	1.016
	Age	.890	1.123
	Gender	.998	1.002

a. Dependent Variable: Step_2

Assumption 7 requires that the data should have no significant outliers. In SPSS, Casewise diagnostic checked for outliers, leverage, or influential points. As explained in LAERD (2018), the Casewise List table, when generated, highlights cases with

standardized residuals greater than ±2 standard deviations. Cases with standardized residual values greater than 2.5 should be analyzed to identify why these cases are outliers. In some cases, the outliers should be removed from the data set (LAERD, 2018). No Casewise list was produced in the SPSS output generated for my study indicating that there were no outliers. My study met assumption 7.

Statistical Tests

I conducted a logistic regression analysis to investigate whether educational attainment predicts involuntary underemployment or voluntary underemployment. The results of the logistic regression are summarized below.

Omnibus Tests of Model Coefficients

The Omnibus Tests of Model Coefficients compares the model in the study to the null model (hypothesis). A significance value less than .05 means that the model is a good fit. In the output for this study the significance value was .000, which indicates that the model was a good fit.

Table 7

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	28.613	2	.000
	Block	28.613	2	.000
	Model	28.613	2	.000

Nagelkerke R Square

The Nagelkerke R^2 test reports how much variation the model explains. Nagelkerle R^2 has a value between 0 and 1. The Nagekelkerke R^2 values closer to one, in

contrast to those closer to zero, suggest a stronger predictive value (Knapp, 2018; LAERD, 2018). As shown in Table 8, in this study, the significance value of the independent variables, educational attainment, without the covariates was .058. This Nagelkerke R^2 value indicates that this model accounts for 58% of the variability in underemployment (Knapp, 2018; LAERD, 2018). However, there is some debate in the literature concerning the value of reporting the Nagelkerke R^2 value (Knapp, 2018).

Table 8

Nagelkerke R. Squared Tests – No Covariates

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	781.374[a]	.044	.058

Note: Estimation terminated at iteration number 3 because parameter estimates changed by less than .001.

As shown in Table 9 the R^2 value with the covariates and the independent variable was 118.

Table 9

Nagelkerke R Squared Tests ¯ with Covariates

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	753.576[a]	.088	.118

Note: Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Hoshemer Lemeshow Test

The Hosmer-Lemeshow test was used to evaluate the level of fit. For most results, a *p*-value greater than 0.05 indicates that the model is statistically significant. However,

for the Hosmer Lemeshow test, the results should not be statistically significant because this would indicate that the model is a poor fit (LAERD, 2018). In my study, the significance value for the independent variable without the covariates was 1.00 (i.e. not significant), which indicates that the model is not a poor fit (LAERD, 2018).

Table 10

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	.000	1	1.000

As shown in Table 11, the significance value with the covariates and the independent variable was .245. This *p*-value indicates that the model is not a poor fit.

Table 11

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	10.299	8	.245

Classification Table

Table 12 compares the predicted outcomes to the actual outcomes. The prediction was that 209 out of 302 cases observed would be voluntarily underemployed. However, in the actual data an additional 93 were involuntarily underemployed. The prediction that 209 out of 302 cases would be voluntarily underemployed is a percentage correct of 69.2%. Next, the prediction was that 129 out of 281 cases would be voluntarily underemployed. There were 152 cases that were involuntarily underemployed. The prediction that 152 cases out of 281 would be underemployed is a percentage correct of

54.1. The average of 69.2% and 54.1% gives an overall percentage correct of 61.9%. The typical preference is for an overall percentage of accuracy between 65% to 75%.

Table 12

Predicted Underemployment[a]

Step 1, Observed	Step 2, Predicted Not underemployed	Yes Underemployed	Percentage Correct
Not Underemployed	209	93	69.2
Yes Underemployed	129	152	54.1
Overall Percentage			61.9

Note: The cut value is .5

Variables in the Equation

In logistic regression, the variables in the equation table show the contribution of each predictor variable to the model and its statistical significance (LAERD, 2018). As shown in Table 13, five of the predictors: sub-baccalaureate certificates, associate degrees, Field of Study (Other Fields), Race/Ethnicity (Hispanics), and Gender (female) were significant. The results summarized in Table 13 are:

Educational Credentials

The predictor variable, educational credential, was tested a priori to verify there was no violation of the assumption of the linearity of the logit. The predictor variable, educational credential, in the logistic regression analysis was found to contribute to the model. The unstandardized Beta weight for the Constant; B = [-.843], SE = [.319], *Wald* = [7.001], p = .008.

For the educational variable, the predictor variable high school diploma (Education Group) was used as the baseline for comparison in the logistic regression. The other two educational variables were compared to high school diploma.

Sub-baccalaureate Certificates

The unstandardized Beta weight for the sub-baccalaureate certificates (Education Group 1) *B* = .738, *SE* = .295, *Wald* = 6.242, *p* = .012. For every unit increase in educational attainment the odds of being involuntarily underemployed increase by 2.519%. The estimated odds ratio favored increase of nearly 109.1% [*Exp (B)* = 2.091, 95% CI (1.172, 3.729)] for involuntary underemployment for every one unit increase of educational credentials.

Associate Degrees

The unstandardized Beta weight for the associate degrees (Education Group 2): B = .901, SE = .220, Wald = 16.680, p < .001. For every unit increase in educational attainment the odds of being involuntarily underemployed increase by 2.096%. The estimated odds ratio favored an increase of nearly 146.1% [Exp (B) = 2.461, 95% CI (1.433, 3.066)] for involuntary underemployment for every one unit increase of educational credential.

Age

The unstandardized Beta weight for the predictor variable Age: *B* = [.006], *SE* = [.005], *Wald* = [1.357], *p* = 2.44. The estimated odds ratio favored an increase of nearly 6% [*Exp (B)* = 1.006, 95% CI (.996, 1.017)] for involuntary underemployment for every one year unit increase of age for the respondents ranging in age from 17 to 66 years of age.

Gender

For the gender variable, the predictor variable male was used as the baseline for comparison in the logistic regression. The data for females was compared to the data for females. A variable that categorizes gender as two outcomes, male or female, is a dichotomous variable (LAERD, 2018). The data set that my study drew from limited gender to male and female only.

The unstandardized Beta weight for the predictor variable Gender: *B* = [-.385], *SE* = [.176], *Wald* = [4.796], $p < .001$. The estimated odds ratio favored a decrease of nearly 68% [*Exp (B)* = .680, 95% CI (.482, .960] for involuntary underemployment for every one unit increase of gender. This means that the odds are .680 times less that females will be involuntary underemployed in comparison to males.

Race/Ethnicity

For the race/ethnicity variable, the predictor variable Caucasian was used as the baseline for comparison in the logistic regression. The data for the other categories of race/ethnicity were compared to the data for Caucasians. The unstandardized Beta weight for the predictor variable African-American (Race/Ethnicity 1): *B* = [.370], *SE* = [.292], *Wald* = [.370], $p = .206$. The estimated odds ratio favored an increase nearly 45% [*Exp (B)* = 1.447, 95% CI (.816, 2.567]) for involuntary underemployment every one unit increase of race/ethnicity. This means that the odds are 1.447 greater that African-Americans will be involuntarily underemployed in comparison to Caucasians.

The unstandardized Beta weight for the predictor variable Hispanic (Race/Ethnicity 2): *B* = [.842], *SE* = [.293], *Wald* = [8.234], $p < .001$. The estimated odds

ratio favored an increase nearly of 132% [*Exp (B)* = 2.320, 95% CI (.706, 2.355)] for involuntary underemployment every one unit increase of race/ethnicity. This means that the odds are 2.320 greater that Hispanics will be involuntarily underemployed in comparison to Caucasians.

The unstandardized Beta weight for the predictor variable Asian (Race/Ethnicity 3): *B* = [.001], *SE* = [.397], *Wald* = [.000], *p* = .997. The estimated odds ratio favored an increase nearly 0.1% [*Exp (B)* = 1.001, 95% CI (.460, 2.179)] for involuntary underemployment every one unit increase of race/ethnicity. This means that the odds are 1.001 times greater that Asians will be involuntarily underemployed in comparison to Caucasians.

The unstandardized Beta weight for the predictor variable Other Races/Mixed Races (Race/Ethnicity 4): *B* = [.465], *SE* = [.421], *Wald* = [1.217], *p* < .001. The estimated odds ratio favored an increase of nearly 27% [*Exp (B)* = .270, 95% CI (.697, 3.632)] for involuntary underemployment every one unit increase of race/ethnicity. This means that the odds are 1.591 times greater that persons in the Other Races/Mixed Races category will be involuntarily underemployed in comparison to Caucasians.

Field of Study

For the field of study variable, the predictor variable Liberal Arts was used as the baseline for comparison in the logistic regression. The data for the other three field of study variables were compared to the data for Liberal Arts.

The unstandardized Beta weight for the predictor variable STEM: *B* (EDU Recode 1) = [.083], *SE* = [.290], *Wald* = [.082], *p* = .774. The estimated odds ratio

favored an increase of 87% %] [*Exp (B)* = [1.087], 95% CI (.615 1.921] for involuntary underemployment every one unit increase of Field of Study. This means that the odds are 1.087 times greater that graduates in the STEM fields will be involuntarily underemployed in comparison to Liberal Arts graduates.

The unstandardized Beta weight for the predictor variable Business (EDU Recode 2): *B* = [.254], *SE* = [.307], *Wald* = [.683], *p* = .409. The estimated odds ratio favored an increase of nearly 29% [*Exp (B)* = [1.289], 95% CI (706, 2.355] for involuntary underemployment every one unit increase of Field of Study. This means that the odds are 1.289 times greater that persons in the Business fields will be involuntarily underemployed in comparison to Liberal Arts.

The unstandardized Beta weight for the predictor variable Other Field of Study (EDU Recode 3) : *B* = [.598], *SE* = [.271], *Wald* = [4.861], *p* = .027. The estimated odds ratio favored an increase/ nearly 81% *Exp (B)* = [1.818], 95% CI (1.069, 3.092)] for involuntary underemployment every one unit increase of field of study. This means that the odds are 1.818 times greater that persons in the Other Fields category will be involuntarily underemployed in Liberal Arts.

Table 13

Variables in the Equation

							95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	High School Diploma			19.023	2	.000			
	Sub-baccalaureate Certificate	.738	.295	6.242	1	.012	2.091	1.172	3.729
	Associate Degree	.901	.220	16.680	1	.000	2.461	1.597	3.791
	Liberal Arts			7.954	3	.047			
	STEM	.083	.290	.082	1	.774	1.087	.615	1.921
	Business	.254	.307	.683	1	.409	1.289	.706	2.355
	Other Fields	.598	.271	4.861	1	.027	1.818	1.069	3.092
	78. Age	.006	.005	1.357	1	.244	1.006	.996	1.017
	73. Gender	-.385	.176	4.796	1	.029	.680	.482	.960
	Caucasian			9.823	4	.044			
	African American	.370	.292	1.598	1	.206	1.447	.816	2.567
	Hispanic	.842	.293	8.234	1	.004	2.320	1.306	4.122
	Asian	.001	.397	.000	1	.997	1.001	.460	2.179
	Other/Mixed Race	.465	.421	1.217	1	.270	1.591	.697	3.632
	Constant	-.843	.319	7.001	1	.008	.430		

Note: Variable(s) entered on step 1: EDUCATTN_GROUP, EDU_Recode, 78. Age, 73. Sex, D-Detailed race-ethnicity.

Summary

Research Question 1

RQ1 asked whether educational attainment predicts involuntary underemployment when controlling for age, race, gender, and field of study. The hypothesis for RQ1, that educational attainment is positively associated with underemployment, was supported by the data from the logistic regression. These results forced a rejection of the null hypothesis for RQ1. Specifically, the results of the regression coefficients (the change in predicted log odds) indicated positive "*B*" values as well as statistical significance for the two independent variables (sub-baccalaureate certificates; Group 2 and associate degrees; Group 3) and the covariates field of study and race. Gender was statistically significant but had a negative *B* value.

For the educational attainment variable (education group), the values for sub-baccalaureate certificates and associate degrees have positive *B* values and were statistically significant (0.012, 0.000 respectively). In the field of study category, the Liberal Arts and the Other category had positive *B* values and were statistically significant (0.047, 0.027 respectively). In the race category the variable for Race (Whites) and Hispanics (Race2) had positive *B* values and were statistically significant (0.044, 0.004 respectively). The positive and statistically significant values for these variables are positively associated with underemployment. In contrast, the negative *B* value for the covariate gender (*B* value, -.385) and the statistical significance (.029) indicates that women are less likely than men to be involuntarily underemployed when compared to males.

The positive odd ratios for each independent variable, except gender, indicate that the odds for involuntary underemployment increase for one unit increase in education or age. The 91% ratio for sub-baccalaureate certificates indicates that respondents in these categories are 91% more likely to be involuntarily underemployed in comparison to those with high school diplomas. The 46% for associate degrees indicates that respondents in this category are 46% more likely to be involuntarily underemployed than those with a high school diploma. The 81% for Other Fields of study, indicates that respondents with credentials listed in this category are 81% more likely to be involuntarily underemployed in comparison to those in the Liberal Arts field of study. The 132% for Hispanics (Race 2) indicates that Hispanics are 132% more likely to be involuntarily underemployed in comparison to whites. For gender, the 68% ratio indicates that females are 68% more likely to be involuntarily underemployed in comparison to males.

Research Question 2

RQ2 asked whether educational attainment predicts voluntary underemployment when controlling for age, race, gender, and field of study. Based on the results of the regression for showing a positive association between five of the predicter variables and involuntary underemployment (the dependent variable for RQ1) the null hypothesis for RQ2 was not rejected. Specifically, based on their answers to the survey, respondents were either classified as involuntary or voluntary underemployed. The results for logistic regression summarized for RQ1 indicated that the two independent variables: sub-baccalaureate certificates and Associate degrees as well as two of the covariates, Race/Ethnicity (Hispanic) and Field of Study (Other Fields), were positively associated

with underemployment. In contrast, for RQ2 the null hypothesis was not rejected because the results of the logistic regression indicated that gender (women) was the only statistically significant variable positively associated with voluntary underemployment. Specifically, the negative *B* value for gender as well as the odds ratio of .680 indicated that women were 68% times more likely to be voluntarily underemployed in comparison to men.

Chapter 4 presented the results of the logistic regression for involuntary underemployment for educational attainment, field of study, race, gender, and age. The results were presented and summarized for the independent variables and covariates and their association with involuntary underemployment. Chapter 5 presents the interpretation of the findings and limitations of the study and concludes with recommendations and implications.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this quantitative study, conducted with archival data, was to determine whether educational attainment predicts post-graduation involuntary underemployment (working part-time but seeking full-time employment) and voluntary underemployment (working part-time but not seeking full-time) for sub-baccalaureate certificate holders and associate degree holders. The covariates for my study were age, gender, race, and field of study. The impact of involuntary underemployment for graduates with sub-baccalaureate certificates and associates degrees is a serious social problem. As reported in the literature, the many students who enroll in sub-baccalaureate certificate and associate degree programs seek, but are not employed in a job that their education prepared them for. A quantitative study using a nationally representative sample was chosen for my study so that the results would be generalizable to a larger population.

In this chapter, the findings of my study are interpreted in terms of whether the findings confirm or disconfirm the empirical literature on underemployment. Moreover, the findings are interpreted in terms of how well they align or fail to align with the main ideas of human capital theory which provided the theoretical framework for my study. The five statistically significant and the six non-statistically significant variables are analyzed to interpret their association with involuntary and voluntary underemployment. The chapter explains the limitations on generalizability for the six statistically non-

significant variables in my study. Finally, this chapter concludes with recommendations for future research.

Summary of Key Findings

In my study, the findings in Table 13 reveal that the hypothesis for RQ1, which states that educational attainment predicts involuntary underemployment, was supported by the data. Table 13 shows that five of the 11 predictor variables were statistically significant (*p*-value less than 0.05). A *p*-value less than 0.05 indicates that the null hypothesis can be rejected. In the Educational Attainment category, that the null hypothesis that sub-baccalaureate credentials and associate degrees do not predict involuntary underemployment is rejected. In the Field of Study category, the null hypothesis that the variable Other Fields of study does not predict involuntary underemployment is rejected. In the Gender category, the null hypothesis that gender does not predict involuntary underemployment is rejected. In the Race/Ethnicity category, the null hypothesis that Hispanic ethnicity does not predict involuntary underemployment is rejected. Rejecting the null hypothesis for five variables indicates that those variables predict involuntary underemployment . In the Age category there were no statistically significant variables. Finally, the data in Table 13 also answers RQ2 because the respondents were either involuntarily or voluntarily underemployed. The data shows that for five of the variables the majority of respondents were involuntarily rather than voluntarily underemployed. Therefore, the null hypothesis for RQ2 is not rejected because educational attainment is predicting involuntary underemployment rather than voluntary underemployment.

Interpretation of the Findings

Empirical Literature

I extended the scholarly discussion on underemployment by examining the under-researched topics of involuntary and voluntary underemployment. The literature reviewed for my study revealed that only two peer-reviewed studies (Rios, 2018; Roth, 2019) and one primary source (Hudson & Isenberg, 2019) used recent data from the 2016 to analyze underemployment for individuals with post-secondary credentials. Hudson & Isenberg, (2019) used 2016 data from the ATES 2016 survey, which provided the data for my study, to analyze involuntary underemployment for graduates with high school diplomas and associate degrees. Hudson and Isenberg did not evaluate underemployment for sub-baccalaureate certificate holders.

The results of my study were positive and statistically significant for four of the eleven predictor variables studied: sub-baccalaureate certificates, associate degrees, field of study (other fields), and race/ethnicity (Hispanics). Additionally, the results for gender (females) were negative but statistically significant. The results of the remaining six variables were positive but not statistically significant: STEM, Business, Age, Caucasian, African American, and Asian. The findings of my study extended the findings of (Hudson & Isenberg, 2019) by determining whether an increase in educational attainment predicted involuntary underemployment or voluntarily employment for certificate holders.

Educational Credentials

Hudson and Isenberg (2019), using 2016 data, focused on underemployment, and found that 6% of high school graduates were involuntarily underemployed due to part-time employment, and 4% were involuntarily underemployed due to temporary employment. However, this study did not include sub-baccalaureate certificates (Hudson & Isenberg, 2019). My study used logistic regression to compare the data on sub-baccalaureate certificates and associate degrees to the data on high school. The results were reported in terms of one unit increase from a high school diploma to a sub-baccalaureate certificate and a one unit increase from a sub-baccalaureate certificate to an associate degree.

My study found that one unit increases in educational attainment were positively associated with involuntary underemployment. The results were statistically significant for the two levels of the educational attainment variables that were compared to high school diplomas: sub-baccalaureate certificates and associate degrees. The statistical significance in this area provides data that is cautiously generalizable to a larger population. According to human capital theory, high school graduates (and others) pursue sub-baccalaureate credentials to obtain the economic benefits associated with these credentials. However, the results of this study indicate that sub-baccalaureate credentials are positively associated with underemployment rather than full-time employment. Stakeholders, such as high school seniors, parents, high school advisers, and high school teachers may be informed by these findings, in conjunction with other available findings informed by research, when planning post-secondary education goals.

Fields of Study

Lowry and Thomas (2017) found that sub-baccalaureate credentials obtained through career and technical education as well as STEM training are productive investments for students because they provided the economic rewards associated with in-demand careers. Although my study found a positive relationship between the STEM field and involuntary underemployment, the findings were not statistically significant, and did not support Lowry's and Thomas' findings. The lack of statistical significance suggests that the relationship between involuntary underemployment in the sample population used for my study may not be representative of the larger population. Therefore, for my study, involuntary underemployment is not statistically significant for STEM graduates.

Kim et al. (2019) found that the 20-year cumulative earnings for persons with sub-baccalaureate credentials varied by field of study. In my study, the results for the Other Field of Study variable (i.e. other than Liberal Arts, STEM, and Business) were positive and significant. The positive and statistically significant results indicate that the fields of study in this category are positively associated with underemployment. There were no statistically significant results for the STEM, includes Healthcare fields and Business category for my study..

Gender

Rios (2018) found that the association between educational attainment and earnings varied based on gender. According to Rios, the positive association between educational credentials and increased earnings occurred in fields such as engineering and

computer fields. For women, the most positive association occurred in the health-related fields (included in the STEM field of my study). My study, which filled a gap in the literature and focused on underemployment rather than earnings, found that the odds of being involuntary underemployed is more likely for males than for females. In contrast to my study, Rios focused on fields of study such as engineering and computer fields and reported higher earnings for men in comparison to women. My study focused on four major categories of study: Liberal Arts, STEM, Business, and Other Fields and I found an association between the Other Fields of Study category and involuntary underemployment. The difference in findings between Rios's study and my study may be explained by comparing Rios' focus on engineering and computer fields to my focus on four major categories of study.

Pedulla and Thebaud (2015) provided another explanation to help understand the difference in employment outcomes for men and women and posited that institutional barriers overlap with women's societal and cultural preferences in choosing family over work when faced with the demands of work-life balance. For women with some college or college degrees, when faced with lack of adequate childcare and/or family medical leave, it is the women who tend to assume the responsibilities for caring for the family. In 2015 over 70% of part-time workers between 24 years of age and 54 years of age were women (Pedulla, 2016). Based on Pedulla's observations, what is reported as voluntary unemployment for women in the ATES 2016 study as well as the data analyzed in my study may be related to institutional barriers to employment and cultural preferences that influence women to voluntarily work part-time.

Race/Ethnicity

According to Pedulla and Pager (2019), African Americans experience a significant difference in labor market related outcomes in all stages of the employment process as compared to Caucasians. Similarly, according to the U.S. Bureau of Labor Statistics, in May 2019, the unemployment rate for African Americans (6.2%) was double the rate for Caucasian Americans (3.3%). For my study, controlling for the influence of race on involuntary underemployment and voluntary underemployment made it possible to examine whether race was positively or negatively associated with underemployment. In my study, the results were positive but not statistically significant for the association between African-Americans and involuntary underemployment.

Analyzing data for the period covering 1968 to 2017, Slack et al. (2020) found that Hispanics in comparison to Caucasians (and African Americans) consistently experienced higher levels of underemployment. According to these authors, the higher level of underemployment for Hispanics was prevalent in metropolitan as well as metropolitan areas. My study confirmed the findings in (Slack et al., 202). In my study, Hispanics were more likely to experience involuntary underemployment in comparison to whites. Slack et al., (2020) focused on workers in general. In contrast, my study focused on workers with sub-baccalaureate certificates and associate degrees.

My study disconfirmed the findings of Young and Mattingly (2016) on educational attainment and underemployment for Hispanics. When analyzing levels of education ranging from no high school diploma to graduate and professional degrees, Young and Mattingly (2016) found that education reduced the gap in underemployment

between Hispanics and Whites. In contrast, my study focused on sub-baccalaureate certificates and associate degrees and found that for both credentials Hispanics were more likely than whites to fall into the category of involuntary underemployment.

Age

According to Vuolo and Mortimer (2016), during the Great Recession young workers are more likely to be unemployed or underemployed in comparison to data for the labor force in general. I examined the association between age and underemployment during a time period that was not impacted by a major economic event such as the Great Recession. The respondents ranged in age from 17 years old to 66 years old. The results for age indicated that for every one unit increase in age the odds of involuntary underemployment increased by 6%. However, the lack of statistical significance for age suggests that the relationship between lower age and higher involuntary under-employment in the sample population used for my study may not be representative of the larger population.

Human Capital Theory

Human capital theory provided the theoretical framework for my study. Based on the results for underemployment in my study, the majority of respondents, represented by the 583 cases analyzed for my study, did not experience the economic benefit of full-time employment as expected under a human capital theoretical framework. According to human capital theory, students who earn higher education credentials expect to obtain the economic benefits associated with the earned credentials. The studies that found an association between education and earnings framed within human capital theory focused

on sub-baccalaureate credentials and linked earning to those credentials (Kim et al., 2019; Lowry & Thomas, 2017). For example, Collins and Long (2015), in one of the few studies to discuss involuntary underemployment, used data from 2012 to show that the Bureau of Labor and Statistics classified 8.9 million American workers as involuntary part-time workers.

Although current researchers and government statisticians distinguish between involuntary and voluntary underemployment, human capital theorists, typically focus on the individual's return on investment in education in terms of increased wages. In my study, the statistically significant association between sub-baccalaureate credentials and involuntary underemployment confirms the findings of Roth (2016) and (Rios, 2019). Ross (2016) and Rios (2018) do not specifically mention human capital theory; however, their analysis aligns with the tenet in human capital theory that individual and government investment in education are expected to translate into economic rewards. Rios (2018) explained that geographic location can contribute to higher levels of underemployment. Roth (2019) explained that the oversupply of graduates contributes to the lack of good paying full-time jobs for graduates with sub-baccalaureate and baccalaureate credentials. In contrast, my findings on educational attainment and involuntary underemployment disconfirm the findings presented by (Hudson & Eisenberg, 2019). These researchers, using ATES 2016 survey data on high school diplomas and associate degrees, but not sub-baccalaureate certificates, reported a negative relationship between educational attainment and involuntary underemployment. My study found a positive and statistically significant relationship between sub-

baccalaureate certificates and underemployment as well as associate degrees an underemployment.

The results of my study are not aligned to human capital theory, which posits that an individual's investment in education provides the return of skills needed to obtain higher wages and reduce unemployment or underemployment (Becker, 1994; Holden & Biddle, 2017). As Holden and Biddle (2017) explained, Becker's idea of individual return on investment in education developed alongside and overlaps with the federal government's increasing involvement in higher education as a way of promoting maximum employment or full employment. As the government began to invest more money in higher education to secure the benefits of maximum employment human capital theory became the rationale to explain the benefits of such an investment (Holden and Biddle, 2017). Although individuals and the federal government invest in education to achieve economic rewards, my findings conflicts with this expectation in human capital theory. The data in my study showed a positive and statistically significant association between educational attainment and involuntary underemployment.

The results of my study confirm the findings of Collins and Long (2015). These researchers found that 832 respondents to the 2005 regional underemployment telephone survey of 26 West Texas and Eastern New Mexico counties (of workers with or without college credentials) continued to experience underemployment after the end of the Great Recession in 2009. Similarly, my study focused on workers with sub-baccalaureate credentials, a narrower portion on the underemployed population, and found a pattern of involuntary part-time underemployment for the majority of the 583 respondents analyzed.

Specifically, the data in my study showed that with the one unit increase from high school diploma to sub-baccalaureate certificate the odds of being involuntarily underemployed increased by 2.519%. Additionally, for the one unit increase from sub-baccalaureate credential to associate degree attainment, the odds of being involuntarily underemployed increased by 2.096%. The results for both levels of educational attainment, sub-baccalaureate certificates to associate degrees, were positive and statistically significant. In contrast to the tenets of human capital theory, in my study the results for certificate holders and associate degree graduates indicated that respondents with these credentials were seeking, but do not have the economic benefit of full-time employment.

The high levels of involuntary underemployment associated with sub-baccalaureate credentials in my study confirms the findings of Roth (2019), who found that graduates with sub-baccalaureate credentials experienced problems obtaining good paying full-time jobs. For example, In the school year 2015-2016, one million graduates received associate degrees and 2.9 million graduates received a bachelor's degree or higher (Roth, 2019). However, in 2016 , the year of the ATES survey, only 2.6 million jobs were created. Therefore, the one million associate degree graduates competed with the 2.9 million graduates receiving bachelor's degrees or higher for employment opportunities. According to Roth, the oversupply of graduates creates the economic environment for underemployment. The competition for available jobs forces many graduates to accept part-time employment. Although my study focused on sub-baccalaureate credentials, the involuntarily underemployed respondents with sub-

baccalaureate credentials in the ATES 2016 survey and the sample analyzed in my study most likely competed with bachelor and advanced degree graduates who were seeking employment and willing to accept employment below their level of training.

Limitations of the Study

My study used archival data from the nationally representative sample that responded to the ATES 2016 survey. Based on the representative nature of the sample, one of the goals of my study was to produce results that were generalizable to a larger population. However, out of the 11 predictor variables (two independent variables and nine covariates), six produced results that were positive but not statistically significant. A random sample of 583 cases was drawn from a sample of 1675 respondents who responded to the two questions on underemployment that related to my study. However, the lack of statistical significance for six of the 11 predictor variables means that the findings for these variables are not generalizable to a larger population.

Another limitation in my study is using Nagelkerke R^2 to evaluate whether logistic regression is a good fit for analyzing the data in my study. Typically, Cox and Snell R^2 and Nagelkerke R^2 values are used to evaluate whether the independent variable correlates with the continuous dependent variable. And, as Knapp (2018) explained, there is no perfect R^2 value for logistic regression but Naglelkerke R^2 is considered the preferred value. Based on the lack of consistency between the Cox and Snell R^2 and Nagelkerke R^2 values, some researchers debate the value of reporting the R^2 value for logistic regression (Knapp, 2018). The lack of consistency does not present a major limitation to using logistic regression for analysis because testing whether a proposed

study meets or violates the 5-7 assumptions related to using logistic regression provides an alternative means to evaluate the appropriateness of logistic regression for a particular study.

Recommendations

Underemployment is a social problem in the United States. The literature reviewed for this study, as well as the data analyzed from the ATES survey for my study, indicated that underemployment is an issue at the sub-baccalaureate certificate and associate degree levels. Future administration of the ATES survey has been discontinued. However, one area for future research is to replicate my study using the National Training, Education, and Workforce Survey (NTEWS), a new instrument currently under development by the National Center for Educational Statistics (NCES) and the National Center for Science and Engineering statistics. The NTEWS survey will collect data from respondents who work in STEM fields (science and engineering) but who do not have a bachelor's degree or higher (Skilled Technical Workforce, 2020). My study did not produce statistically significant results for the association between involuntary underemployment and STEM fields. Future studies may produce statistically significant results and generalizable results for STEM fields using the NTEWS survey thereby strengthening the understanding of the relationship between STEM fields and involuntary underemployment.

Another recommendation is that this study be conducted as a mixed-methods study using interviews (telephone or in-person) or focus groups to provide more detail to the answers provided by respondents on the ATES 2016 survey. The ATES 2016 survey,

the data used for my study, asked the respondent if they were working part-time and preferred full-time or if they were working a temporary position and preferred a permanent position. A yes answer to either or both questions, in my study as well as the ATES 2016 study, meant that the respondent was classified as involuntarily underemployed. Conversely, respondents who answered no to either or both questions were classified as voluntarily underemployed. The dichotomous nature of the dependent variable makes logistic regression a good fit for my study. Future research can build upon this design by interviewing respondent to obtain details on why they chose voluntary underemployment.

My findings for African American graduates and involuntary underemployment were positive but not significant. Supplementing the archival data on African Americans analyzed in my study with individual interviews or focus groups would help to clarify whether African Americans with sub-baccalaureate credentials are disproportionately impacted by involuntary underemployment. Additionally, a mixed method approach could provide more details on the experiences of the Asian, Hispanics, and other/mixed race respondents.

Young and Mattingly (2016) reported that education reduced the levels of involuntary part-time underemployment for Hispanics. In contrast, my findings showed that sub-baccalaureate certificates and associate degrees were associated were associated with involuntary underemployment for Hispanics. Specifically, Hispanics were the only race/ethnic group in my study with statistically significant results. The statistically significant data for Hispanics in my study is cautiously generalizable to the larger

population of Hispanics and provides a national-level view of the relationship between Hispanics and involuntary underemployment. To get a more complete picture of their involuntary underemployment prospects, I recommend that Hispanics contemplating whether to pursue sub-baccalaureate credentials supplement the national-level data in my study with data on involuntary underemployment for Hispanics at specific community colleges as well as data on underemployment prospects for Hispanics in specific geographic areas.

A mixed methods study would provide more insight on the experiences of male and female respondents. The results of my study indicated that men are more likely to fall into the target category of involuntary underemployment in comparison go women. Interviews with women respondents could be used to examine the reasons why women are more likely than men to fall into the voluntary underemployed category. According to Pedulla and Thebaud (2015) structural barriers to employment overlap with societal and cultural preferences to influence the employment outcomes for women. Interview questions could provide insight on whether more women respondents would seek full-time employment if structural barriers were removed.

Community college advisors may find the results of my study helpful when advising students. In response to prospective students' or enrolled students' questions about post-graduation employment outcomes, advisors may discuss data on underemployment as well as the traditional data. Community college leaders may also consult data on underemployment as well as earnings when making decisions related to planning, designing, and funding programs of study to prepare students for post-

graduation employment. Additionally, although six of the predictor variables were not statistically significant, future researchers may be interested in replicating this study to determine if their findings confirm or disconfirm the findings of my study.

Implications

This study filled a gap in the literature by examining underemployment in terms of full-time versus part-time status as well as temporary versus permanent employment rather than focusing on wages. Studies focusing only on wages do not reflect an accurate assessment of employment because graduates who are working and reporting wages may be involuntarily underemployed. The results of my study have the potential to affect positive social change at the individual student level, the community college leadership level, and the political/governmental leadership level. For students who purse sub-baccalaureate credentials primarily to obtain employment, accurate and timely data on the association between sub-baccalaureate credential and underemployment may assist to inform decisions about whether to attend community college as well as what types of credentials to pursue.

At the community college level, the available data on underemployment has implications for the type of career advice provided to students. A full discussion on post-graduation employment outcomes should include information on the likelihood of underemployment as well as expected average earnings. Also, at the community college level, apprenticeships and college/business partnerships could be strengthened to lessen the impact of underemployment on graduates with sub-baccalaureate credentials. For example, several researchers reported a link between college/business partnerships or

apprenticeships and increased wages (D'Amico, 2017; Graham, 2018; Jacoby, 2018; Kuehn, 2019). Community college leaders can build upon the findings of D'Amico, Graham, and Jacoby and examine the issue of underemployment for graduates by surveying graduates with sub-baccalaureate credentials to determine if the graduates are working full-time, working part-time but seeking full-time or voluntarily working part-time. This type of survey, similar to the ATES 2016 survey as well as the data analyzed in my study, could help improve on the monitoring of apprenticeships and college/business partnerships and connect career-oriented students with career paths that lead to full-time employment.

In line with the tenets of human capital theory, many politicians and government leaders link community college credentials to access to the economic benefits of the American dream. President Biden's proposal, known as The American Rescue Plan, has several features that are aligned with research that help shape the future of higher education in general and community college in particular. As pertaining to the elimination of structural barriers for women, President Biden's proposal acknowledges that women, in comparison to men, are more adversely affected by the lack of adequate childcare when pursuing employment opportunities. Biden's proposal asks for congressional support to appropriate $25 billion to upgrade and increase childcare for areas with the greatest need in the United States. Biden's rescue plan also seeks for congress to invest $48 billion dollars in apprenticeship and community college partnerships. One of the goals of these programs is to assist women and people of color to obtain STEM careers or other well-paying jobs (American Jobs, 2021).

President Biden's proposal to address unemployment and underemployment for women by providing childcare aligns with the findings in my study as well as the findings in current literature. The data in my study indicated that women are more likely than men to be voluntarily underemployed. Similarly, President Biden's proposal aligns with the findings in (Pedulla & Thebaud, 2015 and Pedulla (2016). The findings in these studies indicated that when presented with less constraints, such as family friendly work environments, most women prefer to work more hours or full-time hours. The implication for positive social change is that government policy and practice, guided by accurate research, can improve the employment outcomes and overall quality of life for Americans in general as well as for graduates with sub-baccalaureate credentials and college degrees.

Conclusion

The purpose of this study was to determine whether educational attainment predicts post-graduation involuntary underemployment and voluntary underemployment for sub-baccalaureate certificate holders and associate degree holders. My study found a positive and statistically significant association between sub-baccalaureate credentials and involuntary underemployment. These findings are relevant because sub-baccalaureate credentials are a popular educational option for students at the community college level.

Current research indicates that underemployment is a social problem for graduates with sub-baccalaureate credentials. My study confirmed the findings of the few scholarly peer-reviewed studies on involuntary underemployment. These findings contrast with the

human capital theory, which states that students invest in educational credentials to obtain the economic benefits associated with those credentials. The findings in my study can cautiously be used to inform positive social change and the decisions of students, community college leaders, politicians, and governmental leaders who are concerned the return on investment for students who consider advancing their education and improving their post-graduation employment outcomes through sub-baccalaureate programs.

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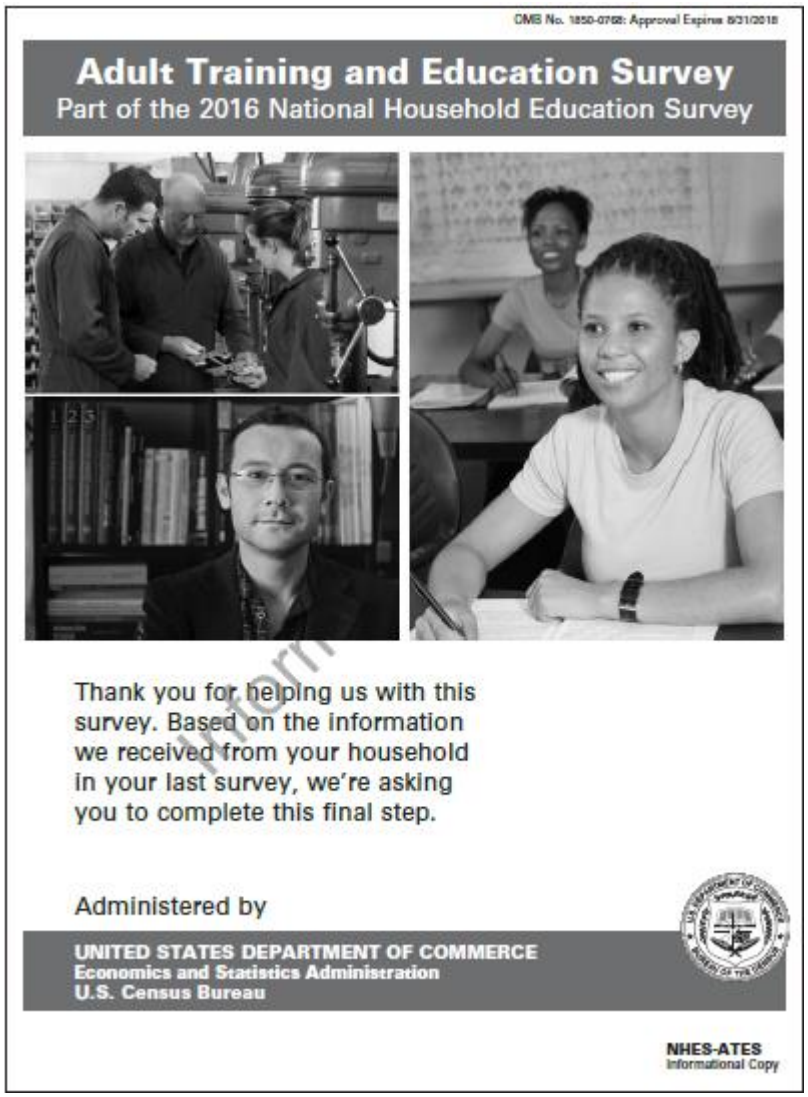
Appendix A: ATES 2016 Survey



OMB No. 1850-0768: Approval Expires 8/31/2018

Adult Training and Education Survey
Part of the 2016 National Household Education Survey

Thank you for helping us with this survey. Based on the information we received from your household in your last survey, we're asking you to complete this final step.

Administered by

UNITED STATES DEPARTMENT OF COMMERCE
Economics and Statistics Administration
U.S. Census Bureau

NHES-ATES
Informational Copy

Instructions

- In response to the survey you answered earlier, we recorded that the person listed below is between the ages of 16 to 65, is not in high school, and lives in this household. If this information is not correct, please call us toll-free at 1-888-840-8353 to let us know.
- These questions should be filled out by:

  No one else in the household should fill out the survey.
- To answer a question, simply mark ☒ the box that best represents your answer.
- Please use a black or blue pen, if available, to complete this survey.
- Please return the completed survey using the postage-paid envelope provided.

The National Center for Education Statistics (NCES), within the U.S. Department of Education, is authorized to conduct this study by the Education Sciences Reform Act of 2002 (ESRA 2002; 20 USC § 9543). The U.S. Census Bureau is administering this survey on behalf of NCES. You do not have to provide the information requested. However, the information you provide will help the Department of Education's ongoing efforts to learn more about the educational experiences of children and families. There are no penalties should you choose not to participate in this study. Your answers may be used only for statistical purposes and may not be disclosed, or used, in identifiable form for any other purpose except as required by law (20 USC § 9573). Your responses will be combined with those from other participants to produce summary statistics and reports.

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this voluntary survey is 1850-0768. The time required to complete this survey is estimated to average 10 minutes per response, including the time to review instructions, gather the data needed, and complete and review the survey. If you have any comments concerning the accuracy of the time estimate, suggestions for improving this survey, or any comments or concerns regarding the status of your individual submission of this survey, please write to: Sarah Grady, National Household Education Survey, National Center for Education Statistics, 1990 K Street, NW, Room 9016, Washington, DC 20006. Do not return the completed form to this address. You may send email to NHES@census.gov. If you have any questions about the study, contact the Census Bureau toll-free at 1-888-840-8353.

Education

1. What is the highest degree or level of school you have completed?

Mark [X] ONE only. EDUATTN

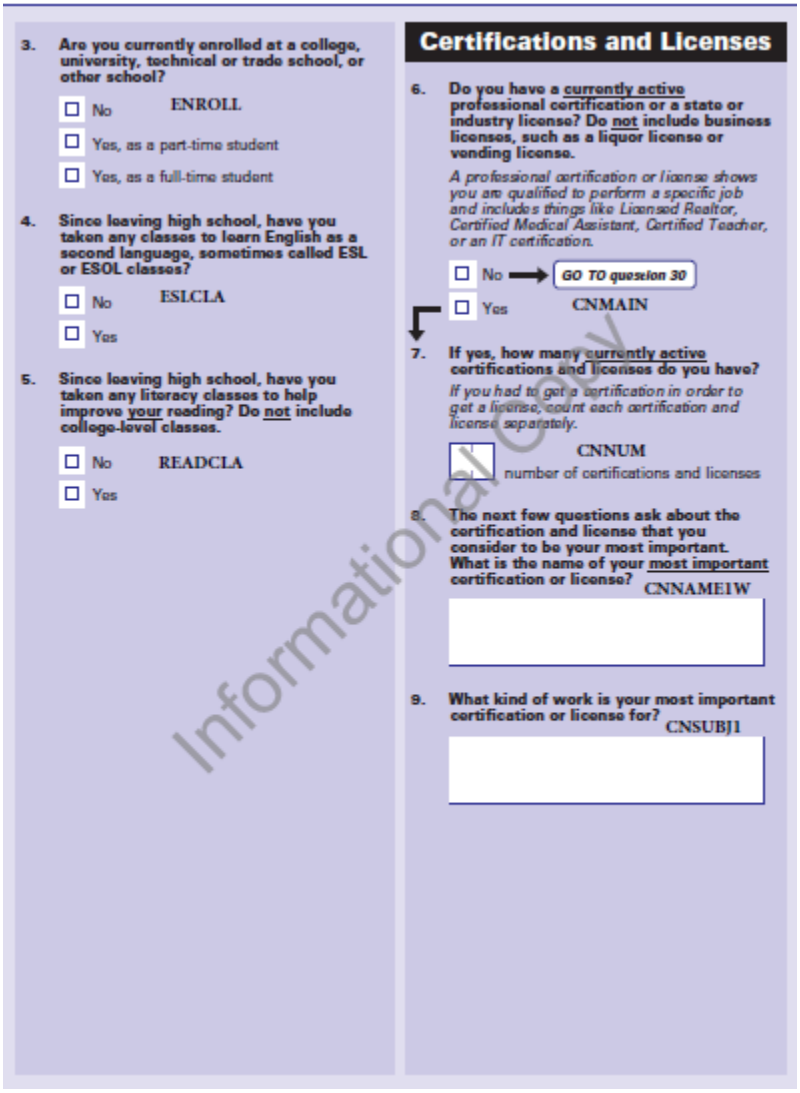
- ☐ Elementary or high school, but no high school diploma or GED®
- ☐ High school diploma
- ☐ GED® or alternative high school credential
- ☐ Some college credit but less than one year of college credit
- ☐ 1 or more years of college credit, no degree
- ☐ Associate's degree (for example, AA, AS)
- ☐ Bachelor's degree (for example, BA, BS)
- ☐ Master's degree (for example, MA, MS, MEng, MEd, MSW, MBA)
- ☐ Professional degree beyond a bachelor's degree (for example, MD, DDS, DVM, LLB, JD)
- ☐ Doctorate degree (for example, PhD, EdD)

2. Which one of the following best describes the field of study for the highest level of school you have completed?

Mark [X] ONE only. EDUFOS

If there was more than one, please choose the one you consider most important.

- ☐ General studies, no major, or undeclared major
- ☐ Accounting, finance, insurance, or real estate
- ☐ Administrative support
- ☐ Agriculture
- ☐ Audio, broadcasting, multimedia, or graphic technologies
- ☐ Business management, administration, or marketing
- ☐ Communications or journalism
- ☐ Computer science or information technology
- ☐ Construction, repair, manufacturing, or transportation
- ☐ Cosmetology
- ☐ Education
- ☐ Engineering or architecture
- ☐ English language or literature
- ☐ Fine arts or music
- ☐ Healthcare
- ☐ Law or legal studies
- ☐ Law enforcement, security, or firefighting
- ☐ Liberal arts
- ☐ Psychology
- ☐ Religious vocations or theology
- ☐ Science or mathematics
- ☐ Social or human services or public administration
- ☐ Social sciences, political science, economics, or history
- ☐ Other — Specify: EDUFOSOS



3. **Are you currently enrolled at a college, university, technical or trade school, or other school?**

- ☐ No — ENROLL
- ☐ Yes, as a part-time student
- ☐ Yes, as a full-time student

4. **Since leaving high school, have you taken any classes to learn English as a second language, sometimes called ESL or ESOL classes?**

- ☐ No — ESLCLA
- ☐ Yes

5. **Since leaving high school, have you taken any literacy classes to help improve your reading? Do not include college-level classes.**

- ☐ No — READCLA
- ☐ Yes

Certifications and Licenses

6. **Do you have a currently active professional certification or a state or industry license? Do not include business licenses, such as a liquor license or vending license.**

A professional certification or license shows you are qualified to perform a specific job and includes things like Licensed Realtor, Certified Medical Assistant, Certified Teacher, or an IT certification.

- ☐ No → GO TO question 30
- ☐ Yes — CNMAIN

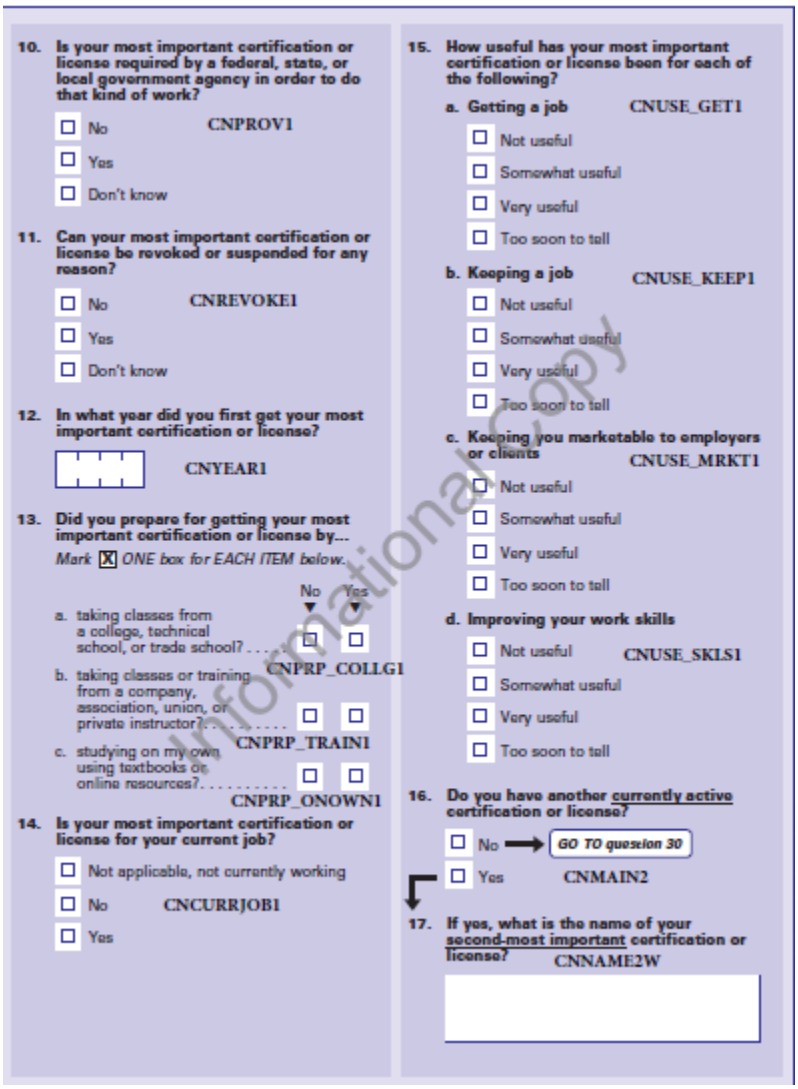
7. **If yes, how many currently active certifications and licenses do you have?**

If you had to get a certification in order to get a license, count each certification and license separately.

__ __ — CNNUM
number of certifications and licenses

8. **The next few questions ask about the certification and license that you consider to be your most important. What is the name of your most important certification or license?** CNNAME1W

9. **What kind of work is your most important certification or license for?** CNSUBJ1



10. Is your most important certification or license required by a federal, state, or local government agency in order to do that kind of work?

- ☐ No — CNPROV1
- ☐ Yes
- ☐ Don't know

11. Can your most important certification or license be revoked or suspended for any reason?

- ☐ No — CNREVOKE1
- ☐ Yes
- ☐ Don't know

12. In what year did you first get your most important certification or license?

☐☐☐☐ — CNYEAR1

13. Did you prepare for getting your most important certification or license by...

Mark [X] ONE box for EACH ITEM below.

	No	Yes	
a. taking classes from a college, technical school, or trade school?	☐	☐	CNPRP_COLLG1
b. taking classes or training from a company, association, union, or private instructor?	☐	☐	CNPRP_TRAIN1
c. studying on my own using textbooks or online resources?	☐	☐	CNPRP_ONOWN1

14. Is your most important certification or license for your current job?

- ☐ Not applicable, not currently working
- ☐ No — CNCURRJOB1
- ☐ Yes

15. How useful has your most important certification or license been for each of the following?

a. Getting a job — CNUSE_GET1
- ☐ Not useful
- ☐ Somewhat useful
- ☐ Very useful
- ☐ Too soon to tell

b. Keeping a job — CNUSE_KEEP1
- ☐ Not useful
- ☐ Somewhat useful
- ☐ Very useful
- ☐ Too soon to tell

c. Keeping you marketable to employers or clients — CNUSE_MRKT1
- ☐ Not useful
- ☐ Somewhat useful
- ☐ Very useful
- ☐ Too soon to tell

d. Improving your work skills — CNUSE_SKLS1
- ☐ Not useful
- ☐ Somewhat useful
- ☐ Very useful
- ☐ Too soon to tell

16. Do you have another currently active certification or license?

- ☐ No → *GO TO question 30*
- ☐ Yes — CNMAIN2

17. If yes, what is the name of your second-most important certification or license? — CNNAME2W

18. What kind of work is your second-most important certification or license for?

CNSUBJ2

19. Is your second-most important certification or license required by a federal, state, or local government agency in order to do that kind of work?

- ☐ No — CNPROV2
- ☐ Yes
- ☐ Don't know

20. Can your second-most important certification or license be revoked or suspended for any reason?

- ☐ No — CNREVOKE2
- ☐ Yes
- ☐ Don't know

21. In what year did you first get your second-most important certification or license?

☐☐☐☐ CNYEAR2

22. Did you prepare for getting your second-most important certification or license by...

Mark [X] ONE box for EACH ITEM below.

	No ▼	Yes ▼	
a. taking classes from a college, technical school, or trade school?	☐	☐	CNPRP_COLLG2
b. taking classes or training from a company, association, union, or private instructor?	☐	☐	CNPRP_TRAIN2
c. studying on my own using textbooks or online resources?	☐	☐	CNPRP_ONOWN2

23. Is your second-most important certification or license for your current job? CNCURRJOB2

- ☐ Not applicable, not currently working
- ☐ No
- ☐ Yes

24. How useful has your second-most important certification or license been for each of the following?

a. Getting a job CNUSE_GET2

- ☐ Not useful
- ☐ Somewhat useful
- ☐ Very useful
- ☐ Too soon to tell

b. Keeping a job CNUSE_KEEP2

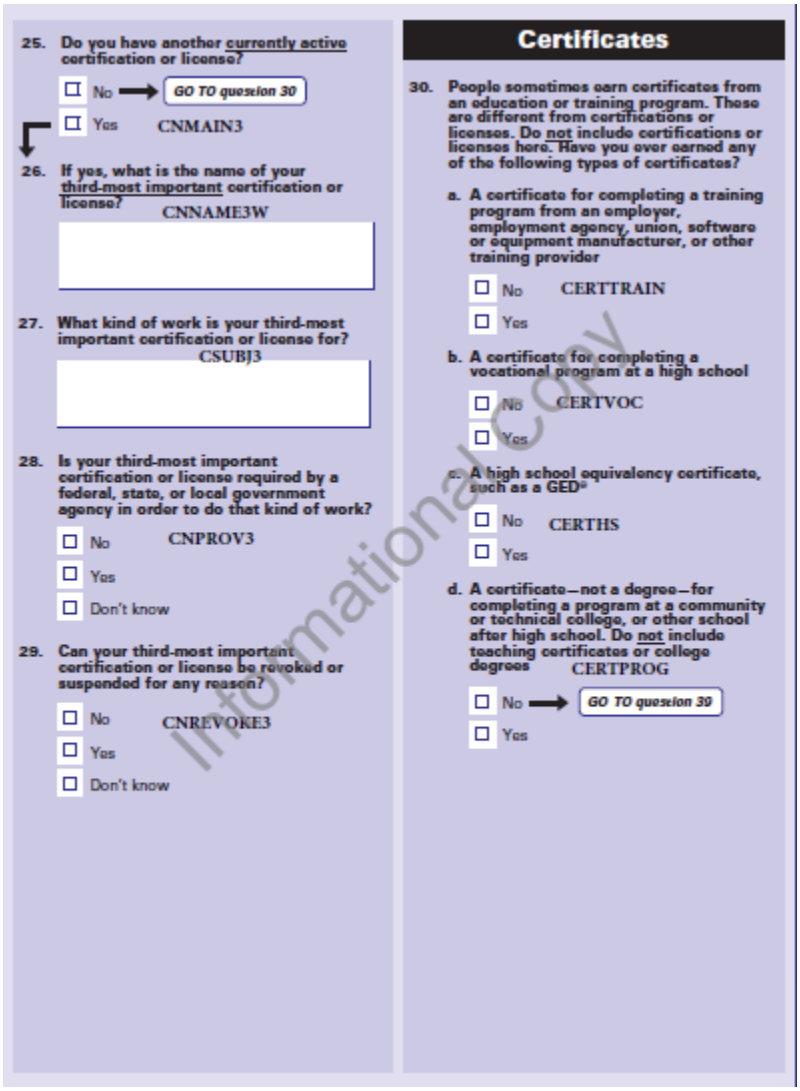
- ☐ Not useful
- ☐ Somewhat useful
- ☐ Very useful
- ☐ Too soon to tell

c. Keeping you marketable to employers or clients CNUSE_MRKT2

- ☐ Not useful
- ☐ Somewhat useful
- ☐ Very useful
- ☐ Too soon to tell

d. Improving your work skills

- ☐ Not useful — CNUSE_SKLS2
- ☐ Somewhat useful
- ☐ Very useful
- ☐ Too soon to tell



25. Do you have another currently active certification or license?

☐ No → GO TO question 30

☐ Yes CNMAIN3

26. If yes, what is the name of your third-most important certification or license?

CNNAME3W

27. What kind of work is your third-most important certification or license for?

CSUBJ3

28. Is your third-most important certification or license required by a federal, state, or local government agency in order to do that kind of work?

☐ No CNPROV3

☐ Yes

☐ Don't know

29. Can your third-most important certification or license be revoked or suspended for any reason?

☐ No CNREVOKE3

☐ Yes

☐ Don't know

Certificates

30. People sometimes earn certificates from an education or training program. These are different from certifications or licenses. Do not include certifications or licenses here. Have you ever earned any of the following types of certificates?

a. A certificate for completing a training program from an employer, employment agency, union, software or equipment manufacturer, or other training provider

☐ No CERTTRAIN

☐ Yes

b. A certificate for completing a vocational program at a high school

☐ No CERTVOC

☐ Yes

c. A high school equivalency certificate, such as a GED®

☐ No CERTHS

☐ Yes

d. A certificate—not a degree—for completing a program at a community or technical college, or other school after high school. Do not include teaching certificates or college degrees CERTPROG

☐ No → GO TO question 39

☐ Yes

31. If yes: We will refer to the certificates in question 30d as "post-secondary certificates." What was the field of study for your last post-secondary certificate?

Mark [X] ONE only. PSFOS

- ☐ Accounting, finance, insurance, or real estate
- ☐ Administrative support
- ☐ Agriculture
- ☐ Audio, broadcasting, multimedia, or graphic technologies
- ☐ Business management, administration, or marketing
- ☐ Computer science or information technology
- ☐ Construction trades
- ☐ Cosmetology
- ☐ Culinary arts
- ☐ Education
- ☐ Engineering technologies or drafting
- ☐ Fine arts or music
- ☐ Funeral service or mortuary science
- ☐ Healthcare
- ☐ Law enforcement, security, or firefighting
- ☐ Law or legal studies
- ☐ Liberal arts
- ☐ Manufacturing or production (for example machinist, welder, boilermaker)
- ☐ Mechanic or repair technologies
- ☐ Transportation
- ☐ Other - Specify: PSFOSOS

32. Who gave you your last post-secondary certificate?

Mark [X] ONE only. LASTPSCER

- ☐ A community college
- ☐ A vocational, technical, trade, or business school
- ☐ Another college or university
- ☐ Someplace else -- Specify:

LASTPSCEROS

33. About how many hours of instruction did you complete in order to earn your last post-secondary certificate?

- ☐ 960 hours (1 full-time school year) or more
- ☐ 480 hours (half a full-time school year) to 959 hours
- ☐ 160 to 479 hours
- ☐ 40-159 hours
- ☐ Less than 40 hours

LCHOURS

34. Which one of the following was required for enrolling in your last post-secondary certificate program?

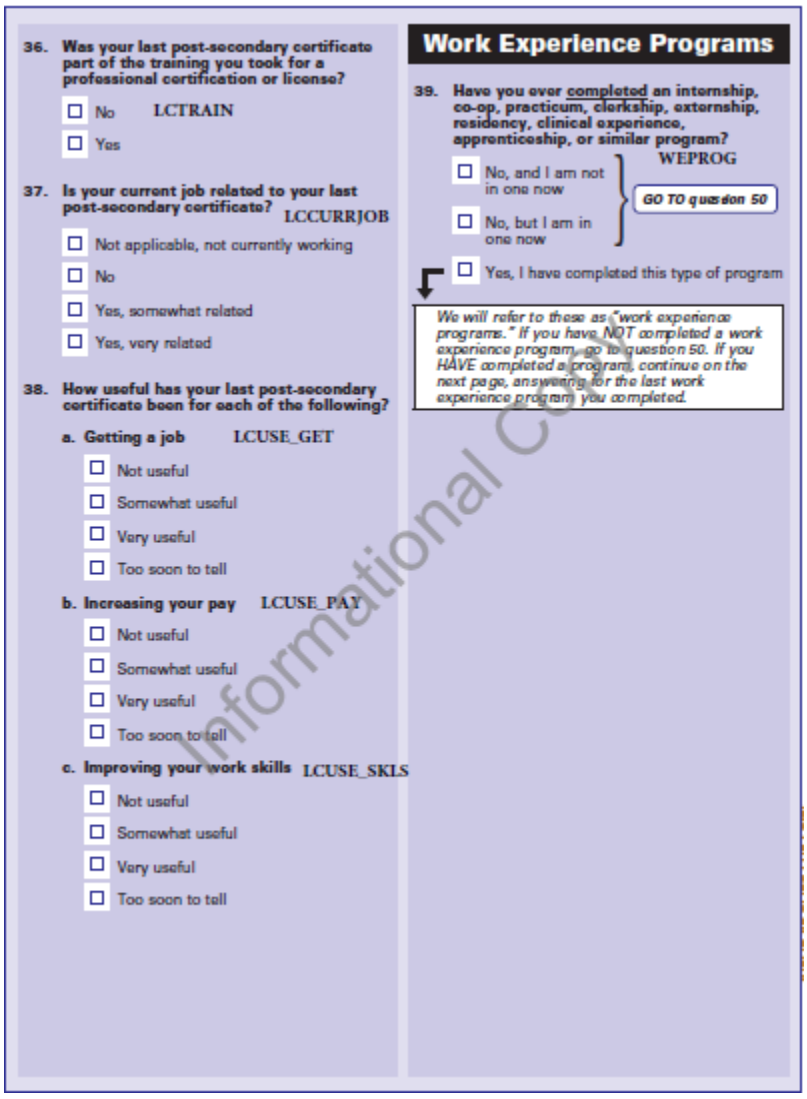
Mark [X] ONE only. LCENROLL

- ☐ Being enrolled in or having completed an advanced degree program (Master's or higher)
- ☐ Being enrolled in or having completed a Bachelor's degree program
- ☐ Having completed high school or a high school equivalency (such as a GED®)
- ☐ None of the above

35. To earn your last post-secondary certificate did you have to complete...

Mark [X] ONE box for EACH ITEM below.

	No ▼	Yes ▼
a. a minimum number of credits?	☐	☐
	LCRED	
b. a minimum number of instructional hours?	☐	☐
	LCINHRS	



36. **Was your last post-secondary certificate part of the training you took for a professional certification or license?** LCTRAIN

- ☐ No
- ☐ Yes

37. **Is your current job related to your last post-secondary certificate?** LCCURRJOB

- ☐ Not applicable, not currently working
- ☐ No
- ☐ Yes, somewhat related
- ☐ Yes, very related

38. **How useful has your last post-secondary certificate been for each of the following?**

a. **Getting a job** LCUSE_GET

- ☐ Not useful
- ☐ Somewhat useful
- ☐ Very useful
- ☐ Too soon to tell

b. **Increasing your pay** LCUSE_PAY

- ☐ Not useful
- ☐ Somewhat useful
- ☐ Very useful
- ☐ Too soon to tell

c. **Improving your work skills** LCUSE_SKLS

- ☐ Not useful
- ☐ Somewhat useful
- ☐ Very useful
- ☐ Too soon to tell

Work Experience Programs

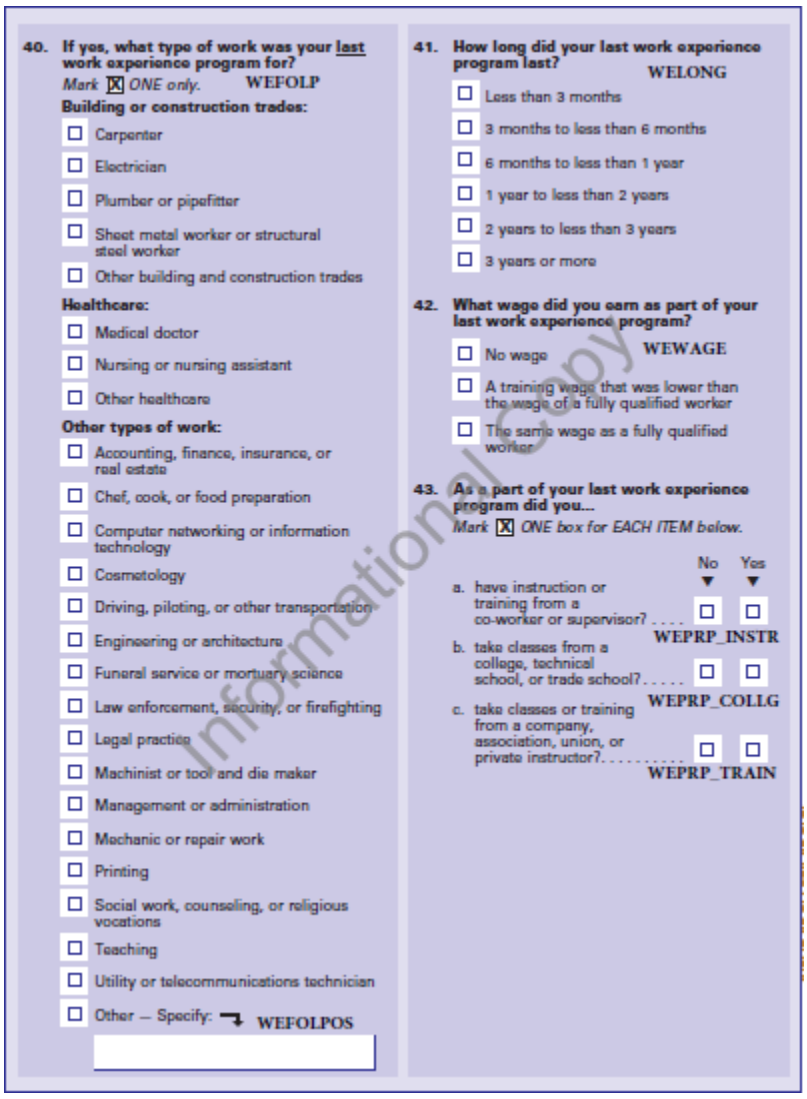
39. **Have you ever completed an internship, co-op, practicum, clerkship, externship, residency, clinical experience, apprenticeship, or similar program?** WEPROG

- ☐ No, and I am not in one now
- ☐ No, but I am in one now

→ *GO TO question 50*

- ☐ Yes, I have completed this type of program

We will refer to these as "work experience programs." If you have NOT completed a work experience program, go to question 50. If you HAVE completed a program, continue on the next page, answering for the last work experience program you completed.



40. If yes, what type of work was your last work experience program for?

Mark [X] ONE only. WEFOLP

Building or construction trades:

- ☐ Carpenter
- ☐ Electrician
- ☐ Plumber or pipefitter
- ☐ Sheet metal worker or structural steel worker
- ☐ Other building and construction trades

Healthcare:

- ☐ Medical doctor
- ☐ Nursing or nursing assistant
- ☐ Other healthcare

Other types of work:

- ☐ Accounting, finance, insurance, or real estate
- ☐ Chef, cook, or food preparation
- ☐ Computer networking or information technology
- ☐ Cosmetology
- ☐ Driving, piloting, or other transportation
- ☐ Engineering or architecture
- ☐ Funeral service or mortuary science
- ☐ Law enforcement, security, or firefighting
- ☐ Legal practice
- ☐ Machinist or tool and die maker
- ☐ Management or administration
- ☐ Mechanic or repair work
- ☐ Printing
- ☐ Social work, counseling, or religious vocations
- ☐ Teaching
- ☐ Utility or telecommunications technician
- ☐ Other – Specify: → WEFOLPOS

41. How long did your last work experience program last? WELONG

- ☐ Less than 3 months
- ☐ 3 months to less than 6 months
- ☐ 6 months to less than 1 year
- ☐ 1 year to less than 2 years
- ☐ 2 years to less than 3 years
- ☐ 3 years or more

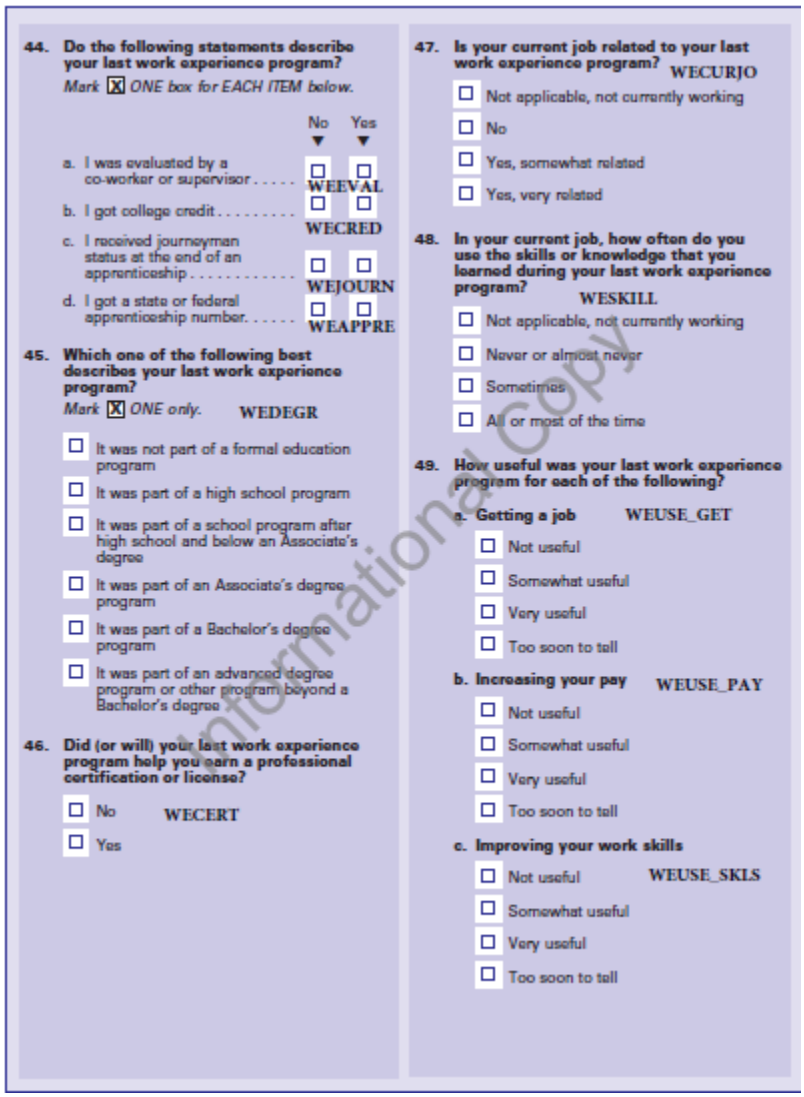
42. What wage did you earn as part of your last work experience program?

- ☐ No wage WEWAGE
- ☐ A training wage that was lower than the wage of a fully qualified worker
- ☐ The same wage as a fully qualified worker

43. As a part of your last work experience program did you...

Mark [X] ONE box for EACH ITEM below.

	No ▼	Yes ▼
a. have instruction or training from a co-worker or supervisor? WEPRP_INSTR	☐	☐
b. take classes from a college, technical school, or trade school? WEPRP_COLLG	☐	☐
c. take classes or training from a company, association, union, or private instructor? WEPRP_TRAIN	☐	☐



44. Do the following statements describe your last work experience program?

Mark [X] ONE box for EACH ITEM below.

	No	Yes
a. I was evaluated by a co-worker or supervisor	☐	☐ WEEVAL
b. I got college credit	☐	☐ WECRED
c. I received journeyman status at the end of an apprenticeship	☐	☐ WEJOURN
d. I got a state or federal apprenticeship number	☐	☐ WEAPPRE

45. Which one of the following best describes your last work experience program?

Mark [X] ONE only. WEDEGR

- ☐ It was not part of a formal education program
- ☐ It was part of a high school program
- ☐ It was part of a school program after high school and below an Associate's degree
- ☐ It was part of an Associate's degree program
- ☐ It was part of a Bachelor's degree program
- ☐ It was part of an advanced degree program or other program beyond a Bachelor's degree

46. Did (or will) your last work experience program help you earn a professional certification or license?

- ☐ No WECERT
- ☐ Yes

47. Is your current job related to your last work experience program? WECURJO

- ☐ Not applicable, not currently working
- ☐ No
- ☐ Yes, somewhat related
- ☐ Yes, very related

48. In your current job, how often do you use the skills or knowledge that you learned during your last work experience program? WESKILL

- ☐ Not applicable, not currently working
- ☐ Never or almost never
- ☐ Sometimes
- ☐ All or most of the time

49. How useful was your last work experience program for each of the following?

a. Getting a job WEUSE_GET

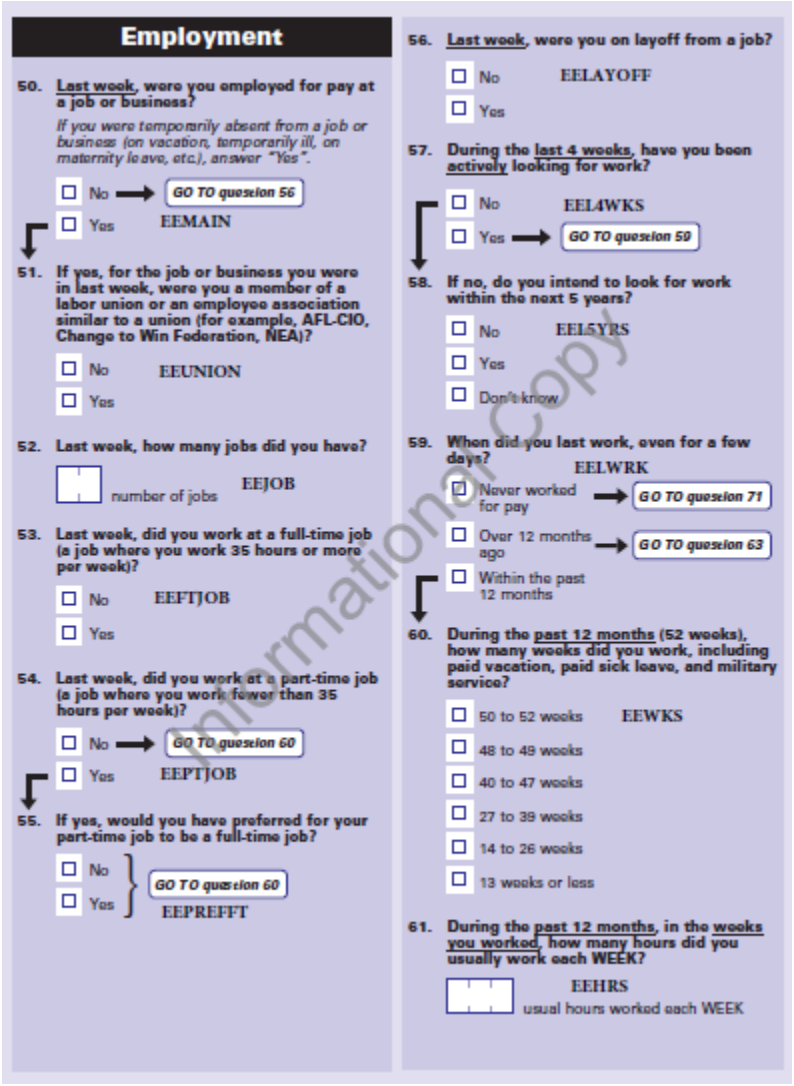
- ☐ Not useful
- ☐ Somewhat useful
- ☐ Very useful
- ☐ Too soon to tell

b. Increasing your pay WEUSE_PAY

- ☐ Not useful
- ☐ Somewhat useful
- ☐ Very useful
- ☐ Too soon to tell

c. Improving your work skills

- ☐ Not useful WEUSE_SKLS
- ☐ Somewhat useful
- ☐ Very useful
- ☐ Too soon to tell



Employment

50. Last week, were you employed for pay at a job or business?

If you were temporarily absent from a job or business (on vacation, temporarily ill, on maternity leave, etc.), answer "Yes".

- ☐ No → *GO TO question 56*
- ☐ Yes — EEMAIN

51. If yes, for the job or business you were in last week, were you a member of a labor union or an employee association similar to a union (for example, AFL-CIO, Change to Win Federation, NEA)?

- ☐ No — EEUNION
- ☐ Yes

52. Last week, how many jobs did you have?

☐ number of jobs — EEJOB

53. Last week, did you work at a full-time job (a job where you work 35 hours or more per week)?

- ☐ No — EEFTJOB
- ☐ Yes

54. Last week, did you work at a part-time job (a job where you work fewer than 35 hours per week)?

- ☐ No → *GO TO question 60*
- ☐ Yes — EEPTJOB

55. If yes, would you have preferred for your part-time job to be a full-time job?

- ☐ No
- ☐ Yes

GO TO question 60 — EEPREFFT

56. Last week, were you on layoff from a job?

- ☐ No — EELAYOFF
- ☐ Yes

57. During the last 4 weeks, have you been actively looking for work?

- ☐ No — EEL4WKS
- ☐ Yes → *GO TO question 59*

58. If no, do you intend to look for work within the next 5 years?

- ☐ No — EEL5YRS
- ☐ Yes
- ☐ Don't know

59. When did you last work, even for a few days? — EELWRK

- ☐ Never worked for pay → *GO TO question 71*
- ☐ Over 12 months ago → *GO TO question 63*
- ☐ Within the past 12 months

60. During the past 12 months (52 weeks), how many weeks did you work, including paid vacation, paid sick leave, and military service? — EEWKS

- ☐ 50 to 52 weeks
- ☐ 48 to 49 weeks
- ☐ 40 to 47 weeks
- ☐ 27 to 39 weeks
- ☐ 14 to 26 weeks
- ☐ 13 weeks or less

61. During the past 12 months, in the weeks you worked, how many hours did you usually work each WEEK?

☐ usual hours worked each WEEK — EEHRS

62. Which category best fits your earnings from wages, salary, commissions, bonuses, or tips, from all jobs over the past 12 months?

Report amount before deductions for taxes, bonds, dues, or other items.

- ☐ $0 to $10,000 EEEARN
- ☐ $10,001 to $20,000
- ☐ $20,001 to $30,000
- ☐ $30,001 to $40,000
- ☐ $40,001 to $50,000
- ☐ $50,001 to $60,000
- ☐ $60,001 to $75,000
- ☐ $75,001 to $150,000
- ☐ $150,001 or more

63. The next few questions ask about your current or last job. If you had more than one job, describe the one at which you worked the most hours. In your current or last job, for whom did you work? EEWHOA

- ☐ *If now on active duty in the Armed Forces, mark (X) this box and print the branch of the Armed Forces below.*

Name of company, business, or other employer

EECOMP

64. What kind of business or industry was this?

(For example: hospital, newspaper publishing, mail order house, auto engine manufacturing, bank)

EEWHOW

65. Which one of the following were you? EEEMPLO

- ☐ An employee of a private company, business, or individual, for wages, salary, or commission
- ☐ A local (city, county, etc.), state, or federal government employee
- ☐ Self-employed in own business, professional practice, or farm
- ☐ Working without pay for family business or farm

66. What kind of work were you doing?

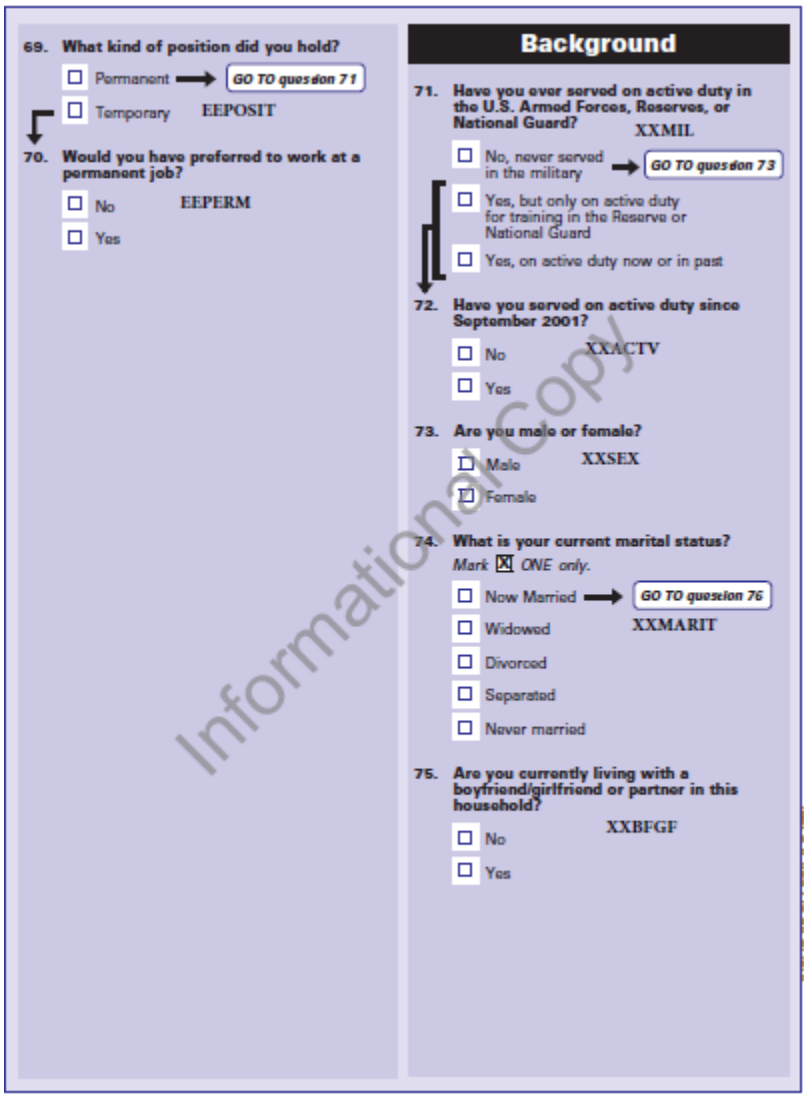
(For example: registered nurse, personnel manager, supervisor of order department, secretary, accountant) EEWRKW

67. What were your most important activities or duties?

(For example: patient care, directing hiring policies, supervising order clerks, typing and filing, reconciling financial records) EEDUTIESW

68. Did you have a license that was required by a federal, state, or local government agency to do this job?

- ☐ No EELICES
- ☐ Yes



69. **What kind of position did you hold?**

- ☐ Permanent → GO TO question 71
- ☐ Temporary EEPOSIT

70. **Would you have preferred to work at a permanent job?**

- ☐ No EEPERM
- ☐ Yes

Background

71. **Have you ever served on active duty in the U.S. Armed Forces, Reserves, or National Guard?** XXMIL

- ☐ No, never served in the military → GO TO question 73
- ☐ Yes, but only on active duty for training in the Reserve or National Guard
- ☐ Yes, on active duty now or in past

72. **Have you served on active duty since September 2001?**

- ☐ No XXACTV
- ☐ Yes

73. **Are you male or female?**

- ☐ Male XXSEX
- ☐ Female

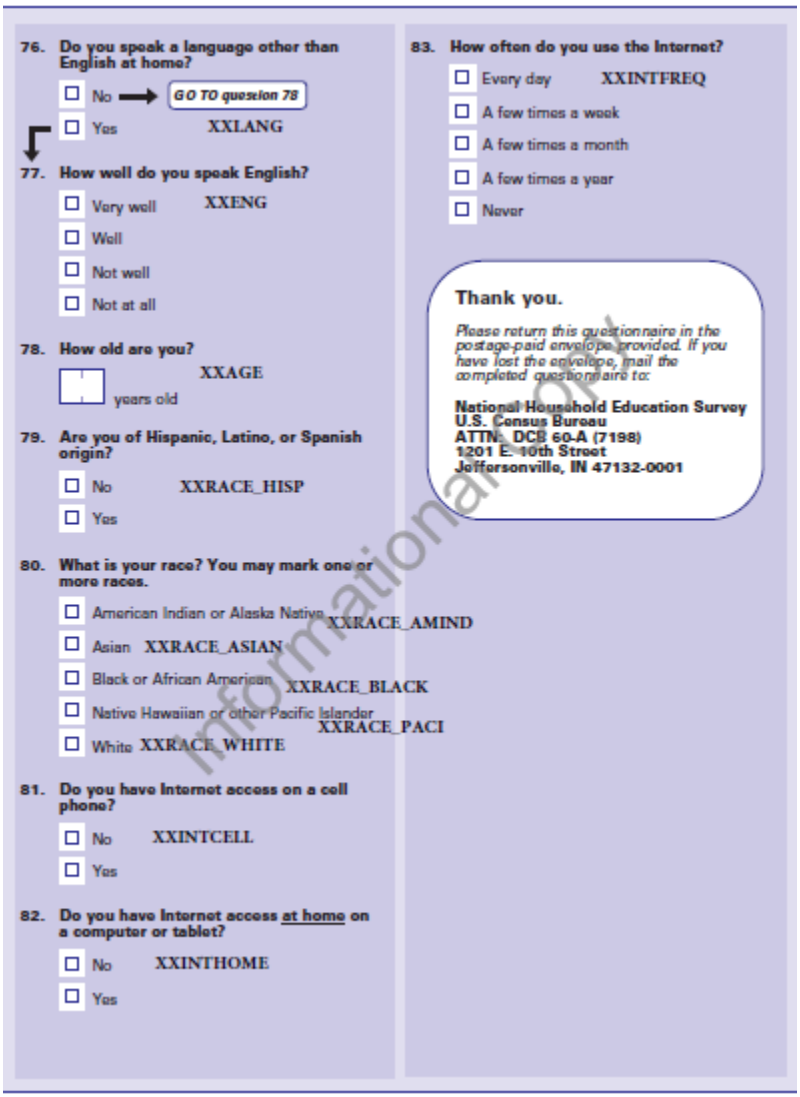
74. **What is your current marital status?**

Mark ☒ ONE only.

- ☐ Now Married → GO TO question 76 XXMARIT
- ☐ Widowed
- ☐ Divorced
- ☐ Separated
- ☐ Never married

75. **Are you currently living with a boyfriend/girlfriend or partner in this household?** XXBFGF

- ☐ No
- ☐ Yes



76. **Do you speak a language other than English at home?**

- ☐ No → *GO TO question 78*
- ☐ Yes XXLANG

77. **How well do you speak English?**

- ☐ Very well XXENG
- ☐ Well
- ☐ Not well
- ☐ Not at all

78. **How old are you?**

☐☐ XXAGE
years old

79. **Are you of Hispanic, Latino, or Spanish origin?**

- ☐ No XXRACE_HISP
- ☐ Yes

80. **What is your race? You may mark one or more races.**

- ☐ American Indian or Alaska Native XXRACE_AMIND
- ☐ Asian XXRACE_ASIAN
- ☐ Black or African American XXRACE_BLACK
- ☐ Native Hawaiian or other Pacific Islander XXRACE_PACI
- ☐ White XXRACE_WHITE

81. **Do you have Internet access on a cell phone?**

- ☐ No XXINTCELL
- ☐ Yes

82. **Do you have Internet access at home on a computer or tablet?**

- ☐ No XXINTHOME
- ☐ Yes

83. **How often do you use the Internet?**

- ☐ Every day XXINTFREQ
- ☐ A few times a week
- ☐ A few times a month
- ☐ A few times a year
- ☐ Never

Thank you.

Please return this questionnaire in the postage-paid envelope provided. If you have lost the envelope, mail the completed questionnaire to:

National Household Education Survey
U.S. Census Bureau
ATTN: DCB 60-A (7198)
1201 E. 10th Street
Jeffersonville, IN 47132-0001

Commonly Asked Questions

Q: How was my household chosen?

A: Your address was randomly selected from among all of the home addresses in the nation. It was selected using scientific sampling methods to represent other U.S. households. The sample was designed so that surveys of only a few thousand people will accurately describe the educational experiences of almost all Americans.

Q: Why should I participate? Do I have to do this?

A: Your answers are very important to the success of this study. You represent thousands of other adults like yourself, and you cannot be replaced. This survey is voluntary. You may choose not to answer any or all questions in this survey, but in order for the survey to be representative, it is important that you complete and return it. Those who do not return the survey will not be represented in statistics used by policymakers and researchers. There are no penalties should you choose not to participate in the study.

Q: Will the information I provide be kept confidential? Will my privacy be protected?

A: Your responses will be combined with those from other adults to produce statistical summaries and reports about education and training in the United States. Your individual data will not be reported. Your answers may be used only for statistical purposes and may not be disclosed, or used, in identifiable form for any other purpose except as required by law (20 USC § 9573).

Q: How will my response help the Department of Education?

A: The U.S. Department of Education wants to understand how adults acquire and maintain the skills they need for work. This survey is the only way our nation can learn about the education and training that adults receive from schools, employers, and other training sponsors. The survey will allow policymakers and researchers to better understand the demand for education and training programs, and can help direct national policy in these areas. Your responses will be combined with those from other households to inform educators, policymakers, and schools about how adults in the U.S. learn the skills needed for work.

Q: Who is sponsoring this study?

A: The National Center for Education Statistics (NCES), within the U.S. Department of Education, is authorized to conduct this study by the Education Sciences Reform Act of 2002 (ESRA 2002; 20 USC § 9543). The U.S. Census Bureau is administering this survey on behalf of NCES. This study has been approved by the Office of Management and Budget (OMB), the office that reviews all federally sponsored surveys.

Q: What if I have other questions?

A: If you have any questions about the study, you may send e-mail to NHES@census.gov or you may call the Census Bureau toll-free at 1-888-840-8353.

NHES ATES

Appendix B: Levels of Attainment

High School Diploma

The high school level of attainment was composed of participants from four groups: (a) participants with a high school diploma; (b) participants with a GED or alternative high school credential; (c) participants with one year or less of college credit; and (d) participants with one or more years of college but no degree or certificate.

Sub-baccalaureate Certificate

The certificate level of attainment was composed of participants from five groups: (a) No high school diploma or GED w/certificate; (b) high school diploma w/certificate; (c) GED or alternative high school credential w/certificate; (d) less than one year of college credit w/certificate; and (e) one or more years of college credit, no degree w/certificate.