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The Decline in U.S. Air Traffic Controllers: A Qualitative Exploration of Current African American Air Traffic Controller Perspectives on Diversity Recruitment in Air Traffic Collegiate Training Initiative Schools

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Abstract

The Federal Aviation Administration's (FAA) Air Traffic Control Specialists (ATCS) workforce has been in steady decline since 2012. The declining number of federal ATCS threatens a $1.5 trillion aviation economy in the United States. The results of fewer controllers are increased delays and cancelled flights (National Air Traffic Controllers Association [NATCA], 2018). Additionally, the controller workforce is predominantly White male (Carey, 2014). Diversity amongst ATCS is another troubling trend for the FAA (McCartin, 2011). According to Outtz and Hanges (2013), an underrepresentation of minorities, including women, exists among the candidates who were hired successfully in the FAA ATCS centralized hiring process. The purpose of this qualitative methods study was to examine the experiences of African American ATCS who studied air traffic control at the collegiate level. Lent and Brown (1996) suggest that an individual's career pursuit is determined by their self-efficacy (SE) and outcome expectation (OE). This study explored the SE and OE of African American ATCS hired through the FAA's Air Traffic Collegiate Training Initiative (AT-CTI) program. Several outcomes were the result of eight semi-structured interviews including high SE and OE that drove the personal goals of obtaining a college degree and becoming an FAA ATCS. This study produced several recommendations including practices the FAA could implement using its Aviation & Space Education Outreach Program (AVSED) to target young African Americans interested in STEM fields to pursue a career in air traffic control (ATC).

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The Decline in U.S. Air Traffic Controllers: A Qualitative Exploration of Current African

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By

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Submitted in partial fulfillment

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Supervised by

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Ralph C. Wilson, Jr. School of Education

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Dedication

This is dedicated to the women in my life whom I love and appreciate. Without you, this would not have been possible. To my grandmother, Carmen Leotta Plante, the matriarch of the family, thank you for being the spirit I carry with me everywhere in my journey. To my mother, Constance Gemma Alleyne, you personify strength and servant leadership. To my wife, Sabrina Suzzana Walcott, this research was not conceivable without your support. To my daughter, Ava Carmen Walcott, the greatest motivation. And to all the other impactful, incredible, inspiring women who have always been the greatest blessing bestowed upon my life by the Almighty. I love you all.

Biographical Sketch

Wycliffe L. Walcott Jr. is currently a Federal Aviation Administration Air Traffic Control Specialist at Westchester County Airport Air Traffic Control Tower. Mr. Walcott attended Vaughn College of Aeronautics and Technology from 2001 to 2002 and graduated with an Associate of Applied Science degree in Airport Management and an AT-CTI endorsement in 2002. He attended Vaughn College of Aeronautics and Technology from 2007 to 2009 and graduated with a Bachelor of Science degree in Management in 2008 and a Master of Science degree in Airport Management in 2009. He attended the CUNY School of Professional Studies from 2012 to 2016 and graduated with an Advanced Certificate in Labor Studies and a Master of Arts in Labor Studies in 2016. He came to St. John Fisher College in the summer of 2016 and began doctoral studies in the Ed.D. Program in Executive Leadership. Mr. Walcott pursued his research in the study of the underrepresentation of African American Air Traffic Control Specialist candidates at the collegiate level under the direction of Dr. Byron K. Hargrove and Dr. Arleen Hogan, and the Ed.D. degree will be granted in 2018.

Abstract

The Federal Aviation Administration's (FAA) Air Traffic Control Specialists (ATCS) workforce has been in steady decline since 2012. The declining number of federal ATCS threatens a $1.5 trillion aviation economy in the United States. The results of fewer controllers are increased delays and cancelled flights (National Air Traffic Controllers Association [NATCA], 2018). Additionally, the controller workforce is predominantly White male (Carey, 2014). Diversity amongst ATCS is another troubling trend for the FAA (McCartin, 2011). According to Outtz and Hanges (2013), an underrepresentation of minorities, including women, exists among the candidates who were hired successfully in the FAA ATCS centralized hiring process. The purpose of this qualitative methods study was to examine the experiences of African American ATCS who studied air traffic control at the collegiate level. Lent and Brown (1996) suggest that an individual's career pursuit is determined by their self-efficacy (SE) and outcome expectation (OE). This study explored the SE and OE of African American ATCS hired through the FAA's Air Traffic Collegiate Training Initiative (AT-CTI) program. Several outcomes were the result of eight semi-structured interviews including high SE and OE that drove the personal goals of obtaining a college degree and becoming an FAA ATCS. This study produced several recommendations including practices the FAA could implement using its Aviation & Space Education Outreach Program (AVSED) to target young African Americans interested in STEM fields to pursue a career in air traffic control (ATC).

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Chapter 1: Introduction

This chapter introduces the air traffic control profession and its staffing shortage. It further reveals the lack of diversity within the profession and new air traffic controllers being hired by the Federal Aviation Administration from colleges across the United States. Chapter 1 offers a theoretical lens for viewing reasons why few African Americans pursue the air traffic control profession utilizing the higher education pathway.

Introduction

In 2015, over 10,000 federal air traffic controllers were responsible for 8,727,691 commercial flights carrying 2,246,004 passengers per day over 5 million square miles of U.S. airspace (FAA, 2015). U.S. air carriers recorded 35.5 billion dollars of revenue between 2005 and 2017 for transporting cargo (Statista, 2018). The Federal Aviation Administration is the regulatory body of the United States government responsible for maintaining the National Airspace System (NAS). The agency's workforce is tasked with maintaining the safety of passengers and the public air space. Air Traffic Control Specialists (ATCS) are the primary workers responsible for the safe, orderly, and expeditious movement of aircraft in the NAS (FAA, 2014). ATCS guide pilots carrying passengers and cargo safely on the ground and in the air in designated areas under FAA control. ATCS are responsible for providing instructions to pilots that ensure aircraft maintain a safe distance from each other in an orderly manner with minimum delay for the aircraft to reach its destination (FAA, 2018).

Individuals pursuing an air traffic control career with the FAA have three distinct pathways for employment if qualified: (a) prior ATC experience, (b) *off the street* hire, and (c) graduation from the Air Traffic Collegiate Training Initiative (AT-CTI) program. The predominant pathway for new ATCS candidates utilized since the late 1990s is the AT-CTI program (Pavel, 2012). Regardless of the path chosen, all candidates must have United States citizenship and have proficiency in oral English to ensure clear transmissions utilizing communication equipment (Jorgenson, 2013).

Candidates with prior ATC experience consist of current military controllers, retired military controllers, current civilian controllers at a privately contracted ATC facility, or prior civilian controllers from a privately contracted ATC facility (Pavel, 2012). Only current military and retired military controller applicants who pursue this track are eligible for employment with the FAA beyond their 31st birthday. All other candidates must receive an official offer from the agency prior to their 31st birthday in addition to completing an FAA interview, medical examination, drug test, and security background check (Jorgenson, 2013).

Candidates without ATC experience or an AT-CTI endorsement typically apply as an off the street hire. In addition to the requirements for non-military controllers, these candidates must possess either a 4-year college degree or 3 years work experience or a combination of the two (Jorgenson, 2013). Once these prerequisites have been met, off the street hires must complete an initial biographical questionnaire (BQ) (Coyne, 2014). The BQ is a personality exam designed to eliminate unqualified applicants from the hiring process (Coyne, 2014). Stoltz (2014) reported that the personality exam predicts candidates' chances of successfully completing ATC training based on their background.

Candidates answer questions about their past that resemble what they are likely to experience if hired. These questions explore candidates' abilities, life experiences, work background, and their ability to handle stressful situations (Stoltz, 2014). Afterwards, remaining candidates must take the FAA's Air Traffic Selection and Training (AT-SAT) exam (Jorgenson, 2013). The AT-SAT is a battery of exams related to the job performance of ATCS. The computer-based test measures different ATCS aptitudes over five blocks and 15 tests (Ramos, Heil, & Manning, 2001a, 2001b). A passing score of 85% or greater is required to confirm the candidate's eligibility for hire and placement into the FAA's Initial Training Program at the Mike Monroney Aeronautical Center located in Oklahoma City, Oklahoma (Jorgenson, 2013).

Candidates without prior experience who choose the AT-CTI path attend one of the AT-CTI institutions. After completing a 2-year or 4-year degree, they become eligible for hire (Pavel, 2012). Unlike non-military off the street candidates, these candidates bypass the BQ and take the AT-SAT (FAA Extension, Safety, and Security Act, 2016). Prior to taking the AT-SAT, AT-CTI candidates need to obtain a recommendation for employment from their AT-CTI institution (Pavel, 2012). AT-CTI institutions' ATC programs differ in scale and design: (a) some institutions require the candidate to acquire a 2-year degree while others require a 4-year degree, and (b) some institutions require candidates to acquire a pilot's license. All of the institutions minimally teach air traffic basics. This allows AT-CTI candidates the ability to bypass the Air Traffic Basics training at the FAA's Mike Monroney Aeronautical Center once the candidate is hired (Jorgenson, 2013).

Problem Statement

Since 2012, there has been a steady decline in the staffing of fully certified professional controllers (CPCs). The number of CPCs, ATCS that have received a full proficiency rating by the FAA to guide pilots, have steadily declined. In 2015, the total number of CPCs employed by the FAA dropped to 10,833 - a 27-year historic low (NATCA, 2018). Of the 10,833 CPCs who guided pilots with their passengers and/or cargo across the nation in 2015, approximately one-third were eligible to retire. According to NATCA (2018), this steady decline is a problem for several reasons. First, a continued reduction in the ATCS workforce would result in fewer airplanes that are able to fly and an increase in delays. Second, understaffed facilities interfere with the FAA's ability to implement new equipment because ATCS play an integral role into the planning, installation, and training of air traffic equipment. Third, understaffed facilities must resort to mandatory overtime to ensure proper staffing, but critically staffed facilities will not have the necessary staffing to operate properly, despite scheduled overtime. With fewer controllers to guide aircraft, less flights can be guided in the NAS. The FAA's national staffing crisis is a threat to the capacity of the NAS and the U.S. economy (NATCA, 2018).

The FAA has historically been challenged with staffing issues for over 5 decades. Staffing issues that existed since the 1960s were aggravated by the 1981 Professional Air Traffic Controllers Organization (PATCO) strike. PATCO, the former union organization that was once officially recognized by the FAA as the sole representative for federal ATCS, led most of its members into an illegal strike on August 3, 1981 over several labor issues including pay, working hours, and working conditions. U.S. laws

forbid federal employees from participating in work actions – strikes. The result of the

strike led by PATCO was the termination of service for 11,345 ATCS in the summer of

1981 (McCartin, 2011). The agency unsuccessfully attempted to respond to the

additional shortage of controllers resulting from the strike with an aggressive hiring

campaign between 1981 and 1985. The replacement ATCS hired in the 1980s and 1990s

have been separating from service with the FAA in the millennium because of the FAA's

mandatory retirement age of 56 for ATCS (Pavel, 2012). At the beginning of the

millennium, the FAA still needed to hire 14,000 ATCS to address its current and

projected staffing shortage (Jorgenson, 2013).

Complicating the matter of staffing, ATC is a profession wherein the workforce

lacks diversity (McCartin, 2011). White males make up the majority of the FAA's air

traffic control workforce at 83% (Carey, 2014). The Equal Employment Opportunity

Commission (EEOC) mandates that federal agencies annually conduct a self-assessment

to monitor progress and identify areas where barriers may operate to exclude certain

groups so that federal agencies position themselves to attract, develop, and retain a top-

quality workforce that can deliver results and ensure our nation's continued growth and

prosperity (Equal Employment Opportunity Commission, 2003). In 2012, the FAA

commissioned Outtz and Associates to conduct a barrier analysis of the FAA's ATCS

centralized hiring process (Outtz & Hanges, 2013). According to Outtz and Hanges

(2013), an underrepresentation of minorities, including women, exists among the

candidates who were hired successfully in the FAA ATCS centralized hiring process.

During the 5-year span between 2007 and 2011, ATCS candidates hired by the FAA

through the agency's AT-CTI program were 70.4% White and 73.6% male (Outtz &

Hanges, 2013). According to APTMetrics (2013), over that same span 5% of the AT-CTI applicants hired were African American. When compared to African American representation across hiring paths that were not AT-CTI, an average of 34% African American representation exists. Even though the AT-CTI path for African Americans is relatively small compared to the other sources, the AT-CTI differences are magnified considering the relatively high *survival rate* of its candidates through the FAA's centralized hiring process (APTMetrics, 2013). Antwi-Boasiako (2008) posits,

> Programs to attract the underrepresented to the main stream historically White male positions in the public sector and educational institutions do not favor gender and race as resistors to diversity allege but, rather, an attempt to reflect the composition of the American population in the public sector. (Antwi-Boasiako, 2008, p. 225)

Theoretical Rationale

The theoretical frame anchoring this study is social cognitive career theory (SCCT). SCCT was developed by Robert W. Lent, Steven D. Brown, and Gail Hackett in 1994. The theory suggests that an individual's career pursuit is determined by their self-efficacy and outcome expectation (Lent & Brown, 1996). Self-efficacy refers to an individual's belief in one's ability to succeed at a task (Bandura, 1986). Outcome expectations refers to one's beliefs about the results of his or her actions. SCCT posits that through individual agency, personal goals reflect one's vigorous belief in his or her own ability to achieve career goal pursuits. Also, one's visualized outcome from his or her pursuit plays a key role in making career choices (Lent & Brown, 1996). SCCT may help to explain how the attributes of the theory are applicable to the study of the

underrepresentation of African American ATC candidates at AT-CTI schools. The ATC profession lacks African American role models displaying the career to a population of African American youth. This may indirectly weaken self-efficacy and outcome expectations for young African Americans considering ATC as a career choice.

SCCT posits that vocational interests arise unexpectedly and persist because an individual's passion will stimulate continued intrigue in that trade. People form lasting attractions toward careers once they anticipate those careers will produce valued outcomes, and lasting attractions in those careers create greater pursuits and exposure to those careers (Lent & Brown, 1996). Lent and Brown (1996) "argue that many people experience narrowed career interests either because they have been exposed to a restricted range of efficacy-building experiences or because they have developed inaccurate occupational self-efficacy or outcome expectations" (p. 314). Individuals pursue careers of preferred activities and people whom the individuals associate with socially who have the right supportive environment (Lent & Brown, 1996). In addition, SCCT focuses on the effort required for individuals to achieve success and the degree of persistence needed to surpass obstacles in their pursuit.

The application of SCCT in vocational studies may help researchers achieve a greater understanding about why African Americans are underrepresented in specific vocational fields. African Americans continue to be underrepresented in science, technology, engineering, and math (STEM) fields (Fouad & Santana, 2017). Aviation occupations, including ATC, are STEM based, and these occupations are critical to the continued success in U.S. aviation (FAA, 2015). Lent et al. (2013) explained the application of SCCT as a persistence predictor amongst college freshmen pursuing

STEM majors at different universities. The study found students' STEM interests predictable based on self-efficacy and outcome expectations (Lent et al., 2013). Lent et al. (2013) demonstrated how SCCT can be applied when explaining the relationship between students' career interests and how they align with distinct academic environments. More importantly, the study demonstrates the importance of SCCT's application towards understanding environment satisfaction and the importance of environment satisfaction in the retention of students in STEM disciplines (Lent et al., 2013).

Despite decades of increased focus on the disinterest of African Americans in vocational psychology, African Americans are still underrepresented in STEM occupations without a greater understanding of why (Fouad & Santana, 2017). Owens, Lacey, Rawls, and Holbert-Quince (2010) and Walsh, Bingham, Brown, and Ward (2001) explain that there is a lack of research into the best ways to promote vocational learning within the African American community. Dickinson, Abrams, and Tokar (2017) believe SCCT research can explain why African Americans do not show greater interests in STEM careers.

Statement of Purpose

The purpose of this qualitative methods study was to examine the experiences of African American ATCS who attended an AT-CTI college. What this study sought was threefold: (a) identify what attracts African Americans to pursuit a career in ATC, (b) understand why some African Americans utilize the AT-CTI path to pursue a career in ATC, and (c) identify what recruitment techniques the FAA and AT-CTI schools can utilize to recruit more African Americans to pursue ATC through the AT-CTI pathway.

The information collected provides additional data on how the participants became interested in and ultimately pursued a career as an ATCS utilizing the AT-CTI path.

Research Questions

To study the underrepresentation of African American ATCS candidates at the collegiate level, this research study explored the perspectives of African American male and female ATCS who have obtained CPC status when researching the following questions:

1. What SCCT factors determine whether African Americans will pursue an air traffic control career?

   a. What self-efficacy beliefs do African American ATCS share about ATC?

   b. What outcome expectations beliefs do African American ATCS share about ATC?

   c. What choice and performance goals do African American ATCS share about ATC?

2. What SCCT factors determine African Americans' pursuit of an air traffic control career utilizing the AT-CTI path?

   a. What self-efficacy beliefs do African American ATCS share about college?

   b. What outcome expectations beliefs do African American ATCS share about the AT-CTI pathway?

   c. What personal goals do African American ATCS share about CTI institutions?

3. What do current African American ATCS recommend for recruiting more African American candidates into the ATC profession utilizing the AT-CTI path?

Significance of the Study

The AT-CTI program is the FAA's primary tool for hiring future ATCS. This is the FAA's preferred recruitment method in part because AT-CTI graduates, with their higher aviation education, are better suited for the ATC profession when compared to their general public applicant counterparts (Pavel, 2012). This research has the potential to help higher education institutions that participate in the FAA's AT-CTI program identify, recruit, and retain African Americans into their AT-CTI program with greater success. Greater ATC recruiting efforts in higher education can assist the FAA in replenishing its diminishing ATC staffing numbers and diversifying its workforce simultaneously. Both the higher education institutions and the FAA may find the results about the factors determining African Americans' purposeful pursuit of an ATC career utilizing the AT-CTI path significant because the success rate for hiring African Americans through the FAA's centralized hiring process is considerably improved over all other paths (APTMetrics, 2013).

Definitions of Terms

The following definitions of key terms are used for this study:

Air Traffic Collegiate Training Initiative (AT-CTI) - A higher education program designed by the FAA to provide air traffic basics knowledge to matriculated students at select colleges (Pavel, 2012).

Air Traffic Control (ATC) - The primary occupation responsible for the safe, orderly, and expeditious movement of aircraft in the National Airspace System (FAA, 2014).

Air Traffic Control Specialist (ATCS) - A person authorized to provide air traffic control service (FAA, 2014).

Federal Aviation Administration (FAA) - The regulatory body of the United States government responsible for maintaining the National Airspace System (FAA, 2014).

National Airspace System (NAS) - the airspace, navigation facilities, and airports within the United Sates (FAA, 2014).

Science, Technology, Engineering, and Mathematics (STEM) - acronym for science, technology, engineering, and mathematics subjects (FAA, 2015)

Social Cognitive Career Theory (SCCT) - one's formation of lasting attractions towards careers anticipated to produce valued outcomes and enduring interest that create greater pursuits and exposure to those careers (Lent & Brown, 1996).

Chapter Summary

The United States federal workforce of air traffic controllers that guide passengers and their cargo throughout the nation's airspace is at historic lows. It is currently two-thirds staffed, and one-third of its current workforce is eligible to retire today (NATCA, 2018). The ATC profession is a predominantly White male profession (Carey, 2014; McCartin, 2011). Even though the FAA is an equal opportunity employer, African Americans accounted for 5% of the candidates who were hired successfully in the FAA ATCS centralized hiring process that participated in the FAA's AT-CTI program between 2007 and 2011 (APTMetrics, 2013).

The purpose of this qualitative methods study was to examine the experiences of African American ATCS who attended an AT-CTI college. This study sought to measure the factors that attract African Americans to ATC, and to record the experiences of African American ATCS who have participated in the FAA's AT-CTI program. The theoretical frame anchoring this study is SCCT. SCCT suggests that an individual's career pursuit is determined by their self-efficacy and outcome expectation (Lent & Brown, 1996). Therefore, through one's own effort, a great self-belief, and a strong vision of a desired outcome, the career pursuit of choice is enhanced (Lent & Brown, 1996). AT-CTI institutions and the FAA may find the results about what factors influence African Americans to pursue an ATC career utilizing the AT-CTI path significant because the success rate for the FAA to hire African Americans that participate in an AT-CTI program is considerably improved over all other FAA hiring paths (APTMetrics, 2013).

Chapter 2 will review the literature on: (a) the history of air traffic control hiring as it relates to diversity, (b) a synthesis on the FAA's AT-CTI program, and (c) SCCT as it relates to the ATC career field. Chapter 3 will review the qualitative methods design, methodology, and analysis of this study. Chapter 4 provides the results of the study and Chapter 5 discusses implications of the research and recommendations for the future.

Chapter 2: Review of the Literature

This chapter provides an analysis of the literature exploring the research on ATC and higher education. Based on studies about African Americans in the ATC profession, this section will synthesize empirical documents pertaining to ATC staffing and the underrepresentation of African Americans that exists amongst AT-CTI candidates hired by the FAA. This literature review has four key sections. The first section reviews the FAA's hiring history. The second section synthesizes the research on diversity in ATC hiring. The third section analyzes the AT-CTI program from inception. The final section synthesizes the research on SCCT and its ability to assess African Americans' higher education and career choice pursuits.

Introduction and Purpose

According to NATCA (2018), the FAA's national staffing crisis is a threat to the capacity of the NAS and the U.S. economy. Fewer controllers guiding aircraft results in fewer flights and increased delays. In 2016, *The Economic Impact of Civil Aviation on the U.S. Economy*, reported aviation contributes over 5% to the U.S. economy with approximately one and a half trillion dollars in economic activity (FAA, 2016). Cancelled flights directly impact the nation's commerce (NATCA, 2018). Pavel (2012) explained that one of the main causes for the FAA's staffing crisis can be traced back almost 4 decades to the PATCO strike of 1981. The Federal Labor Relations Act of 1978 forbids federal employees from participating in strikes (U.S. Federal Labor Relations Authority, 1978). The national strike led to the termination of service for 11,345 ATCS in the

summer of 1981 (McCartin, 2011). According to Pavel (2012), the FAA failed to replace

all the controllers lost after the strike. The controllers who were hired to replace those

terminated have been retiring since the millennium because of a mandatory retirement

age of 56.

The lack of diversity in the controller workforce further complicates the matter of

staffing (McCartin, 2011). At 83%, White males predominantly make up the FAA's air

traffic control workforce (Carey, 2014). An underrepresentation of minorities, including

women, exists among the candidates who were hired successfully in the FAA ATCS

centralized hiring process. During the 5-year span between 2007 and 2011, 70.4% of

ATCS candidates who were hired by the FAA through the agency's AT-CTI program

were White and 73.6% were male (Outtz & Hanges, 2013). A follow-up report

examining barriers to employment for the ATCS centralized hiring process at the FAA

confirmed the initial findings of Outzz and Hanges (APTMetrics, 2013). APTMetrics

(2013) found 5% of applicants in the AT-CTI path were African American as compared

to an average of 34% African American representation in all other paths. The AT-CTI

hiring path is relatively small compared to other paths, and these AT-CTI path

differences are magnified considering the AT-CTI path's relatively high rate of success in

applicants getting hired by the FAA (APTMetrics, 2013). Therefore, the most effective

path to getting hired by the FAA to become an ATCS is by far the least used path by

African Americans. This chapter provides an analysis and synthesis of the literature

pertaining to the FAA's ATC hiring, diversity in ATC hiring, the AT-CTI program, and

SCCT.

Review of the Literature

The review of the literature explores the FAA's hiring practices for ATCS to gain an in-depth understanding of the agency's staffing issues over the past 6 decades. The review of literature further explores how the FAA has handled challenges in diversifying its controller workforce. Then the literature review focuses on the FAA's AT-CTI program and diversity amongst the applicants being hired by the FAA through the colleges and universities partnered with the FAA. Finally, the literature review synthesizes SCCT and its applicability to STEM majors and ATC.

Air traffic control hiring. Cobb and Nelson (1974) explained that there are two distinct periods of FAA hiring ATCS: pre-1964 and post-1964. According to Cobb and Nelson (1974), prior to 1964 ATCS candidates were ranked by preemployment experience, educational background, and an interview with air traffic management officials. The highest rankings were given to applicants with prior military air traffic experience. Between 1964 and 1968, numerous hiring exams were introduced including the U.S. Civil Service Commission (CSC) exam. The CSC exam was a battery of six aptitude tests. These tests were better known as the CSC ATC Aptitude Screening Test (Cobb & Nelson, 1974).

Cobb and Nelson (1974) further explained that during the 1960s air traffic volume grew 100%, but the ATC workforce grew only by 10%. The FAA responded by waiving the CSC ATC Aptitude Screening Test, and the agency began hiring applicants with *highly specialized* air traffic control experience. A study in 1973 by the FAA's Civil Aviation Medical Institute (CAMI) produced evidence showing highly specialized ATCS candidates success rate in training was slightly higher than ATCS candidates with little or

no air traffic control experience (Cobb & Nelson, 1974). As reported by Cobb and

Nelson (1974), highly specialized air traffic control experience that was believed to be a

key component to successful ATCS training was dispelled and replaced with a new belief

– the key variable to air traffic control training success was age. The study showed

significant training success for candidates 34 years old and younger, and the experience

of the candidates had no bearing on the results. Thus, the FAA ceased with waiving the

CSC ATC Aptitude Screening Test for highly specialized air traffic applicants, and air

traffic applicants had a maximum cut-off age of 30 years old (Cobb & Nelson, 1974).

Further improvements to the FAA's selection and hiring of ATCS were halted by

the 1981 Professional Air Traffic Controllers Organization strike (U.S. General

Accounting Office [U.S. GAO], 1986a, 1986b, 1988, 1989). The strike resulted in

11,345 ATCS being removed from service. Over the next 4 years 13,533 ATCS

candidates were hired. However, the attrition rate of these new hires was 60% in some

cases. By the end of the 1980s, the number of fully certified ATCS was 10,450. That

number was well short of the FAA's goal of 15,000. Also, it took 100 ATCS candidates

to produce one fully certified ATCS (U.S. GAO, 1986a, 1986b, 1988, 1989).

During the 1990s, the FAA started development of the Air Traffic Selection and

Training (AT-SAT) (Ramos et al., 2001a, 2001b). Ramos et al. (2001a, 2001b) explain

that the battery of exams was designed to screen new candidates necessary to replace

ATCS who were projected to retire over the course of a decade starting in 2005. In

addition, the AT-SAT updated prior test batteries that were obsolete. The AT-SAT was

part of a new training process design that was distinctively different from its predecessor

because the new process removed a screening goal – a two-stage process that was

expensive and inefficient. The Office of Personnel Management (OPM) test was the predecessor to the AT-SAT, and it had been in place from 1981 to the early 2000s. Due to test preparation materials and classes, the resultant scores from the OPM exam were artificially growing without a corresponding increase in controller ability of ATCS candidates. As a result, the FAA's 9-week screen training process had a success rate below 40% (Ramos et al., 2001a, 2001b).

Starting in 2005, the FAA needed to build up a new controller workforce. The need for a new controller workforce stemmed from mandatory retirements of the previous generation of controllers. Most of the PATCO replacement controllers were hired from 1981 through 1984, and relatively few controllers were hired beyond 1984. Therefore, many post-strike controllers started becoming retirement eligible in 2005, and the FAA needed to build up a new controller workforce by hiring 500 to 800 controllers a year in the years following 2005 (Ramos et al., 2001a, 2001b).

By law, the FAA performed an internal audit of its air traffic control workforce analyzing the years 2007 through 2012. An Independent Review Panel (IRP) was assembled by the FAA's administrator to assess hiring, assignments, and training of future air traffic controllers. A few changes were implemented in early 2014 because of the FAA's internal audit and IRP including standardizing the hiring process and minimum qualifications. Thus, the focus of hiring air traffic controllers from the colleges participating in the AT-CTI program shifted to hiring air traffic controllers from the public (U.S. Department of Transportation, 2016).

Utilizing a new screening tool, the Biographical Questionnaire (BQ)-which predicts controller performance based on applicants' past experiences and behaviors-

replaced the role of the AT-CTI institutions. The BQ was implemented in February of 2014. In September 2014, 155 out of 1,593 applicants (9.73%) successfully passed the new screening tool, were hired, and proceeded to the FAA's academy in Oklahoma City, Oklahoma. for training. The result of the new BQ screening tool was the removal of 900 applicants from the FAA's hiring process who were once in the hiring pipeline through the AT-CTI program. After revising the assessment screening tool and testing it on over 1,700 certified professional controllers, the revised assessment was implemented in March 2015. In October 2015, 741 applicants, which accounted for half of the total applicants, were successfully screened, hired, and moved onward to Oklahoma (U.S. Department of Transportation, 2016).

In 2016, the U.S. Department of Transportation (DOT) concluded that the FAA continues to struggle from longstanding air traffic controller staffing issues. The report detailed the FAA's plan to hire 3,400 controllers by 2018. The DOT believed the FAA would incur challenges in hiring and placement of these future controllers (U.S. Department of Transportation, 2016).

Diversity in air traffic control hiring. Prior to the 1970s, the predominant source of air traffic control applicants was the military (Boone, 1978). Prior air traffic control experience gained from the military was seen as relative to FAA air traffic training success, but women and minority air traffic applicants were not likely to emerge from the military with air traffic control experience. Therefore, the Predevelopmental "150" program was established in 1968 to help the FAA meet the need for more women and minority air traffic control applicants. It included 15 courses taught over 17 weeks, and it was designed to compensate for the deficiencies of the candidates (Boone, 1978).

Boone (1978) reported on the study of all Predevelopmental "150" participants from 1974 through 1977 (*n*=157) (Boone, 1978). The FAA Civil Aerospace Medical Institution (CAMI) argued the most important finding from the study was the significant relationship between the "150" program and its design to aid the disadvantaged in achieving success at the FAA Academy. However, before the findings could be generalized, the study noted three items: (a) inferences should be cautiously drawn because of a less than ideal sample size; (b) it was recommended that once more trainee data became available, a cross-validation study was needed; and (c) the causal models only infer causality but does not prove causality (Boone, 1978).

Four decades have passed since the FAA recognized a need to address the lack of diversity amongst its air traffic control workforce, but 2011 data shows only marginal progress for the agency in accomplishing this task (Pavel, 2012). According to Pavel (2012), since the inception of its AT-CTI program, the percentage of air traffic control candidates hired from the AT-CTI program who were African American increased from 5.32% to 6.21%. Pavel (2012) questioned whether the locations of the AT-CTI schools were strategically located to better recruit a diverse pool of talent. According to 2010 U.S. Census data (as cited in Pavel, 2012), the second largest minority group in the United States is Black/African American at 12.6%. The 2010 U.S. Census data (as cited in Pavel, 2012) also shows six of the nation's states each have a population of one million or greater African Americans but do not have an AT-CTI program.

In 2005 the FAA estimated losing 73% of its workforce over 10 years due to the agency's mandatory retirement age of 56 (as cited in King, Manning, & Drechsler, 2007). The agency's awareness of the attrition its workforce was facing led to a change in the

official civil service test used to hire ATCS without previous operational air traffic control experience. Since the summer of 2002, the AT-SAT test battery has been the official civil service test. The test is a battery of eight subtests, and its objective is predicting an ATC candidate's probability of success in training and on the job (King et al., 2007). King et al. (2007) posits the AT-SAT "ensures that those who are hired have (or have the potential to develop) the necessary knowledge, skills, and abilities to be successful" (p. 1).

Prior to its implementation, the AT-SAT was a cause of concern for minorities who worried about the potential adverse impact of such an exam (King et al., 2007). Adverse impact is defined as "a selection rate for any race, sex, or ethnic group that is less than 4/5 (80%) of the rate for the group with the highest rate" (King et al., 2007, p. 2). The concerns appeared valid because three out of every 100 African American/Black candidates were projected to obtain a passing grade of 70% (King et al., 2007). These numbers predict a validity of 69% for the African American/Black minority group which fits the definition of adverse impact, but the FAA can make a case for business necessity:

> A defense available when the employer has a criterion for selection that is facially neutral but excludes members of one sex, race, or national origin at a substantially higher rate than members of other groups (thus creating adverse impact). The employer must then prove that its selection requirement having the adverse impact is job-related, typically as demonstrated by a job analysis. (King et al., 2007, p. 2)

Concerns about the ability of candidates to pass the AT-SAT also applied to incumbent FAA controllers as well (King et al., 2007). Significantly, 38% of certified

controllers failed the original design of the AT-SAT (King et al., 2007). Therefore, scientists created a constant used to calibrate the overall scores of incumbent fully certified controllers aimed at minimizing FAA academy failures of all candidates, and the calibration compensates for the possibility of increased difficulty in future duties (King et al., 2007). Additionally, the subtests have been reweighted to eliminate differences that could produce adverse impact for women and Hispanics (King et al., 2007). The reweighting of the subtests also greatly reduces the potential for adverse impact on African Americans. Another step taken to address any adverse impact of the AT-SAT on minority groups was the use of a category ranking method for hiring purposes. Applicants' scores ranging from 85 and above were placed in a well-qualified category, and applicants' scores ranging from 70 to 84.9 were placed in a qualified category (King et al., 2007).

The study by King et al. (2007) focused on the function of reweighting the AT-SAT battery for the purposes of addressing adverse impact. The results of 219 out of 854 applicants who took the AT-SAT test between June 2002 and June 2006 were reviewed. The 219 applicants were chosen because they voluntarily completed a Race and National Origin (RNO) form. The report explains the exam does not exhibit an adverse impact between the RNO group with the lowest passing rate (Black or African American) and the RNO group with the highest passing rate (White). The result of the comparison between both RNO groups was 80.57 which fails to exceed the threshold for adverse impact by .57 point (King et al., 2007).

In April 2012, the FAA commissioned Outtz and Associates to conduct a barrier analysis to ATCS hiring through the use of the FAA's centralized hiring process (Outtz &

Hanges, 2013). As mandated by the Equal Employment Opportunity Commission, the report was supposed to identify and analyze potential barriers to equal employment opportunities within the FAA's hiring practices (Outtz & Hanges, 2013). Approximately 1 year later, four of seven decision points where adverse impacts to ATCS applicants in at least one demographic group existed were identified including the AT-SAT testing phase (Outtz & Hanges, 2013).

> Evidence of barriers was found for racial/ethnic minorities at the first four decision points. Evidence of barriers was found about race/ethnicity and gender for the second decision point. No barriers were found for the last three decision points. Overall, women and minorities were underrepresented among those successfully completing the ATCS Centralized Hiring Process and being hired. (Outtz & Hanges, 2013, p. 13)

The qualification determination decision point verifies whether the applicant matches the minimum qualifications to become an ATCS. Some of the determinations at this step are systematic – an objective qualification is missing, but some of the determinations at this step are not systematic – subjective decisions regarding education and experience are made by human resources (HR) personnel. The AT-SAT testing phase decision point is applicable to applicants who have applied from off the street or through the AT-CTI program. These applicants take a battery of exams, and those applicants who score 85 and above are considered highly qualified. Applicants scoring between 70 and 84.9 are considered qualified. An examination of the RNO and gender composition of highly qualified applicants shows African Americans and Hispanics/Latinos scoring substantially lower than Whites. Therefore, the highly

qualified designation fits the definition of adverse impact for RNO minorities. The

referral list decision point shows the referrals for each RNO subgroup compared to the

majority White subgroup. African Americans and multiracial subgroups were referred

significantly less compared to the White subgroup (Outtz & Hanges, 2013). Outtz and

Hanges (2013) concluded "that the process for preparation of the referral list of eligible

and qualified applicants is a barrier to African Americans" (p. 21). In addition, the

referral list decision point affected the centralized selection panel decision point because

the differences in referrals transpose negatively to the adverse impact ratios for selection

decisions as a function of race/ethnicity. Thus, the centralized selection decision point

was determined to be a barrier for African Americans (Outtz & Hanges, 2013).

A key component of the selection of air traffic control candidates is the AT-SAT

battery. This FAA screening tool was developed to usher the FAA into the future at the

turn of the 21st century. Despite the development of this modern *select-in* battery of

exams, questions about the lack of diversity in the air traffic control profession remained

(King et al., 2007; Outtz & Hanges, 2013). King et al. (2007) found the AT-SAT not to

cause adverse impact, but Outtz and Hanges (2013) found the AT-SAT to be a barrier to

equal employment opportunity. Outtz and Hanges (2013) found little evidence that the

AT-SAT was a predictor of job performance. Prior to reweighting the AT-SAT

subcategories, King et al. (2007) observed 38% of certified ATCS failed the original

design of the AT-SAT.

Applicants who passed the AT-SAT (score 70 or greater) were placed into one of

two categories: (a) well qualified or (b) qualified (King et al., 2007). King et al. (2007)

justified the necessity to stratify the applicants into two subgroups to minimize adverse

impact. Conversely, Outtz and Hanges (2013) stated that the creation of a highly

qualified band creates additional barriers to applicants based on race/ethnicity and

gender.

The criterion utilized by Outtz and Hanges (2013) were: (a) statistical differences

between a minority group and Whites and males, (b) an effect size greater than or equal

to .20, and (c) and adverse impact ratio less than .80. Instances where two out of three of

the criteria were triggered resulted in an overall determination of a barrier for that

decision point (Outtz & Hanges, 2013). Outtz and Hanges (2013) used statistically

weighted data between the years 2006 and 2011. They explained the use of a small effect

size by industry standards. Their validation was centered about the FAA having very few

openings respective to many applicants. Thus, small differences in selection rates could

produce significant negative consequences which qualified as a barrier (Outtz & Hanges,

2013).

Air traffic-collegiate training initiative. Over the past 5 decades, the FAA and

the collegiate aviation community have been partnered in training future ATCS (Ruiz &

Ruiz, 2003). In 1981, FAA administrator J. Lynn Helms proposed the Airway Science

Curriculum (AWS) to generate a pool of aviation educated candidates qualified for

technical positions within the industry (Broach, 1991; Ruiz & Ruiz, 2003).

Administrator Helms created the Airway Science Program Task Force while the

University Aviation Association (UAA) appointed college representative members to the

task force (Broach, 1991; Ruiz & Ruiz, 2003). Initial task force members represented 4-

year colleges because the program was a baccalaureate curriculum (Broach, 1991; Ruiz

& Ruiz, 2003). Later on, it was found that community colleges offering lower division

course work could contribute, and a representative for the community colleges was added to the task force (Broach, 1991; Ruiz & Ruiz, 2003). One of the objectives of the program was to determine the impact of the program on the employment of women and minorities (Broach, 1991; Ruiz & Ruiz, 2003).

Broach (1991) conducted a quantitative study focused on how well the AWS achieved its goals including its impact "on the employment and career progression of women and minorities" (Broach, 1991, p. 1). The Airway Science Curriculum Demonstration Project (ASCDP) was created to conduct this study evaluating the years 1984 through 1990. The overall sample (N) consisted of 10,277 participants. ATCS represented 94.3% of the sample ($n = 9,693$). Air Traffic Airway Science register hires represented 3.2% ($n = 312$). However, the number of graduates represented from recognized schools with approved programs was 47. A statistical significance was found between AWS hires and their traditionally hired counterparts on the importance of a career in aviation after 1 year of employment, but that statistical significance was no longer found after 2 years and 3 years of employment (Broach, 1991).

A few years after the AWS was created, the FAA partnered with collegiate aviation to develop the Air Traffic Co-operative Education Program (ATCEP) (Ruiz & Ruiz, 2003). This was an apparent move by the FAA to meet its short-term and long-term staffing needs because the AWS failed in that regard (Ruiz & Ruiz, 2003). However, the co-op program was suspended a decade later due to the introduction of a new air traffic pre-training screen (Ruiz & Ruiz, 2003).

Both the AWS and the ATCEP were designed to simultaneously attract college-educated students and provide initial training towards a career as an air traffic controller

(Ruiz & Ruiz, 2003). Reviews of these programs resulted in a number of FAA

commissioned studies about training air traffic controllers (Ruiz & Ruiz, 2003). The

outcome of the studies created another FAA aviation college partnership – the Collegiate

Training Initiative-Air Traffic Control Specialist Program (CTI-ATCS) (Ruiz & Ruiz,

2003). The name of the program was eventually changed to the Air Traffic-Collegiate

Training Initiative Program (AT-CTI) (Ruiz & Ruiz, 2003).

Despite the presence of two FAA programs designed to attract college students to

ATC-related careers, the FAA had its rationale for creating the CTI-ATCS program in

1991 (Morrison, Fotouhi, & Broach, 1996). The reasoning behind this decision, in part,

was to strategically recruit minority and female students (Morrison et al., 1996). The

FAA entered into contract with Hampton University to recruit from an urban center with

a high African American population (Morrison et al., 1996). The FAA also contracted

the University of North Dakota and the University of Alaska, Anchorage because of their

proximity to Native American populations (Morrison et al., 1996). The Minnesota Air

Traffic Control Training Center (MnATCTC), the only institution from the CTI-ATCS

program that was not a college or university, attempted to recruit minorities by

advertising its program in minority publications and educating minority populations

about the air traffic control career by networking with minority coalitions that represented

African Americans, Hispanics, and women (Morrison et al., 1996).

Morrison et al. (1996) showed the different approaches the FAA attempted in

trying to diversify its air traffic controller workforce. However, MnATCTC's first class

was 96% White and 10% female (Morrison et al., 1996). Several classes later,

improvement in gender could be seen with 69% White and 53% female (Morrison et al.,

1996). Hampton University, one of the members of the Historically Black Colleges and

Universities, could not enroll more than 20 students per class despite numerous

recruitment efforts including focused visits at community colleges with high minority

enrollment across three surrounding states (Morrison et al., 1996). Morrison et al. (1996)

stated that there had been some success recruiting females and minorities without

providing data to support such claims. This may have been in part to programs' inability

or unwillingness to track student demographics (Morrison et al., 1996).

An evaluation of the FAA's initial AT-CTI schools (formerly named CTI-ATCS)

led to an expansion of the program in 1997 (Jorgenson, 2013). The number of schools in

the program expanded from five to 13 (Jorgenson, 2013). The AT-CTI program would

continue to expand in 2007, 2008, and 2009 to 22, 30, and 36 respectively (Jorgenson,

2013). Prior to 2002, AT-CTI graduates were hired directly into assigned facilities

(FAA, 2007; Jorgenson, 2013). After 2002, AT-CTI graduates were sent to the FAA's

Academy for technical skill-building training prior to reporting to their assigned facility

(Jorgenson, 2013). The change was in response to the anticipated loss of post-strike

ATCS reaching their mandatory retirement age of 56 (Jorgenson, 2013). Some of the

largest gains the FAA made in air traffic control hiring from the AT-CTI program

occurred in 2007 when the agency hired 1,019 air traffic control candidates (FAA, 2007;

Jorgenson, 2013). Those students accounted for 56% of all new hires that year (FAA,

2007; Jorgenson, 2013). Despite not surpassing 1,000 AT-CTI new hires, AT-CTI

students accounted for 823 new hires which comprised 37% of all air traffic control

candidates in 2008 (FAA, 2009; Jorgenson, 2013). AT-CTI students were the largest

source of new hires in 2007 and 2008 (Jorgenson, 2013). Jorgenson (2013) also noted

the effect of delays in FAA hiring of AT-CTI graduates. ATC-CTI graduates historically wait years to be hired by the agency (Jorgenson, 2013). As a result, not all AT-CTI graduates continue their pursuit of a career in air traffic control (Jorgenson, 2013).

Broach (1991), Morrison et al. (1996), Ruiz and Ruiz (2003), and Jorgenson (2013) all acknowledged the FAA's pursuit of higher education air traffic control candidates was an attempt by the FAA to replenish and change the makeup of its air traffic control workforce. The numerous collegiate programs the FAA implemented were aimed at providing a more aviation educated workforce. Yet, Broach (1991), Morrison et al. (1996), Ruiz and Ruiz (2003), and Jorgenson (2013) were not able to make a correlation between aviation education and achievement of full certified professional controller. Broach (1991), Morrison et al. (1996), Ruiz and Ruiz (2003), and Jorgenson (2013) could show a correlation between aviation education and initial aviation training such as the FAA academy. Another change the FAA had pursued was workforce diversity. This has been an ongoing mission for the agency. However, Broach (1991), Morrison et al. (1996), Ruiz and Ruiz (2003), and Jorgenson (2013) consistently provided descriptive data about the collegiate demographics that mirrored the FAA's workforce dilemma that it had battled since the 1960s. Since the inception of the AWS program to the latest iteration of the AT-CTI program, Broach (1991), Morrison et al. (1996), Ruiz and Ruiz (2003), and Jorgenson (2013) showed that female controller students' percentages routinely were in the 20s; concurrently, minority percentages rarely broke 10%.

Social cognitive career theory (SCCT). SCCT is the theoretical lens used to examine the disproportionate number of African American AT-CTI candidates hired by

the FAA to become ATCS. Lent and Brown (1996) explained the process of academic and career choice development promoting career-relevant choices and the attainment of various levels of performance and persistence in educational and career pursuits. "SCCT highlights three intricately linked variables through which individuals help to regulate their own career behavior: self-efficacy beliefs, outcome expectations, and personal goals" (Lent & Brown, 1996, p. 312).

Lent, Brown, and Hackett (1994) developed SCCT to discuss career-related interest, choice, and performance processes within the interaction of an individual's vocational interests, occupational choice, and career-related performance. Building off the triadic reciprocal causation model of personal factors, environmental factors, and observable behavior developed by Bandura in 1986, SCCT theorizes individuals regulate their career behavior through a complex interaction of three variables: self-efficacy beliefs, outcome expectations, and personal goals. SCCT assumes self-efficacy beliefs and outcome expectations are strengthened, modified, or diminished while seeking a career through various combinations of experiences: (a) personal performance accomplishments, (b) vicarious learning, (c) verbal persuasion, and (d) physiological states and reactions (Lent & Brown, 1996). Bandura (1986) refers to self-efficacy beliefs as "people's judgements of their capabilities to organize and execute courses of action required to attain designated types of performances" (p. 391). Outcome expectations are beliefs people develop about an outcome or set of outcomes that result from particular behaviors. An individual's behavior is impacted by self-efficacy and outcome perceptions, but self-efficacy has greater influence (Lent & Brown, 1996). Lent and Brown (1996) argued:

Many people hold positive outcome expectations about a given course of action (e.g., the common belief in the United States that pursuing a medical career will yield a high income) but avoid such action if they doubt that they possess the requisite capabilities. (p. 312)

What may enhance or lessen an individual's outcome expectation are firsthand learning experiences coupled with relevant past endeavors or second-hand information acquired about various career fields and their paths (Lent & Brown, 1996). Personal goals and a commitment to seek desired outcomes also play a particular role in career choice (Bandura, 1986). They are consequentially affected by a person's self-efficacy and outcome expectation. Therefore, robust beliefs about one's capabilities coupled with positive visions of outcomes will likely cultivate personal goals (Lent & Brown, 1996).

There has been a focus on the underrepresentation of women and minorities in the field of vocational psychology for over 4 decades (Fouad & Santana, 2017). During that time, "women and racial-ethnic minorities have continued to be underrepresented in many STEM occupations despite some 40 years of trying to understand why" (Fouad & Santana, 2017, p. 34). STEM fields are important for the United States to remain a global leader in aviation including ATC (FAA, 2015). In the 1980s, Bandura's self-efficacy theory was proposed as a theoretical lens with which to investigate why women choose not to pursue STEM occupations. In that same decade, it was discovered that college women had lower self-efficacy to complete the educational requirements or job duties of traditional male occupations–physician or engineer–versus traditional female occupations–social worker or teacher (Betz & Hackett, 1981). In the 1990s, SCCT was formed by postulating that self-efficacy, in conjunction with outcome expectations, leads

to career interests which result in a person's career choice. Since its inception, SCCT has become the major theoretical framework for investigating women and minorities in STEM fields. SCCT explicitly incorporates gender and contextual influences (Fouad & Santana, 2017). SCCT has several general areas of study including: (a) individual characteristics (e.g., socioeconomic status [SES], race); (b) psychological factors (e.g., self-efficacy); and (c) perceptions of STEM careers (Kanny, Sax, & Riggers-Piehl, 2014). According to Fouad and Santana (2017), "SCCT has been instrumental in investigating undergraduate women and underrepresented minorities' career interests, choice, and persistence while pursuing STEM majors" (p. 32).

Women and minorities experience higher unemployment than White males in STEM occupations. At higher rates, unemployed minority women reported family responsibilities as a reason for not working full-time. On average, Whites accumulate six-times the wealth of Blacks and Hispanics which allows White men and women the choice of working part-time (as cited in Fouad & Santana, 2017). SCCT's framework studies contextual factors, such as SES, and the affects these factors have on a person's career choices. An understanding of these factors may be key in studying the underrepresentation of women and minorities in STEM fields (Fouad & Santana, 2017). African American women have equal or higher interests and intentions to pursue higher education studies leading to a science-based occupation than their White counterparts, but racism and sexism act as deterrents to the sciences for African American women (Hanson, 2004). An understanding of systematic barriers, such as racism or sexism, may explain its effect on entrance and persistence in a STEM field through one's own self-

efficacy and outcome expectations. Racism, actual or perceived, may be a predictor of career choice (Fouad & Santana, 2017).

SCCT combines interest, choice, and performance models with a satisfaction model to predict persistence (Lent et al., 2013). Lent et al. (2013) tested an integrated model of SCCT on approximately 1,300 freshmen in a STEM major at four universities which included two HBCUs. The participant makeup included 15% African American students and 33% female students. The results found students' interests predictable by self-efficacy and outcome expectations. Furthermore, interests predicted persistence, but the path between interests and pesistence was not direct. Lent et al. (2013) noted, "interests may help to draw people toward particular educational/vocational environments; satisfaction with the environment may then be an important part of what keeps them coming back" (p. 28).

Factors predicting college students maintaining an interest in a STEM career from enrollment to graduation for women and minority students are: (a) college attendance for a specific career, (b) working with faculty on research, and (c) a high grade point average in high school (as cited in Fouad & Santana, 2017). Byars-Winston and Fouad (2008) found that coping efficacy, "perceived confidence to manage the situational and environmental demands that may impede or interfere with performance" (p. 427), and parental support positively predict math and science goals. However, career barriers were negative predictors of goals (Byars-Winston & Fouad, 2008). Therefore, women and minorities are as likely as White males to enroll in STEM majors, but women and minorities will likely change enrollment to a non-STEM major because of perceived barriers (Fouad & Santana, 2017).

Other factors associated with low self-efficacy and academic persistence for minorities in STEM majors include a sense of belonging–the feeling that one is a member of the college community (Johnson, 2012). Researchers have found that some campus programs help foster positive self-efficacy and outcome expectations for women and minorities, such as science programs that are viewed by students as collaborative and empowering (Fouad & Santana, 2017; Hurtado, Cabrera, Lin, Arellano, & Espinosa, 2009). Female students attending a STEM-related living and learning community in college had greater academic self-efficacy and greater positive outcome expectations than women who did not attend a college with a comparable community (Szelényi, Denson, & Inkelas, 2013). Several support activities including mentoring, community involvement, and hands-on experiences were shown to positively affect STEM commitment in minorities (Chemers, Zurbriggen, Syed, Goza, & Bearman, 2011). It was also found that having a mentor of one's own race or gender was an important factor in building self-efficacy in STEM majors (Blake-Beard, Bayne, Crosby, & Muller, 2011).

An inquiry into SCCT and African Americans in higher education explains how SCCT research can explain African American college students' interest development and career choice goals (Dickinson, Abrams, & Tokar, 2017). African Americans are underrepresented in career development literature. Little knowledge exists about African Americans' career learning and growth and how best to facilitate their career learning and growth (Owens et al., 2010; Walsh et al., 2001). Career theories do not always account for the narratives of racial/ethnic minority groups, but SCCT accounts for unique career development experiences of diverse populations (as cited in Dickinson et al., 2017).

SCCT suggests one's interests, choices, and performances are impacted by experiences attained along one's academic and career journey. Since SCCT is equipped to consider gender, social class, and other background contexts, several scholars have researched the career development of predominantly or exclusively African American samples particularly in STEM fields (Dickinson et al., 2017). Research examining SCCT in relation to Holland's Realistic, Investigative, Artistic, Social, Enterprising, and Conventional (RIASEC) model has generally been applied to non-STEM fields, but Gainor and Lent (1998) found African American math self-efficacy predictable by verbal persuasion and physiological arousal rather than performance accomplishments or vicarious learning as the strongest predictors of self-efficacy and outcome expectation. Schaub and Tokar (2005) suggested the relationship of learning experiences to outcome expectations is partially mediated by self-efficacy.

Prior research into experiential sources of self-efficacy and outcome expectations displays the importance of self-efficacy to African Americans (Dickinson et al., 2017). Particularly for math-based careers, African Americans experience racism and lack of access to career-related experiences that foster math-based careers (Alliman-Brissett & Turner, 2010). Self-efficacy and outcome expectation for African Americans is further hindered by socialization experiences encountered by African Americans affecting career relevant learning experiences hindering the development of self-efficacy and outcome expectation. This is particularly true for African American women. Additionally, African Americans experience limited exposure to career role models to whom they can identify with culturally. This negatively impacts vicarious learning on self-efficacy and outcome expectations (Dickinson et al., 2017).

Dickinson et al. (2017) studied the current understanding of SCCT applicability for African Americans by examining six hypotheses for each RIASEC theme:

1. Each of the learning experiences will have a direct and positive relation to self-efficacy and outcome expectations, and part of the relation of learning experiences to outcome expectations will be mediated through self-efficacy;

2. Self-efficacy will have a direct and positive relation to outcome expectations;

3. Self-efficacy and outcome expectations each will have a direct and positive relation to interests, and part of self-efficacy's relation to interests will be mediated through outcome expectations;

4. Self-efficacy and outcome expectations each will have a direct and positive relation to choice goals, and those relations will be partially mediated through interests (self-efficacy's relation to choice goals also will be partially mediated through outcome expectations);

5. Interests will have a direct and positive relation to choice goals; and

6. Verbal persuasion will be a stronger positive predictor of self-efficacy and outcome expectations than will performance accomplishments and vicarious learning. (Dickinson et al., 2017, pp. 78-79)

Dickinson et al. (2017) surveyed 130 African American women and 78 African American men totaling 208 African American students ranging in age from 18 to 43 years enrolled at a large, public, Midwestern university. SCCT appears to be an appropriate theoretical framework for understanding African American students' career development (Dickinson et al., 2017, p. 87).

For all six RIASEC-themed models the results supported (a) the direct and/or

indirect relations of one or more learning experiences to self-efficacy and

outcome expectations; (b) the direct relation of self-efficacy to outcome

expectations; (c) the direct and/or indirect relations of self-efficacy and outcome

expectations to interests and choice goals; and (d) the direct relation of interests to

choice goals. Finally, the results provided limited support for the hypothesis that

verbal persuasion would be the strongest positive predictor of self-efficacy and

outcome expectations. (Dickinson et al., 2017, pp. 87-88)

Chapter Summary

The review of the literature explored the FAA's hiring practices for ATCS to gain

an in-depth understanding of the agency's staffing issues over the past 6 decades. The

review of literature further explored how the FAA has handled challenges diversifying its

controller workforce. Then the literature review focused on the FAA's AT-CTI program

and diversity amongst the applicants being hired by the FAA through the colleges and

universities partnered with the FAA. Finally, the literature review synthesized SCCT and

its applicability to STEM majors and ATC.

Cobb and Nelson (1974), explain that prior to 1964 ATCS candidates were ranked

by preemployment experience, educational background, and an interview with air traffic

management officials. The highest rankings were given to applicants with prior military

air traffic experience. Between 1964 and 1968, numerous hiring exams were introduced

including the U.S. CSC exam. The CSC exam was a battery of six aptitude tests. These

tests were better known as the CSC ATC Aptitude Screening Test (Cobb & Nelson,

1974). Cobb and Nelson (1974) further explained that during the 1960s air traffic

volume grew 100%, but the ATC workforce grew only by 10%. The FAA responded by waiving the CSC ATC Aptitude Screening Test, and the agency began hiring applicants with highly specialized air traffic control experience. A study in 1973 by the FAA's CAMI produced evidence showing highly specialized ATCS candidates success rate in training was slightly higher than ATCS candidates with little or no air traffic control experience (Cobb & Nelson, 1974).

Prior to the 1970s, the predominant source of air traffic control applicants was the military (Boone, 1978). Prior air traffic control experience gained from the military was seen as relative to FAA air traffic training success, but women and minority air traffic applicants were not likely to emerge from the military with air traffic control experience (Boone, 1978). Four decades have passed since the FAA recognized a need to address the lack of diversity amongst its air traffic control workforce, but 2011 data showed only marginal progress for the agency in accomplishing this task.

Over the past 5 decades, the FAA and the collegiate aviation community have been partnered in training future ATCS (Ruiz & Ruiz, 2003). An evaluation of the FAA's initial AT-CTI schools (formerly named CTI-ATCS) led to an expansion of the program in 1997 (Jorgenson, 2013). The number of schools in the program expanded from five to 13 (Jorgenson, 2013). The AT-CTI program would continue to expand in 2007, 2008, and 2009 to 22, 30, and 36 respectively (Jorgenson, 2013). Prior to 2002, AT-CTI graduates were hired directly into assigned facilities (FAA, 2007; Jorgenson, 2013). After 2002, AT-CTI graduates were sent to the FAA's Academy for technical skill-building training prior to reporting to their assigned facility (Jorgenson, 2013).

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Lent and Brown (1996) explained the process of academic and career choice development promoting career-relevant choices and the attainment of various levels of performance and persistence in educational and career pursuits. "SCCT highlights three intricately linked variables through which individuals help to regulate their own career behavior: self-efficacy beliefs, outcome expectations, and personal goals" (Lent & Brown, 1996, p. 312). Lent et al. (1994) developed SCCT to discuss career-related interest, choice, and performance processes within the interaction of an individual's vocational interests, occupational choice, and career-related performance. Building off the triadic reciprocal causation model of personal factors, environmental factors, and observable behavior developed by Bandura in 1986, SCCT theorizes individuals regulate their career behavior through a complex interaction of three variables: self-efficacy beliefs, outcome expectations, and personal goals.

There has been a focus on the underrepresentation of women and minorities in the field of vocational psychology for over 4 decades (Fouad & Santana, 2017). During that time, "women and racial-ethnic minorities have continued to be underrepresented in

many STEM occupations despite some 40 years of trying to understand why" (Fouad & Santana, 2017, p. 34). STEM fields are important for the United States to remain a global leader in aviation including ATC (FAA, 2015). Women and minorities experience higher unemployment than White males in STEM occupations (as cited in Fouad & Santana, 2017).

An inquiry into SCCT and African Americans in higher education explains how SCCT research can explain African American college students' interest development and career choice goals (Dickinson et al., 2017). African Americans are underrepresented in career development literature. Little knowledge exists about African Americans' career learning and growth and how best to facilitate their career learning and growth (Owens et al., 2010; Walsh et al., 2001). Career theories do not always account for the narratives of racial/ethnic minority groups, but SCCT accounts for unique career development experiences of diverse populations (as cited in Dickinson et al., 2017).

Chapter 3: Research Design Methodology

This chapter explains in detail how the researcher conducted a phenomenological

qualitative research study exploring the lived experiences of African American males and

females who became Air Traffic Control Specialists (ATCS) utilizing the Air Traffic -

Collegiate Training Initiative (AT-CTI) pathway. This chapter explains the current

staffing issues for the ATCS profession and focuses on workforce diversity issues

stemming from a lack of diversity in the FAA's AT-CTI hiring pool. Chapter 3 provides

detailed descriptions of where and how the study was performed. Specific information

about the participants of the study are detailed in this chapter, and this chapter also

provides specific information about the semi-structured interview questions.

General Perspective

The FAA's ATCS workforce has been in steady decline since 2012. The

declining number of federal ATCS threatens a $1.5 trillion aviation economy in the

United States. The results of fewer controllers are increased delays and cancelled flights

(NATCA, 2018). Additionally, the controller workforce is predominantly White male

(Carey, 2014). Diversity amongst ATCS is another troubling trend for the FAA

(McCartin, 2011). According to Outtz and Hanges (2013), an underrepresentation of

minorities, including women, exists among the candidates who were hired successfully in

the FAA ATCS centralized hiring process. Between 2007 and 2011, ATCS candidates

hired by the FAA through the agency's higher education program were 70.4% White and

73.6% male (Outtz & Hanges, 2013). During that same time, 5% of the college graduates were African American (APTMetrics, 2013).

To study the underrepresentation of African American ATCS candidates at the collegiate level, this qualitative methods study explored the experiences of African American ATCS who studied air traffic control in higher education. The purpose of this study was to understand: (a) what SCCT factors determine whether African Americans will pursue an air traffic control career, (b) what SCCT factors determine African Americans' pursuit of an air traffic control career utilizing the AT-CTI path, and (c) what do current African American ATCS recommend for recruiting more African American candidates into the ATC profession utilizing the AT-CTI path?

Past studies about SCCT, including its applicability to African Americans and to STEM fields, have been quantitatively designed. The researcher had elected to study the underrepresentation of African Americans ATCS through the SCCT lens qualitatively to explore the lived experiences they share. A phenomenological design allowed the researcher to identify the subjective and objective experiences of the participant group that may be commonly identified with other African Americans.

Research Context

This study was conducted by telephone. There was no research site. Participating African American ATCS were located throughout the United States at various FAA ATC facilities, and they work various shifts over 24-hours. Also, African American, male and female FAA ATCS who have obtained a full certified professional controllers (CPC) status make up a small number of an already small workforce. Therefore, the sampling strategy for this qualitative inquiry was purposeful sampling.

Research Participants

The participants of this study were African American, male and female, ATCS. These ATCS graduated from an AT-CTI institution and were hired by the FAA through the AT-CTI pathway. The participants were recruited from a list of Black/African American, male and female, AT-CTI alumni provided by one of 36 institutions participating in the FAA's AT-CTI program (see Appendix A). Utilizing the list of Black/African American, male and female, AT-CTI alumni provided by the institution, the researcher emailed an introductory letter to the Black/African American, male and female, AT-CTI alumni describing this research that was exploring the experiences of African American ATCS who studied air traffic control in higher education (see Appendix B). The letter solicited their voluntary participation by asking the addressees to reply to the email agreeing to participate in this study. The Black/African American alumni, male and female, AT-CTI alumni who responded to the email were considered for this study.

For this study, a population of 72 Black/African American AT-CTI alumni of an AT-CTI college's alumni list were invited to participate in this study. The AT-CTI college alumni association provided the names of past graduates from their AT-CTI program and the last known contact email address of each alumni member. The AT-CTI alumni association did not provide graduation dates, FAA hiring date, and FAA pathway hired. A total of 10 respondents replied to the invitation. The majority of the responses occurred within 1 week of receiving the invitation, and all of the responses were received within 1 month. After replying to the initial invitation, the respondents confirmed with the researcher their eligibility for this study – African American, ATCS-CPC, and the

respondent was hired through the AT-CTI pathway. Once the respondents' eligibility for this study was confirmed, a total of eight respondents were allowed to participate in this study which resulted in an 11% response rate. The participants are identified in the study as P1 through P8.

Data Collection Instruments

The primary research instrument in a qualitative study was the researcher, and it is important for the researcher to disclose his position to the research (Creswell & Poth, 2018). Therefore, it is important to understand the position of the researcher in this study as an African American ATCS who has achieved CPC status. The researcher was hired by the FAA through the AT-CTI pathway, and he is also an FAA AT-CTI institution alumnus. Due to a lack of African American ATCS who have been hired by the FAA through the AT-CTI pathway, a previous relationship between the researcher and the participants may exist. However, the researcher did not have any influence or bearing on the participants' responses because the researcher does not hold any position of authority over other ATCS at any facility. The researcher's disclosure about his position in this study was his attempt to be reflexive. Creswell and Poth (2018) suggest researchers performing qualitative studies record reflexive comments that provide a self-understanding about any biases, values, and experiences that are brought to a particular study.

The Air Traffic Control Specialist Semi-Structured Interview Protocol (ATCS-SSIP), a 16-item semi-structured interview guide was used to explore the participants' self-reported in-depth responses to the experience of being a Black/African American, male or female, ATCS who chose the FAA AT-CTI pathway to become an FAA ATCS.

The researcher validated the ATCS-SSIP instrument by triangulation. First, the instrument was reviewed by African American ATCS-CPC who did not get hired utilizing the AT-CTI pathway. Second, the instrument was piloted by the researcher conducting semi-structured interviews with African American ATCS-CPC who did not get hired utilizing the AT-CTI pathway. The ATCS-SSIP can be viewed in Appendix C.

Data collected from the use of the appendixes and from the AT-CTI institution is secure in a password protected file on a password protected external hard drive. The researcher conducted semi-structured interviews and used pseudonyms to protect the identity of the participants. The participants' identities remain anonymous and confidential in a password protected file on a password protected external hard drive. The password protected external hard drive is secured in a locked cabinet or safe. The data will be destroyed in 3 years. The participants were provided an informed consent form to notify them of their rights and receive their signed consent prior to initiating the interview (see Appendix D).

Data Analysis Procedures

The researcher chose a qualitative design for this study. Creswell and Poth (2017) suggest phenomenological studies are best suited for research that attempts to describe a common meaning for the lived experiences of several individuals. The use of psychologist Moustaka's hermeneutical phenomenology approach is suggested for its systematic steps to analyzing the data and to interpret the texts of life (Creswell & Poth, 2018). The participants' interviews were recorded with audio recording equipment and transcribed. Pseudonyms were used in place of the participants' names to ensure anonymity. The recordings and transcription files are stored in a password protected file

on a password protected external hard drive. The external hard drive is kept in a locked

cabinet or safe. As suggested by Creswell and Poth (2018), transcriptions of each

participant were segmented, coded, and analyzed. Afterwards, themes were created from

the data that emerged. The data were summarized in a composite description by using

textural and structural descriptions.

The researcher utilized open-ended questions in this study. According to

Creswell and Poth (2018), the participants' best opportunity to provide data in a

qualitative study is through the use of open-ended questions. The literature and

theoretical frame used in this study drove the open-ended questions through global

research questions. Creswell and Poth (2018) also recommend intercoder agreement to

ensure the reliability of the research. Multiple coders were used to analyze transcript

data. The coders were provided segments of transcripts with the associated pseudonyms

to ensure the stability of responses to multiple codes of the data. The coders possess a

doctorate degree.

The interviews were recorded and transcribed by a third-party transcription

service. Two additional interviews with African American ATCS who attended and

completed an ATC program at an AT-CTI institution but were not hired through the AT-

CTI pathway were used to check for validity and reliability of the ATCS-SSIP.

Segments of the transcriptions of these two transcriptions were provided to two coders to

confirm accuracy of descriptions or themes identified by the researcher.

The committee coded the data and organized large pieces of data into assertions

and/or descriptions. Inductive data analysis was performed to build codes, categories,

and themes sourced from the raw data collected. The researcher utilized a multistep

process of coding and analysis in three different stages. During the first stage – open

coding, the researcher coded segments of the transcripts from the participants who were

not hired through the AT-CTI pathway to record inductive/emergent codes based on first

impressions from the readings.

Additionally, the researcher read the entire transcript of both participants who

were not hired through the AT-CTI pathway and recorded a new set of in vivo codes

based on distinctive terms used by the participants. Finally, the researcher became

further immersed in the coding process by reading the entire transcript of both

participants who were not hired through the AT-CTI pathway again and separately

coding the transcripts using a priori codes based on the research from the review of the

literature for this study.

During the second stage – axial coding, the committee collaborated on the final

set of codes that would be used for this analysis of the entire transcript of all participants

who were hired through the AT-CTI pathway. Once the codes of the transcriptions were

agreed upon between the researcher and the multiple coders, assertions based on the

codes were developed into categories. Finally, in the third stage – selective coding, the

committee grouped the codes and categories into several themes.

Chapter Summary

This chapter explains in detail how the researcher conducted a phenomenological

qualitative research study exploring the lived experiences of African American, males

and females, who became ATCS utilizing the AT-CTI pathway. This study was

conducted by telephone. There was no research site. The participating African American

ATCS were located throughout the United States at various FAA ATC facilities and

worked various shifts over 24-hours. Also, African American, male and female, FAA ATCS who have obtained a CPC status make up a small number of an already small workforce. Therefore, the sampling strategy for this qualitative inquiry was purposeful.

The participants of this study were African American, male and female ATCS. These ATCS graduated from an AT-CTI institution and were hired by the FAA through the AT-CTI pathway. The participants were recruited from a list of Black/African American, male and female, AT-CTI alumni provided by one of 36 institutions participating in the FAA's AT-CTI program (see Appendix A).

The primary research instrument in a qualitative study is the researcher, and it is important for the researcher to disclose his position to the research (Creswell & Poth, 2018). Therefore, it is important to understand the position of the researcher in this study as an African American ATCS who has achieved CPC status. The researcher was hired by the FAA through the AT-CTI pathway, and he is also an AT-CTI alumnus. Due to a lack of African American ATCS who have been hired by the FAA through the AT-CTI pathway, a previous relationship between the researcher and the participants may exist. However, the researcher would not have any influence or bearing on the participants' responses because the researcher does not hold any position of authority over other ATCS at any facility.

The Air Traffic Control Specialist Semi-Structured Interview Protocol (ATCS-SSIP), a 16-item semi-structured interview guide was used to explore the participants' self-reported in-depth responses to the experience of being an African American, male or female, ATCS that chose the FAA AT-CTI pathway to become an FAA ATCS (see Appendix C). The researcher chose a qualitative design for this study. Creswell and

Poth (2017) suggest phenomenological studies are best suited for research that attempts to describe a common meaning for the lived experiences of several individuals. The use of psychologist Moustaka's (1994) hermeneutical phenomenology approach was suggested for its systematic steps to analyzing the data and to interpret the texts of life (Creswell & Poth, 2018). The ATCS-SSIP was reviewed by African American, male and female, ATCS-CPC who did not get hired utilizing the AT-CTI pathway. The interview guide was piloted by African American, male and female, ATCS-CPC who did not get hired utilizing the AT-CTI pathway. Multiple coders were used to analyze transcript data. The coders were provided segments of transcripts with the associated pseudonyms to ensure the stability of responses to multiple codes of the data. Multiple coders are recommended to ensure the reliability of the research (Creswell & Poth, 2018).

Chapter 4: Results

This chapter will display the results of the semi-structured interview of eight African American ATCS participants who volunteered to participate in this study. The data collected were the product of the Air Traffic Control Specialist Semi-Structured Interview Protocol (ATC-SSIP). The results are displayed using various tables to summarize the experiences shared by the participants. Multiple quotes taken from the participants are included to provide additional context to the narratives of the participants.

Research Questions

The purpose of this study was to explore the experiences of African American ATCS who attended an AT-CTI college and were hired by the FAA through the AT-CTI pathway. Qualifying African American ATCS were those who graduated from an AT-CTI college and were hired by the FAA through the AT-CTI pathway within the last 2 decades. This chapter will report the findings of the three research questions guiding this study:

1. What SCCT factors determine whether African Americans will pursue an air traffic control career?

    a. What self-efficacy beliefs do African American ATCS share about ATC?

    b. What outcome expectations beliefs do African American ATCS share about ATC?

c. What choice and performance goals do African American ATCS share about ATC?

2. What SCCT factors determine African Americans' pursuit of an air traffic control career utilizing the AT-CTI path?

a. What self-efficacy beliefs do African American ATCS share about college?

b. What outcome expectations beliefs do African American ATCS share about the AT-CTI pathway?

c. What personal goals do African American ATCS share about CTI institutions?

3. What do current African American ATCS recommend for recruiting more African American candidates into the ATC profession utilizing the AT-CTI path?

Eight African American ATCS were recruited from colleges partnered with the FAA's AT-CTI program to participate in this study. Predominantly, there are three types of controllers: (a) Tower Controllers – controllers who primarily guide and separate aircraft based on their view of the aircraft from an ATC tower located at an airport; (b) Terminal RADAR Approach Control (TRACON) controllers – controllers who guide and separate aircraft within the vicinity of an airport based on a RADAR presentation; and (c) En-Route Controllers – controllers who guide and separate aircraft outside of the vicinity of an airport based on a RADAR presentation (FAA, 2014). Some ATCS possess multiple types of controller certification.

Data Analysis and Findings

The FAA's air traffic controller workforce is approximately 85% White male (Carey, 2014). Five percent of the AT-CTI applicants hired between 2007 and 2011 were African American (APTMetrics, 2013). Therefore, the community of African American ATCS who were hired through the AT-CTI pathway is relatively small within the overall air traffic controller workforce. In the interest of protecting the anonymity of the participants, demographic data about the participants' age, gender, and location were not recorded. The results of the findings focused on the major tenets of SCCT – self-efficacy (SE) and outcome expectations (OE) (Lent & Brown, 1996). An additional focus of the results was placed on the educational and/or career goals of the participants because SCCT purports the participants' efforts are required for their individual success (Lent & Brown, 1996). The final focus was placed on what the participants suggest the FAA and AT-CTI institutions do to recruit and retain more African Americans to pursue a career in ATC utilizing the AT-CTI pathway.

Descriptive statistics. The data collected were analyzed using descriptive statistics to assess the background of the participants. Table 4.1 outlines the demographic profile of the eight African American ATCS: (a) in which STEM fields the participants considered themselves to be strong, (b) the highest education degree/diploma the participants earned prior to enrolling at the AT-CTI college of their choice, and (c) other careers the participants had considered at the time they decided to pursue a career in ATC. The participants were allowed to select more than one STEM field, and 62.5% selected two or more. Three or more STEM fields were selected by 25% of the participants. All of the participants, except for two, entered their AT-CTI program with a

high school degree. Numerous other career interests were revealed during the interview,

but 87.5% of the participants named an aviation related career.

Table 4.1

Demographic Profile of Eight African American Air Traffic Control Specialists

Variable	*n*=8	%
STEM		
Science	3	37.5
Technology	6	75
Engineering	0	0
Math	6	75
Highest Education Level prior to entering AT-CTI institution		
High School Diploma	6	75
Associate Degree	1	12.5
Bachelor's Degree	1	12.5
Other careers considered		
Aircraft Mechanic	2	25
Airport Management	1	12.5
Computer Science	1	12.5
Finance	1	12.5
Flight/Pilot	4	50
Flight Attendant	1	12.5
Intelligence	1	12.5
Law Enforcement	2	25
Marketing	1	12.5
Stockbroker	1	12.5
Teacher	1	12.5
Controller Type		
Tower Controller	4	50
TRACON	1	12.5
En-Route	4	50

Note. All eight of the African American Air Traffic Control Specialists graduated from an Air Traffic Collegiate Training Initiative (AT-CTI) college and were hired by the FAA through the AT-CTI pathway.

Qualitative results. In accordance with the research design of this study, a

phenomenological qualitative study of African American ATCS who attended an AT-CTI

college was performed to: (a) identify what attracts African Americans to pursue a career

in ATC, (b) understand why some African Americans utilize the AT-CTI path to pursue a career in ATC, and (c) identify what recruitment techniques the FAA and AT-CTI schools can utilize to recruit more African Americans to pursue a career in ATC. Data were collected using semi-structured in-depth one-on-one interview questions. In an effort to answer the research questions of this study, African American ATCS were asked to share their experiences on becoming an ATCS and what could be done to attract more African Americans to pursue a career in ATC. Several assertions were generated as a result of the data collected from the interviews. The resulting codes, categories, and themes are organized into Table 4.2.

Self-efficacy (SE). Self-efficacy, an individual's belief in their ability to accomplish a task (Bandura, 1986), was measured by recording the assertions of the participants when answering questions related to research question 1: What SCCT factors determine whether African Americans will pursue an air traffic control career? To answer the first research question, participants were asked to describe their degree of confidence in respect to: (a) their general and specific abilities as an air traffic controller, (b) becoming a future air traffic controller after learning about the career, (c) their ability to complete the AT-CTI program, (d) their confidence level at the end of the AT-CTI program, and (e) what has been the most important factor that helped increase their confidence to complete the daily duties of an ATCS? All of the participants were certain about their choice to pursue ATC and pursue the career through the CTI pathway. They were certain about their choice despite there being no guarantees that the participants would be hired by the FAA. However, either a lack of choice or a lack of understanding that they had a choice to be hired as an off-the-street (OTS) hire was also expressed.

Table 4.2

Summary of the Codes, Categories, and Themes

Codes	Category	Themes
Challenging, confident, controller in charge (CIC), driven, expectation, experience level, extremely confident, felt ready, great deal of confidence, high, highly confident, I know how to do my job, I had confidence in my work ethic, confidence is high, self-doubt, strong, success in ATC, teaching ATC, training, uncertainty	Certitude	Self-Efficacy (SE)
Addressing problems in a timely manner, confidence in decisions, critical thinking, focus, I've always been an analytical person, planning, problem/conflict recognition, problem solving, recognition of problems before they develop	Decisiveness	
A lot of experience, accumulated years of air traffic experience, been there long enough, buckle down, dealt with heavy pushes, decade or more years of experience, difficult training, have seen emergencies, seen a lot of different things, study, training	Experiences (Hands-On)	
Aviation summer camp experience, completed CTI program, completed degree, conversations about aviation, flew once a week and spoke with controllers on frequency, great academic background, I visited JFK Tower, open to aviation at an early age through family engagement, terrible hiring experience, training, travel by flight	Prior Experiences (Lived)	Outcome Expectation (OE)
financial security, get hired in NYC, high paying, highly specialized, income that sustain and provide for future, learn on the job each day, lots of overtime, one hundred thousand dollars, paid a lot of money, provide information and groundwork needed to pass FAA academy, provides time to be at home, RADAR, shift work, work in a dark room, work in air conditioned spaces, work holidays, work special hours, work weekends	Expected Career Challenges & Rewards	
A challenging career, a fulfilling career, benefits, demanding job, early retirement, financial security for family, get hired in NYC, how a person can benefit from a career in ATC, how a person in ATC can make a difference in aviation, I wanted to do ATC, I'll be making six figures, my career goal, never bored, retirement after 25 yrs., retiring in your mid-40s, salary, saving lives, something to look forward to every day, stability, submit paperwork in a timely fashion, what a career in ATC could do for a person's future	Motivating Factors	
Aviation enthusiast, collected airplane cards (similar to baseball cards), general academic interest, I was passionate about aviation, loved aviation since junior high school, my love for aviation, parents and family bought aviation books	Interests	Educational/ Career Goals
ATC classes, aviation classes, complete CTI program and gain air traffic knowledge and necessary steps to get hired by FAA, complete CTI program and submit application ASAP, CTI Program, curriculum, electives, fulfill course requirements, get a degree with CTI certificate, get recommended, have paperwork in for next hiring bid, hiring steps, main course to study, pass OPM exam, personal goals, required classes, straight forward, tedious, tricky, weather classes	Roadmap/Steps to Successful Hire	
Awareness, getting out into the African American community, participate in career days,	Community Involvement	Recruitment
Find ways to reach inner city communities, inner city where I grew up, job fair in urban neighborhoods, not reaching the kids they need to reach	Urban Area	
Explain to them, explanation of aviation roles, reach kids in high school, speak about ATC, talk to them, target certain high schools	Verbal Persuasion of High Schoolers	

Note. The eight participants were asked 16 questions in a semi-structured interview. Most of the participants attended their AT-CTI school for the purposes of pursuing a career in ATC.

Table 4.3 provides examples shared by African American ATCS about their confidence. These experiences were categorized under certitude as they revealed feelings about confidence in their general and specific abilities as an ATCS.

Table 4.3

Summary of the Certitude to Pursue an ATC Career Recollections That Helped Shape the Self-Efficacy Expectations of African American ATCS Participants

Category	Theme	Frequency	Quote
Certitude	SE	8	"Just every day training, hours and hours, and getting certified and getting sectors. That's where the confidence comes from so yeah" (P5).
			"That with all the training that we have to go through and all the pressure that they put on you during the training, it definitely does boost your confidence" (P6).
			"I really didn't know how difficult or easy it would be. That really never crossed my mind, I don't think. I feel like I had a pretty good ability to learn" (P7).
			"I had confidence in my work ethic" (P8).

Note. The responses categorized under certitude were derived from a series of questions pertaining to participants' confidence including their confidence in completing the AT-CTI program and becoming a future air traffic controller.

When analyzing the participants' certitude narratives, recollections about their state of being or feeling certain, all of the participants expressed confidence in their decision to pursue ATC and their current abilities as a controller. Their confidence was tied strongly to the training they received after being hired by the FAA. The participants were all certain about their abilities as an ATCS because of this training. Reflecting on their confidence at the time of their enrollment into the AT-CTI program at the college

they attended, the participants were not always certain because the AT-CTI program at their location was new and/or studying aviation specific courses was new to the participants. The participants shared that their confidence routinely cycled between low and high once they were hired by the FAA and proceeded to continue training as an FAA employee. However, the participants also shared that taking AT-CTI courses did provide some level of confidence overall.

The En-Route participants (P2, P5, P6, P8) had varied opinions about their confidence in respect to the AT-CTI college they attended. Their varied opinions were due to the schools they attended not having a program in place for graduates that would become En-Route Controllers. The schools they attended focused on terminal controllers – Tower Controllers and TRACON Controllers. Half of all of the participants entered their AT-CTI program with low confidence. Three of the four participants who initially had low confidence finished their AT-CTI program with high confidence. All of the other participants finished their AT-CTI program with high confidence.

Table 4.4 provides example quotes shared by African American ATCS about their decisiveness. These narratives were categorized under decisiveness as they revealed their feelings about being resolute and determined. When analyzing the participants' decisiveness narratives, recollections about their ability to be resolute and/or determined, all of the participants expressed confidence in their decision-making abilities as a controller. This ability was tied strongly to their ability to filter excess information and focus on the data necessary to make informed decisions.

Table 4.4

Summary of the Decisiveness Recollections That Helped Shape the Self-Efficacy

Expectations of African American ATCS Participants

Category	Theme	Frequency	Quote
Decisiveness	SE	8	"I can focus on just that one thing" (P7).
			"I've always been an analytical person, which is why the job of air traffic control appealed to me personally" (P8).

Note. The responses categorized under decisiveness were derived from a series of questions pertaining to participants' confidence including their confidence in completing the AT-CTI program and becoming a future air traffic controller.

Table 4.5 provides examples shared by African American ATCS about mentoring. These experiences were categorized under mentoring as they revealed their feelings about being counseled and guided.

Table 4.5

Summary of the Mentoring Recollections That Helped Shape the Self-Efficacy

Expectations of African American ATCS Participants

Category	Theme	Frequency	Quote
Mentoring	SE	2	"Wow, this guy is an air traffic controller, for lack of a better word. That really resonated and let me say, You know what? This is something I can do as well" (P3).
			"I met a controller in high school. . . meeting this guy kind of swayed my decision and I said let me try this air traffic control" (P5).

Note. The responses categorized under mentoring were derived from questions pertaining to whether or not the participants met a controller prior to enrolling in the AT-CTI program.

Most of the participants were not mentored at their AT-CTI institution. However, they expressed the importance of mentoring in their ATC career. All of the participants received some form of mentoring once they were hired by the FAA and passed their initial training in Oklahoma City, OK.

Table 4.6 provides examples shared by African American ATCS about problem solving. These experiences revealing opinions about problem solving as one of the critical skills necessary to become an ATCS were categorized under problem solving.

Table 4.6

Summary of the Problem-Solving Recollections That Helped Shape the Self-Efficacy Expectations of African American ATCS Participants

Sub-theme	Theme	Frequency	Quote
Problem-Solving	SE	7	"Your job is based off solving a problem" (P4).
			"Planes in conflict and you have to solve them very quickly and be confident in that decision. So absolutely. Problem-solving is big" (P5).
			"You must be a problem solver and you have to think outside the box because you always have situations that come up and you have to find a solution to it" (P6).
			"Between critical thinking and problem-solving, those are the two most important things, because often we are not really given a clear outcome, but we do have enough of the tools and enough of the experience to come up with decisions that can lead to better outcomes" (P8).

Note. The responses sub-themed problem solving were derived from questions pertaining to whether or not the participants felt problem solving is an essential skill necessary to become an ATCS.

Table 4.7 provides examples shared by African American ATCS about critical thinking. These experiences revealing opinions about critical thinking as one of the crucial skills necessary to become an ATCS were categorized under critical thinking.

Table 4.7

Summary of the Critical Thinking Skills Recollections That Helped Shape the Self-Efficacy Expectations of African American ATCS Participants

Sub-theme	Theme	Frequency	Quote
Critical Thinking	SE	6	"You have to think critically all the time" (P4).
			"I think critically, I analyze things. I like to make sure that decisions are based on a certain level of information" (P7).
			"Critical thinking is a difficult skill to learn and to develop, and it's a fundamental skill that I think many of the higher-performing controllers do very well" (P8).

Note. The responses sub-themed critical thinking were derived from questions pertaining to whether or not the participants felt critical thinking is an essential skill necessary to become an ATCS.

The participants shared strong feelings towards the importance of problem-solving and critical as necessary skills to successfully become an ATCS. The participants were forceful in their opinions on the importance of utilizing these skills daily as a controller. A lot of emotions were expressed when the topics of problem-solving and critical thinking emerged.

Table 4.8 provides examples shared by African American ATCS about education/learning. These opinions about the role education/learning played in the participant becoming an ATCS were categorized under education/learning.

Table 4.8

Summary of the Education/Learning Recollections That Helped Shape the Self-Efficacy

Expectations of African American ATCS Participants

Sub-theme	Theme	Frequency	Quote
Education/Learning	SE	5	"You are learning something new every day" (P3).
			"You constantly have to review things so that you're up to date with changes" (P7).
			"I'm a big reader and I'm always trying to find a new way of seeing things" (P8).

Note. The responses sub-themed education/learning were derived from questions pertaining to whether or not the participants considered themselves lifelong learners.

Many of the participants shared their belief that they were lifelong learners. These participants also shared the importance of being a lifelong learner as a controller because of the numerous changes that take place in aviation. They felt that being open to continuous learning allowed them to build greater confidence in their abilities over their fellow controllers who do not share the same enthusiasm for learning.

Table 4.9 provides examples shared by African American ATCS about their time/experience as an ATCS. These experiences about their role time/experience played a role in the participants' self-efficacy and were categorized as time/experience.

The experience level of the participants varied greatly. However, the participants who distinctly referenced their years controlling clearly voiced the connection between their years of experience and their level of confidence as an ATCS. Despite a wide range in years of experience controlling, the confidence levels expressed were similar.

Table 4.9

Summary of the Experience and Time Invested Narratives That Helped Shape the Self-

Efficacy Expectations of African American ATCS Participants

Sub-theme	Theme	Frequency	Quote
Time/Experience	SE	5	"I've been on the job 15 years now. The first 4 or 4 and a half years were training. And I've been certified for at least 9 years now so I have a lot of experience and I've seen a lot of different things that happen at work. So I feel very confident. I've been there long enough." (P5) "I've been doing air traffic control for 10 years now, I've also learned a lot about decision-making and I think a lot about human factors" (P8).

Note. The responses sub-themed time/experience were derived from a series of questions pertaining to participants' confidence.

Table 4.10 provides examples shared by African American ATCS about their

feelings towards the AT-CTI program providing an advantage over non-CTI candidates.

These opinions about AT-CTI candidates having an advantage over non-CTI candidates

were categorized as CTI advantage over OTS hire.

Table 4.10

Summary of the CTI Advantage Narratives That Helped Shape the Self-Efficacy

Expectations of African American ATCS Participants

Sub-theme	Theme	Frequency	Quote
CTI Advantage Over OTS Hire	SE	3	"The things that I learned definitely gave me an advantage compared to those who may have been hired off of the street" (P1).

Note. The responses sub-themed CTI advantage over OTS hire were derived from questions pertaining to participants' feelings on any perceived advantage over non-CTI candidates.

Very few participants expressed any feeling of having an advantage becoming an ATCS by attending an AT-CTI school. In addition, three out of four participants who self-identified as ATCS who work at an En-Route facility revealed a negative opinion towards the AT-CTI program they attended. These negative opinions were centered around a shared opinion that the AT-CTI school they attended focused on the terminal aspects of air traffic control. Therefore, these three participants felt ill-prepared for En-Route curricula once they were hired by the FAA. Table 4.11 provides examples shared by African American ATCS about their feelings towards taking initiative. These opinions about taking initiative were categorized as takes initiative.

Table 4.11

Summary of the Personal Initiative Recollections That Helped Shape the Positive Self-Efficacy Expectations of African American ATCS Participants

Sub-theme	Theme	Frequency	Quote
Personal Initiative	SE	4	"You have to take the time to actually go out and find whatever it is you're looking for so that you know the appropriate way to do different things" (P7).
			"I've kind of taken it upon myself to learn things or to investigate different areas that I can sharpen my ability beyond just maybe the scope or learning and understanding the orders" (P8).

Note. The responses sub-themed personal initiative were derived from questions pertaining to participants' feelings about the importance of taking initiative in their training success.

The participants who responded on the subject of personal initiative repeatedly spoke about the need to seek answers. The opinions shared revealed that once these participants were hired, they received little assistance obtaining knowledge necessary to

become successful in their ATC learning. Alongside being a lifelong learner, taking

initiative to seek out answers to their own questions about the profession was another

skill necessary to becoming a fully certified ATCS.

Outcome expectation (OE). Outcome expectation, an individual's beliefs about

the results their action (Lent & Brown, 1996), was measured by recording the assertions

of the participants when answering questions related to the research question 2: What

SCCT factors determine African Americans' pursuit of an air traffic control career

utilizing the AT-CTI path? To answer the second research question, participants were

asked to describe (a) their expectations of the ATC career, (b) their expectations of the

AT-CTI program they attended, (c) how their expectations helped them finish their AT-

CTI program, and (d) how their expectations were met or unmet.

Table 4.12 provides examples shared by African American ATCS about their

outcome expectation in regard to their prior experiences. These experiences were

categorized under prior experiences.

The prior experiences revealed by the participants were centered around airport

environments. Some participants were admitted access into an air traffic control tower.

Other participants had frequent visits to airports. The airport environment and the

experience of observing aircraft land and depart from an airport was a consistent lived

experience amongst the participants.

Table 4.12

Summary of the Prior Experiences with Air Traffic Control Recollections That Helped

Shape the Career-Related Outcome Expectations of African American ATCS Participants

Category	Theme	Frequency	Quote
Prior Experiences	OE	5	"Watching the air traffic controllers at JFK airport talk to the airplanes and give them the commands at the time I didn't know what they were saying, what they were doing, but watching people do take-off and landing and moving the airplanes on the ground, that is when I walked away from there, I said, This is absolutely what I want to do." (P3)
			"We visited the tower. It was just LaGuardia Tower and Kennedy Tower" (P5).
			"I spoke to a few pilots about it who were also interested in air traffic control but became pilots instead. And they also encouraged me to go along with that. ... to go along that route" (P6).
			"We visited I think it was Boston Center, and I think also maybe a tower up there like Nashua or Manchester" (P8).

Note. The responses categorized under prior experiences were derived from questions pertaining to participants' experiences that exposed them to air traffic control prior to enrollment in their AT-CTI program.

Table 4.13 provides examples shared by African American ATCS about their outcome expectation in regard to their expected career rewards. These experiences were categorized under expected career rewards. The responses provided by the participants to questions about their expected career rewards varied widely. There were responses about compensation and benefits associated with the career. In addition, participants that had knowledge about the work schedules of professional pilots spoke about more desirable

work schedules relative to their pilot counterparts. Other participants spoke about pride and professionalism when reflecting upon their expected career rewards.

Table 4.13

Summary of the Expected Career Rewards Recollections That Helped Shape the Career-Related Outcome Expectations of African American ATCS Participants

Category	Theme	Frequency	Quote
Expected Career Rewards	OE	6	"It just seems like, when I've seen either movies or shows, that they always show the controllers in the dark room working off RADAR scope. Everybody's making 100 thousand dollars" (P4).
			"Started at 21. I could retire at 46 after 25 years. That's another motivator. I say more than the money it's the retirement after 25 years at the age that I started" (P5).
			"I knew it was a very important job and I wanted to be a part of that. When I heard how the job was and the responsibility and all that stuff, it was appealing to me" (P6).
			"I thought that it would provide me some time to be at home versus if I was a pilot I'd be on the road or that sort of thing" (P8).

Note. The responses categorized under expected career rewards were derived from questions pertaining to participants' life expectations from a career in ATC before enrolling in an AT-CTI program.

The majority of the participants discussed various unmet expectations. Time off from work was the most popular unmet expectations discussed by the participants. One participant stressed the point that controllers are averaging 4 days off from work every month. However, another participant revealed that the minimal time off from work was expected. That participant cited the effects of the post Professional Air Traffic

Controllers Organization strike. Additionally, that same participant welcomed the

minimal days off from work because it provided extra earning power in terms of overtime

wages. Table 4.14 provides examples shared by African American ATCS about their

outcome expectations in regard to motivating factors. These experiences were

categorized under motivating factors.

Table 4.14

Summary of the Motivating Factors Recollections That Helped Shape the Career-Related

Outcome Expectations of African American ATCS Participants

Category	Theme	Frequency	Quote
Motivating Factors	OE	8	"I also expected a level of income that can sustain and provide for my future" (P1).
			"I would say that's number one. Being able to retire early. And number two is the money" (P5).
			"I think the fact that we're keeping people alive in certain instances, not even just getting them from one place to another where they can see family and all that, just the fact that we're maintain a certain level of safety within the operation. I feel like that's what motivates me" (P7).
			"It is as demanding as I thought it would be and hoped it would be and then some. And it's definitely been a great learning opportunity and I've very rarely, I don't think I've ever really, found myself bored or lacking something important to do. And so it really did meet that expectation of giving me something that I can look forward to each day, and something that I enjoy." (P8)

Note. The responses categorized under motivating factors were derived from questions pertaining to participants' motivations to pursue a career in ATC.

The responses provided by the participants to questions about motivating factors were consistently linked to compensation and benefits. The participants were aware of their potential to make a good income and how that income could life-changing for them and their family. However, the participants also voiced many views on their role in guiding people safely through the skies and how that aspect of the career was very appealing. Another motivating factor that was expressed was the atypical aspect of the job. The participants talked about the career having enough variety to break from norms and routine.

Table 4.15 provides examples shared by African American ATCS about their experience meeting an ATCS prior to enrolling in the AT-CTI program. These experiences were categorized under – met an ATCS prior to enrolling in CTI Program.

Table 4.15

Summary of the Prior ATSC Encounters Recollections That Helped Shape the Career-Related Outcome Expectations of African American ATCS Participants

Sub-theme	Theme	Frequency	Quote
Prior ATSC Encounters	OE	4	"I met a controller in high school who works at a facility on Long Island and I was originally trying to be a pilot and I met him and talked to him and went from there to see if I could try this profession" (P5).

Note. The responses sub-themed – met an ATCS prior to enrolling in CTI Program – were derived from questions pertaining to whether or not the participants met a controller prior to enrolling in an AT-CTI program.

Half of the participants met an ATCS prior to enrolling in an AT-CTI program, but only one-quarter of the participants viewed that controller as a mentor. The participants expressed the importance of meeting a controller before enrolling into the

AT-CTI program to gain some aspects about the career. Participants who never met an

ATCS prior to enrolling in an AT-CTI program agreed with those who did on the

importance of meeting a controller.

Table 4.16 provides examples shared by African American ATCS about their

experience watching a movie – *Pushing Tin* – that is loosely based on ATC. These

experiences were categorized under movie (*Pushing Tin*).

Table 4.16
Summary of the Movie-Depiction of ATCS Recollections That Helped Shape the Career-

Related Outcome Expectations of African American ATCS Participants

Sub-theme	Theme	Frequency	Quote
Movie (*Pushing Tin*)	OE	2	"I felt my perceptions were probably based on Hollywood. I watched the *Pushing Tin* movie probably too many times. In that movie, the controllers are a little bit more cowboys than anything else, and so I felt that it would be a lot of, I don't know, coming up with things on the fly, snap judgments so to speak. And I expected that it would be demanding and stressful in certain ways." (P8)

Note. The responses sub-themed movie were derived participants who discussed the movie *Pushing Tin* and how the movie provided images of the life of an air traffic controller.

Pushing Tin was released in theatres on April 23, 1999. The movie depicts the

life of an air traffic controller residing in New York. Albert Bandura's work on social

learning theory and theorizes the effects of observation and imitation on learning new

social behaviors. The participants who discussed *Pushing Tin* spoke about the popularity

of the movie amongst current controllers.

Table 4.17 provides examples shared by African American ATCS about being an aviation enthusiast. These experiences were categorized under aviation enthusiast.

Table 4.17

Summary of the Aviation Enthusiast Recollections That Helped Shape the Career-Related Outcome Expectations of African American ATCS Participants

Sub-theme	Theme	Frequency	Quote
Aviation Enthusiast	OE	6	"I loved to watch planes take off and land" (P3). "They sell them little flash cards when I was a kid. Everybody is collecting baseball cards. I was collecting planes like the cards" (P5).

Note. The responses sub-themed aviation enthusiast were derived from questions pertaining to whether or not the participants self-identify as aviation enthusiasts.

The participants who revealed they were aviation enthusiasts spoke candidly on the topic. Many of these participants revealed that their interests in aviation dated back to their childhood. The views they shared were candid and vivid as if during this segment of the interview, they were transformed back to their childhood.

Educational/career goals. Educational/career goals was measured by recording the assertions of the participants when answering questions related to research question 2: What SCCT factors determine African Americans' pursuit of an air traffic control career utilizing the AT-CTI path? To answer the second research question, participants were asked to describe: (a) their plan to becoming hired by the FAA, and (b) their plan to completing the AT-CTI program they attended.

Table 4.18 provides examples shared by African American ATCS about their educational/career goals in regard to their hands-on experiences. These examples were categorized under experiences (hands-on).

Table 4.18

Summary of the Hands-on Experience Recollections That Helped the African American ATCS Participants Achieve Their Educational and Career Goals

Category	Theme	Frequency	Quote
Experiences (Hands-On)	Educational/ Career Goals	6	"In all the years I've accumulated enough ability doing different things and just my awareness of the overall scope of my responsibilities" (P7).

Note. The responses categorized under experiences (hands-on) were derived from a series of questions pertaining to participants' confidence.

The participant responses about their hands-on experiences and their effects on their educational and/or career goals varied widely. Some of the experiences that were shared by the participants were early childhood memories, but some of the experiences that were shared were adult experiences. Most of the respondents had an experience at some point prior to their 18th birthday that shaped their goals.

Table 4.19 provides examples shared by African American ATCS about their educational/career goals in regard to their interests. These examples were categorized under interests.

Table 4.19

Summary of the "Career Interests" Recollections That Helped the African American

ATCS Participants Achieve Their Educational and Career Goals

Category	Theme	Frequency	Quote
Interests	Educational/ Career Goals	5	"It was something I was passionate about and I wanted to do" (P1).
			"My love for aviation" (P3).
			"When I was a kid, I always liked planes, especially military planes. I actually collected . . . I do all the military planes like the vintage ones" (P5).

Note. The responses categorized under interests were derived from a series of questions pertaining to participants' childhood experiences and aviation interests.

Consistent with the responses recorded for aviation enthusiasts, these responses were consistent with an aviation interest that stemmed from childhood. The participants who spoke about their interests emerging in their early years consistently discussed that interest developing prior to their teenage years. Other participants did acknowledge developing a general aviation interest in their adult years after becoming an ATCS.

Table 4.20 provides examples shared by African American ATCS about their educational/career goals in regard to their roadmap/steps to being successfully hired by the FAA. These examples were categorized under roadmap/steps to successful hire.

Table 4.20

Summary of the "Roadmap" Recollections That Helped the African American ATCS

Achieve Their Educational and Career Goals

Category	Theme	Frequency	Quote
Roadmap/Steps to Successful Hire	Educational/ Career Goals	8	"Don't quit your day job while you're waiting" (P4).
			"Yeah, my expectation was to get at least a basic knowledge of air traffic control. I knew I wasn't going to learn the job until I got to my facility. Just basic knowledge. The phraseology. The 7110.65 which is the book we use for all the rules and regulations. Yeah, we got all that out at the school" (P5).
			"I went through the CTI program so pretty much the college did most of the work in terms of dealing with the FAA" (P6).
			"Even though I wanted to go to school beyond an associate's degree, I wanted to get into the job selection pool as soon as I could. For me, going to school, doing the CTI program with a 2 year degree I feel like that was right for me" (P7).

Note. The responses categorized under roadmap/steps to successful hire were derived from a series of questions pertaining to participants' and/or colleges' plan to successfully complete the AT-CTI program and get hired by the FAA.

Unanimously, the participants responded favorably to having a plan to becoming an ATCS. For some, the plan that was in place was self-developed and initiated. However, for many of the participants, the AT-CTI school they attended provided a step-by-step guide on being hired by the FAA to become a controller. Additionally, for those

participants that had their own plan, the AT-CTI school they attended had a similar plan that worked with that participants' pre-existing plan.

Recruitment. Recruitment was measured by recording the assertions of the participants when answering questions related to the research question 3: What do current African American ATCS recommend for recruiting more African American candidates into the ATC profession utilizing the AT-CTI path? To answer the third research question, participants were asked to recommend (a) what the FAA should do to recruit more African Americans to pursue a career in ATC, and b) what the AT-CTI institutions should do to recruit more African Americans to pursue a career in ATC.

Table 4.21 provides examples shared by African American ATCS about their suggestions on recruitment of African Americans to ATC in regard to community involvement. These examples were categorized under community involvement. Overwhelmingly, the participants voiced support for greater community involvement. Some suggested the FAA and the AT-CTI institutions focus more attention on career days at high schools where African Americans predominantly made up the student body. One participant suggested the FAA find a creative solution to recruiting its African American ATCS to introduce the ATC career to young African Americans while officially being on duty time. Another participant suggested the AT-CTI institutions recruit African American alumni from their institution to introduce at an institution-led open house about ATC.

Table 4.21

Summary of the Community Involvement Narratives as a Recommended Strategy for

Recruiting More African American ATCS in the United States

Category	Theme	Frequency	Quote
Community Involvement	Recruitment	7	"It has to be a job that African Americans know about" (P3).
			"I don't think a lot of people were aware that hey, this is an option" (P6).
			"There are so many people, so many African Americans and minorities especially, who are just not aware that there is this great career field available to them. …just minutes away from Newark Airport, one of the busiest airports in the Northeast, and it's also a high population of minorities, and everyone you can think of using that. But when you ask people, 'What are you thinking about as a career?' it's just not on even anyone's radar. It's just, there's really no starting point." (P8)

Note. The responses categorized under community involvement were derived from a series of questions pertaining to participants' suggestions for recruiting African Americans to pursue a career in ATC utilizing AT-CTI pathway.

A popular idea shared by the participants was tours.

I definitely think tours would be key. Tours would be really good. Kids like tours.
I mean, I think about when people come and visit my job, and the excitement I see
in their face. I could see that, if I had been exposed to air traffic when I was
younger, especially African Americans in there, like talking to these pilots and
planes, and it's kind of crazy to see. I definitely see the kids light up and I
definitely think that tours would help for sure, with any program. (P4)

Another participant had an African American controller who resided in the same neighborhood during the participant's high school years who visited the participant's high school for a career day. The career day visit swayed that participant to become an ATCS. Table 4.22 provides examples shared by African American ATCS about their suggestions on recruitment of African Americans to ATC in regard to recruitment in urban areas. These examples were categorized under urban area.

Table 4.22

Summary of the Target Urban Areas Narratives as a Recommended Strategy for

Recruiting More African American ATCS in the United States

Category	Theme	Frequency	Quote
Urban Area	Recruitment	6	"Go to the inner city schools where they're not reaching the kids they need to reach" (P2).
			"My CTI school was probably the only that you may say in a urban area. … get more CTI programs into our community colleges and into some schools that are historically black colleges" (P3).
			"The FAA can probably just spend more time in urban communities, whether it be visiting schools, sending a representative to schools, or even to public libraries. Wherever people gather, essentially. I don't know what would get more people into like an air traffic app or anything like that." (P7)
			"I was a part of an organization that encouraged young people to get into aviation, young people from the inner city where I grew up" (P8).

Note. The responses categorized under urban area were derived from a series of questions pertaining to participants' suggestions for recruiting African Americans to pursue a career in ATC utilizing the AT-CTI pathway.

The participants suggested targeting low socioeconomic neighborhoods serving African Americans. This idea was offered by many of the participants as an alternative method to educate African American communities about the ATC career. The participants shared a common belief that the lack of knowledge about aviation careers in low socioeconomic neighborhoods serving African Americans was a leading reason why African American families do not discuss careers in ATC and aviation.

Table 4.23 provides examples shared by African American ATCS about their suggestions on recruitment of African Americans to ATC in regard to the verbal persuasion of high schoolers. These examples were categorized under verbal persuasion of high schoolers.

Many of the participants voiced their concerns about a general lack of awareness about ATC amongst high schoolers. Some of the participants suggested a greater effort be made by the FAA and AT-CTI institutions to educate high school aged students regardless of location and socioeconomic status. They also suggested targeting STEM high schools rather than focusing on aviation based high schools.

Table 4.24 provides examples shared by African American ATCS about their suggestions on recruitment of African Americans to ATC in regard to exposure of the profession to African Americans. These examples were categorized under exposure. Many ideas were shared by the participants about recruiting African American youth at earlier ages – preteen years. For many of the participants, their own interests in aviation pre-dated their interests in ATC. Their exposure and developing interests in aviation started as early elementary school-aged years. From these years, a growing interest in aviation was later focused on the ATC career.

Table 4.23

Summary of the "Promote ATC Careers to High School Students" Narratives as a

Recommended Strategy for Recruiting More African American ATCS

Category	Theme	Frequency	Quote
Verbal Persuasion of High Schoolers	Recruitment	7	"Schools probably need to come up with a plan to promote, educate, and really push the air traffic control career to students outside of just those that want to be pilots or mechanics or outside of those that already have an interest in aviation and get it out into the high schools" (P3)
			"If you actually go into the inner cities and you see these kids and you talk to them, guess what, it might. … They may want to check it out and see what's going on. You never know. You never know." (P5)
			"Even the colleges that have the equipment to simulate air traffic, I feel like just bringing people in to experience that for a week or whatever from junior high, middle school, wherever. Just so that they're getting exposure to the career field. So that they have an idea." (P7)

Note. The responses categorized under community involvement were derived from a series of questions pertaining to participants' suggestions for recruiting African Americans to pursue a career in ATC utilizing the AT-CTI pathway.

Table 4.24

Summary of the ATC Career Exposure Narratives as a Recommended Strategy for

Recruiting More African American ATCS

Sub-theme	Theme	Frequency	Quote
Exposure	Recruitment	6	"Get them at an early age, to expose them to what it is we do" (P2).
			"I tell somebody I'm an air traffic controller and they're like, 'Wow. I never met air traffic controller before. Especially a black one." (P4)
			"my parents, my uncles. They bought me different aircraft books. . . So they supported what I wanted to do . . . Definitely had support from my mother and my father and my uncles" (P5).
			"It was a pretty unique program, and the person who led that program was a minister and was in the army way back in the day. So, the structure of the program was very similar to a civil air patrol-type program, and the focus was really flight and so the experiences and the opportunities I had were through that program." (P8)

Note. The responses sub-themed exposure were derived from a series of questions pertaining to participants' suggestions for recruiting African Americans to pursue a career in ATC utilizing the AT-CTI pathway.

Chapter Summary

The results of the data analysis and findings found in this chapter were the

product of a semi-structured interview research design. The researcher interviewed eight

African American FAA ATCS who graduated from an AT-CTI college. The participants

were located at various ATC facilities throughout the United States. The semi-structured

interview questions were designed to collect the narratives of the participants in an attempt to answer three research questions:

1. What SCCT factors determine whether African Americans will pursue an air traffic control career?

2. What SCCT factors determine African Americans' pursuit of an air traffic control career utilizing the AT-CTI path?

3. What do current African American ATCS recommend for recruiting more African American candidates into the ATC profession utilizing the AT-CTI path?

The analysis of the findings focused on several components of SCCT: (a) SE, (b) OE, (c) educational and/or career goals of the participants, and (d) what the participants suggest the FAA and AT-CTI institutions do to recruit and retain more African Americans to pursue a career in ATC utilizing the AT-CTI pathway? Therefore, the participants were asked 16 semi-structured interview questions designed to: (a) identify what attracts African Americans to pursuit a career in ATC, (b) understand why some African Americans utilize the AT-CTI path to pursue a career in ATC, and (c) identify what recruitment techniques the FAA and AT-CTI schools can utilize to recruit more African Americans to pursue a career in ATC. Descriptive demographic statistics, narrative statistics, and quotes were displayed through the use of tables.

Chapter 5: Discussion

This chapter will reintroduce the reader to the disproportionately low number of FAA African American ATCS guiding pilots in the national airspace system, and how African American controller candidates overwhelmingly avoid the FAA hiring path with the highest survival rate – the AT-CTI pathway. This study's objective was to perform a phenomenological qualitative study of African American ATCS who attended an AT-CTI institution for the purposes of examining their lived experience. Therefore, this chapter discusses the implications from the findings of the eight African Americans who voluntarily discussed their unique experiences and interests in pursuing a career in air traffic control utilizing the FAA's higher education pathway.

Introduction

The ATC profession's workforce is predominantly White male at 83% (Carey, 2014). An underrepresentation of minorities, including women, exists among the candidates who were hired successfully in the FAA's ATCS centralized hiring process. During the 5-year span between 2007 and 2011, ATCS candidates hired by the FAA through the agency's AT-CTI program were 70.4% White and 73.6% male (Outtz & Hanges, 2013). Over that same span, 5% of the AT-CTI applicants hired were African American. When compared to African American representation across hiring paths that were not AT-CTI, an average of 34% African American representation exists. Even though the AT-CTI path for African Americans is relatively small compared to the other

sources, the AT-CTI differences are magnified considering the relatively high survival

rate of its candidates through the FAA's centralized hiring process (APTMetrics, 2013).

The purpose of this study was to explore the experiences of African American

ATCS who attended an AT-CTI college and were hired by the FAA through the AT-CTI

pathway. The narratives of these ATCS are pertinent to: (a) identify what attracts

African Americans to pursuit a career in ATC, (b) understand why some African

Americans utilize the AT-CTI path to pursue a career in ATC, and (c) identify what

recruitment techniques the FAA and AT-CTI schools can utilize to recruit more African

Americans to pursue a career in ATC utilizing the AT-CTI pathway. In order to collect

this data, 16 semi-structured interview questions were used in a phenomenological

qualitative design. These questions were derived from the research questions for this

study:

1. What SCCT factors determine whether African Americans will pursue an
   ATC career?

2. What SCCT factors determine African Americans' pursuit of an ATC career
   utilizing the AT-CTI path?

3. What do current African American ATCS recommend for recruiting more
   African American candidates into the ATC profession utilizing the AT-CTI
   path?

The phenomenological qualitative design of this research focused on interviewing

eight African American ATCS who graduated from an AT-CTI institution and were hired

by the FAA. Currently, there are 35 AT-CTI institutions located throughout the United

States. The researcher successfully recruited eight qualified participants employed by the

FAA at various facilities nationwide. Semi-structured interviews were completed via telephone at various times due to the participants' dynamic work schedules and availability. The interviews were transcribed and analyzed to study the findings that emerged from the narratives of the participants. The findings revealed:

1. The African American ATCS participants provided numerous examples of their self-confidence and visions of a better future for themselves and their families that led to the ultimate personal goal of becoming an ATCS. Lent and Brown (1996) discuss how an individual's robust beliefs about their abilities in conjunction with visions of what the positive outcomes of attaining their goals likely cultivates personal goals. The participants demonstrated, through their recollections, how their own confidence and dreams led to their successful pursuit of a career in ATC utilizing the AT-CTI pathway.

2. All eight participants recollected various aspects of strong self-efficacy (SE) upon entering AT-CTI college. These African Americans shared that their SE may have been modified and/or diminished slightly at times throughout their college experience. However, their overall SE about their choice to pursue a career in ATC while obtaining a college education and degree remained robust overall.

3. All eight participants recollected various positive visions of outcome expectations (OE) entering AT-CTI college. The combination of these African Americans' individual OE combined with their robust SE are examples of how the combination of the two SCCT tenets led to personal career goals of becoming an ATCS.

4. Many of the participants recollected various examples of firsthand experiences and second-hand information about the ATC career. Lent and Brown (1996) discussed how the combination of firsthand experiences, relevant past endeavors, and second-hand information enhance an individual's OE.

5. Most of the participants recollected various examples of vicarious learning and verbal persuasion. Lent and Brown (1996) discuss how SE and OE, while pursuing a career, are strengthened by vicarious learning and verbal persuasion. The recollections of these African Americans are proof of how vicarious learning and verbal persuasion helped to strengthen their SE and OE.

Implications of Findings

The findings of this qualitative study have several research and practice implications:

1. Outcome expectations of high wage earnings, benefits, and an attractive retirement motivated the participants. The participants were introduced to the air traffic control profession at various stages of their lives, but they all shared these outcome expectations.

2. The participants were driven by personal goals to acquire a college degree.

The participants incorporated a strategy to achieve their personal goal of acquiring a college degree that would also qualify them for employment by the FAA as an ATCS. Five of the eight participants self-identified as lifelong learners. Being a lifelong learner may be a precursor for the vicarious learning that SCCT posits

strengthens, modifies, or diminishes SE beliefs while seeking a career. What may

enhance or lessen an individual's OE are firsthand learning experiences coupled with

relevant past endeavors or second-hand information acquired about various career fields

and their paths (Lent & Brown, 1996).

3. SCCT is an appropriate theoretical lens with which to examine the ATC

   career aspirations of African Americans.

The participants recalled moderate to high confidence prior to entering the AT-

CTI program that they enrolled into. At times their SE may have been modified or

diminished slightly, but their overall SE about ATC remained robust. The participants

also had very positive OE about their ATC career choice. Their positive OE combined

with a robust SE led to personal their personal goal of becoming an ATCS despite the

volatility of the FAA's centralized hiring practices.

Lent et al. (1994) developed SCCT as a theoretical lens to study an individual's

vocational interests. Fouad and Santana (2017) asserted that SCCT has become the major

theoretical frame for investigating women and minority interests into STEM fields.

According to Fouad and Santana (2017), "SCCT has been instrumental in investigating

undergraduate women and underrepresented minorities' career interests, choice, and

persistence while pursuing STEM majors" (p. 32). Despite ATC being a highly

specialized technical occupation that is White male dominated and is considered a STEM

field because of its overarching industry - aviation, SCCT has not been specifically

applied to the ATC career. ATC is the intersection of three distinct aspects that apply to

SCCT – vocation, STEM, and a lack of diversity. Additionally, SCCT's framework

studies contextual factors, such as socioeconomic status, and the effects these factors

have on a person's career choices. Finally, despite the use of SCCT to study the vocational interests of African Americans in STEM fields in quantitative research designs, SCCT can be used to study the vocational interests of African Americans in STEM fields in a qualitative design. Qualitative research is applicable here because it provides a mechanism to capture the lived experiences of African Americans who may be experiencing institutional biases in many forms such as racism or sexism whether actual or perceived.

    4. AT-CTI institutions and the FAA need to recruit African Americans from urban settings into the ATC career field at high school ages.

Overwhelmingly, the participants recommended targeting future African American ATCS candidates at earlier ages. The majority of the recollections shared by the participants revealed that the participants themselves developed an interest in ATC during or before their high school years. Additionally, these participants' ATC interests developed out of a broader interest in aviation. The recollections shared by the participants implied that most of them were raised in urban areas and were from a lower SES before being hired by the FAA. Therefore, it is not surprising that the participants overwhelmingly recommend that the AT-CTI colleges and FAA actively expose high school aged and younger African Americans to ATC through community involvement efforts in urban areas.

As previously mentioned, SCCT is an appropriate theoretical lens with which to examine the ATC career aspirations of African Americans. However, SCCT is not the only theoretical lens available to study African Americans' vocational interests into ATC. Several of the participants recollected social interactions that appeared to shape the

decision making of these participants. Therefore, social learning theory, can also be used

to study African American interests in ATC. SLT is most widely associated with

psychologist Albert Bandura (Miller, 2011). SLT explains how people can cognitively

learn through social interaction with their environments. According to Bandura, people

consciously think, understand, learn, and remember from each other through various

methods of observational learning – observing, imitating, and modeling. Some

participants in this study recounted airport and ATC tower visits as their social

interaction. Other participants shared experiences of meeting ATCS and being

influenced by the interaction on some level. A few of the participants recalled having

visited a tower, meeting air traffic controllers, and having met an African American

ATCS. For these participants, the combination of social interactions was a major driving

force toward developing the personal goal of one day becoming an ATCS. The findings

from the narratives provided by the participants imply that the best method for

introducing young African Americans is through social interaction in various forms.

Several support activities including mentoring, community involvement, and hands-on

experiences were shown to positively affect STEM commitment in minorities (Chemers

et al., 2011). It was also found that having a mentor of one’s own race or gender was an

important factor in building self-efficacy in STEM majors (Blake-Beard et al., 2011).

SLT appears to support this notion.

The recommendations provided by the participants also focused heavily on

recruiting young African Americans. The theory of circumscription and compromise in

career development supports this rationale. The theory of circumscription and

compromise in career development theorizes how an individual’s occupational aspiration

develops from pre-school age through adolescence (Gottfredson, 1981). Gottfredson (1981) purports one's self-concept which ranges from self-perceptions about appearance to self-perceptions about life roles. These elements manifest themselves at different stages of cognitive development with a growth in one's own outlook on their burgeoning dynamic and intricate environments. There are four stages: (a) orientation to size and power (ages 3-5 years); (b) orientation to sex roles (ages 6-8 years); (c) orientation to social valuation (ages 9-13 years); and (d) orientation to the internal, unique self (ages 14 and above).

In stage 1, children conceptualize the meaning of being an adult. They develop an open-mind for all careers with positive outlooks. During stage 2, children become aware of differences in gender. Here, children narrow down their perceived view of acceptable occupations based on their interpretation of what careers are suitable for them based on gender associations with careers. At stage 3, children grasp abstract concepts of social class, ability, behavior, and expectations. There is a further narrowing down of available occupations based on the prestige-level associated with careers. Low-prestige careers are eliminated at this stage based on the child's own self-perception of their own social class. Stage 4 beholds a transition of children entering adolescence and the individual becoming aware of their feelings and capacities. At this final stage, children filter out occupations based on the perceived level of personal investment and their return on investment (Gottfredson, 1981). According to Gottfredson (1981), the exploration of vocational alternatives in adolescence is largely within the set of occupations that were deemed compatible at earlier ages according to one's more visible social attributes (sex, social class, and intelligence) and one's sense of what is available with reasonable effort.

Limitations

        Several limitations of this study exist. First, this study captures the lived

experiences of eight African American ATCS. Despite the targeted population size

adequately being eight as suggested by Creswell and Poth (2018), a greater number of

participants would have provided a greater spectrum of narratives for this study. Second,

the semi-structured interview questions had to be followed up by additional questions

because not all participants easily expressed themselves and at times, they had difficulty

recollecting past experiences. The follow up questions and the order of these questions

were not consistent. Third, on more than one occasion, the interview experienced

technical difficulties and all or part of the interview had to be redone. Fourth, the semi-

structured interview questions failed to capture the participants' recollections, if any, on

having a sense of belonging at the AT-CTI institution that they attended. Fifth, all of the

participants resided in the northeast region of the United States between Washington

D.C./Maryland/Virginia metropolitan area and the Boston area prior to their enrollment at

their AT-CTI college. Therefore, the experiences and opinions that were recorded may

be regional. Finally, demographic data pertaining to the number of African American

male and female students who enter the AT-CTI program of the 36 participating

colleges/universities compared with the number of African American male and female

students who successfully complete the AT-CTI courses was not recorded. This research

did not investigate if none, some, or all of the 36 AT-CTI institutions track the

completion rates of these African American male and female students. Therefore, this

study is unable to track trends, if any, of African American males and females currently

or previously enrolled in AT-CTI programs throughout the United States to see how any

trends compare with prior SCCT research on African Americans enrolled in STEM

fields.

Recommendations

Based on the results of this study, several recommendations for future research

should be considered:

1. A mixed method research design that encompasses the Holland occupational

   themes theory for the quantitative results.

SCCT appears to be an appropriate theoretical framework for understanding

African American students' career development (Dickinson et al., 2017). Specifically,

Dickinson et al. (2017) suggest African Americans' vocational interests can be studied by

examining the six hypotheses for each realistic, investigative, artistic, social, enterprising,

and conventional (RIASEC) theme:

- Each of the learning experiences will have a direct and positive relation to

  self-efficacy and outcome expectations, and part of the relation of learning

  experiences to outcome expectations will be mediated through self-

  efficacy;

- Self-efficacy will have a direct and positive relation to outcome

  expectations;

- Self-efficacy and outcome expectations each will have a direct and positive

  relation to interests, and part of self-efficacy's relation to interests will be

  mediated through outcome expectations;

- Self-efficacy and outcome expectations each will have a direct and positive

  relation to choice goals, and those relations will be partially mediated

through interests (self-efficacy's relation to choice goals also will be partially mediated through outcome expectations);

- Interests will have a direct and positive relation to choice goals; and
- Verbal persuasion will be a stronger positive predictor of self-efficacy and outcome expectations than will performance accomplishments and vicarious learning. (Dickinson et al., 2017, pp. 78-79)

2. A cross-group comparison between African American ATCS who were hired through the AT-CTI pathway and African American ATCS that were hired off-the-street (OTS).

Further research on why African Americans do not utilize the AT-CTI pathway and elect to utilize the OTS pathway instead can provide data on strategies employed by African American ATCS for getting hired by the FAA. Additional data may be generated that specifically examines differences between the two groups, if any, in respects to their SE and OE. Prior research into experiential sources of SE and OE displays the importance of SE to African Americans (Dickinson et al., 2017). Particularly for math-based careers, African Americans experience racism and lack of access to career-related experiences that foster math-based careers (Alliman-Brissett & Turner, 2010). SE and OE for African Americans is further hindered by socialization experiences encountered by African Americans. This affects career relevant learning experiences and hinders the development of SE and OE.

3. FAA require AT-CTI institutions record demographic data (e.g., race/ethnicity, gender, SES, etc.) about their students' participation in

aviation, ATC, and AT-CTI courses and programs to track data about women

and minority ATCS candidates.

In the 1980s, it was discovered that college women had lower self-efficacy to

complete the educational requirements or job duties of traditional male occupations–

physician or engineer–versus traditional female occupations–social worker or teacher

(Betz & Hackett, 1981). Additionally, SCCT has several general areas of study

including: (a) individual characteristics (e.g., SES), (b) psychological factors (e.g., SE),

and (c) perceptions of STEM careers (Kanny et al., 2014).

4. FAA require ATC managers whose facilities are not critically staffed to

actively recruit ATCS to participate in the agency's Aviation & Space

Education Outreach Program (AVSED).

ATC managers would replace any ATCS participating in the AVSED program

that was removed from their assigned shift with another qualified ATCS through the use

of overtime (charged to the AVSED program). ATCS participating in the AVSED

program on their off day would earn credit hours.

5. FAA National STEM AVSED Program Manager work with FAA national

employee representative groups to recruit women and minority ATCS to

participate in the FAA's AVSED program.

Several national employee representation groups represent a diverse population of

FAA employees outside of the bargaining unit representatives of these employees. The

list of these employee representation groups includes the National Black Coalition of

Federal Aviation Employees (NBCFAE), Professional Women Controllers (PWC), and

the National Hispanic Coalition of Federal Aviation Employees (NHCFAE). Recruiting

members of employee representation groups to target specific populations in K through 12 grades provides opportunities for young women and minorities to meet FAA women and minority ATCS. This interaction may build and reinforce SE in ATC for young women and minorities, particularly African Americans, in a similar manner to the participants of this research study. Additionally, the interaction between women and minority ATCS and young women and minorities aspiring to become future ATCS provides an opportunity for the ATCS to share the rewards of the ATC profession. This experience may provide the young women and minorities with an idea of what OE can be envisioned while pursuing an ATC career.

6. FAA National STEM AVSED Program Manager collaborate with ATC managers and NATCA to routinely provide access to FAA facilities for K through 12 youth and their families to witness FAA ATCS performing ATC duties.

Repeated exposure to an ATC environment will provide young students participating in the FAA's ASVED program numerous opportunities to unique firsthand ATC experiences normally excluded from the general public. This may particularly serve young African Americans an increased SE about a career in ATC when they can interact with ATCS willing to share the skills and knowledge necessary to perform the job of an ATCS.

7. FAA explore assisting schools serving youth in grades K through 12 and AT-CTI institutions collaboratively develop a pipeline for the introduction and immersion of young African Americans into ATC.

An ATC pipeline targeted at African American youth in urban areas where STEM

programs serve African American youth can systematically identify and immerse African American youth, their families, and their communities to ATC. Administrators on local levels can then work together, with guidance from the FAA's ASVED program, on utilizing local and national resources to guide interested participants towards a career as an ATCS.

Conclusion

Since 2012, there has been a steady decline in the staffing of fully certified professional controllers (CPCs). The number of CPCs, ATCS who have received a full proficiency rating by the FAA to guide pilots, has declined steadily. In 2015, the total number of CPCs employed by the FAA dropped to 10,833 – a 27-year historic low (NATCA, 2018). Of the 10,833 CPCs who guided pilots with their passengers and/or cargo across the nation in 2015, approximately one-third were eligible to retire. According to NATCA (2018), this steady decline is a problem for several reasons. First, a continued reduction in the ATCS workforce would result in fewer airplanes being able to fly and an increase in delays. Second, understaffed facilities interfere with the FAA's ability to implement new equipment because ATCS play an integral role into the planning, installation, and training of air traffic equipment. Third, understaffed facilities must resort to mandatory overtime to ensure proper staffing, but critically staffed facilities will not have the necessary staffing to operate properly despite scheduled overtime. With fewer controllers to guide aircraft, less flights can be guided in the NAS. The FAA's national staffing crisis is a threat to the capacity of the NAS and the U.S. economy (NATCA, 2018).

The FAA has historically been challenged with staffing issues for over 5 decades. Staffing issues that existed since the 1960s were aggravated by the 1981 Professional Air Traffic Controllers Organization strike. PATCO, the former union organization that was once officially recognized by the FAA as the sole representative for federal ATCS, led most of its members into an illegal strike on August 3, 1981 over several labor issues including pay, working hours, and working conditions. U.S. laws forbid federal employees from participating in work actions – strikes. The result of the strike led by PATCO was the termination of service for 11,345 ATCS in the summer of 1981 (McCartin, 2011). The agency unsuccessfully attempted to respond to the additional shortage of controllers resulting from the strike with an aggressive hiring campaign between 1981 and 1985. The replacement ATCS hired in the 1980s and 1990s have been separating from service with the FAA in the millennium because of the FAA's mandatory retirement age of 56 for ATCS (Pavel, 2012). At the beginning of the millennium, the FAA still needed to hire 14,000 ATCS to address its current and projected staffing shortage (Jorgenson, 2013).

Complicating the matter of staffing, ATC is a profession wherein the workforce lacks diversity (McCartin, 2011). White males make up the majority of the FAA's air traffic control workforce at 83% (Carey, 2014). An underrepresentation of minorities, including women, exists among the candidates who were hired successfully in the FAA ATCS centralized hiring process. During the 5-year span between 2007 and 2011, ATCS candidates hired by the FAA through the agency's AT-CTI program were 70.4% White and 73.6% male (Outtz & Hanges, 2013). Over that same span, 5% of the AT-CTI applicants hired were African American. When compared to African American

representation across hiring paths that were not AT-CTI, an average of 34% African American representation exists. Even though the AT-CTI path for African Americans is relatively small compared to the other sources, the AT-CTI differences are magnified considering the relatively high survival rate of its candidates through the FAA's centralized hiring process (APTMetrics, 2013).

The theoretical frame anchoring this study is SCCT. SCCT was developed by Robert W. Lent, Steven D. Brown, and Gail Hackett in 1994. The theory suggests that an individual's career pursuit is determined by their SE and OE (Lent & Brown, 1996). SE refers to an individual's belief in one's ability to succeed at a task (Bandura, 1986). OE refers to one's beliefs about the results of his or her actions. SCCT posits that through individual agency, personal goals reflect one's vigorous belief in his or her own ability to achieve career goal pursuits. Also, one's visualized outcome from his or her pursuit plays a key role in making career choices (Lent & Brown, 1996).

This qualitative methods study sought to examine the experiences of African American ATCS who attended an AT-CTI institution. The purpose of this study is threefold: (a) identify what attracts African Americans to pursue a career in ATC, (b) understand why some African Americans utilize the AT-CTI path to pursue a career in ATC, and (c) identify what recruitment techniques the FAA and AT-CTI schools can utilize to recruit more African Americans to pursue ATC through the AT-CTI pathway. This data is being sought because the AT-CTI program is the FAA's primary tool for hiring future ATCS. AT-CTI graduates, with their higher aviation education, are better suited for the ATC profession when compared to their general public applicant counterparts (Pavel, 2012). This research has the potential to help higher education

institutions that participate in the FAA's AT-CTI program identify, recruit, and retain

African Americans into their AT-CTI program with greater success. Greater ATC

recruiting efforts in higher education can assist the FAA replenish its diminishing ATC

staffing numbers and diversify its workforce simultaneously. Both the higher education

institutions and the FAA may find the results about the factors determining African

Americans' purposeful pursuit of an ATC career utilizing the AT-CTI path significant

because the success rate for hiring African Americans through the FAA's centralized

hiring process is considerably improved over all other paths (APTMetrics, 2013).

In order to collect data for this research, eight African American ATCS located at

various FAA facilities throughout the United States were recruited to participate in this

study. These African American ATCS graduated from an AT-CTI institution and was

hired by the FAA through the AT-CTI pathway. The participants were recruited from a

list of Black/African American, male and female, ATCS AT-CTI alumni provided by one

of 36 institutions participating in the FAA's AT-CTI program (see Appendix A). The

design of this research study was a phenomenological qualitative semi-structured

interview. The 16 semi-structured interview questions were driven by three overarching

research questions:

1. What SCCT factors determine whether African Americans will pursue an

   ATC career?

2. What SCCT factors determine African Americans' pursuit of an ATC career

   utilizing the AT-CTI path?

3. What do current African American ATCS recommend for recruiting more African American candidates into the ATC profession utilizing the AT-CTI path?

The research into the recollections and narratives of the eight African American ATCS who graduated from an AT-CTI institution and were hired by the FAA through the AT-CTI pathway produced several findings:

1. OE of high wage earnings, benefits, and an attractive retirement motivated the participants. The participants were introduced to the air traffic control profession at various stages of their lives, but they all shared these outcome expectations.

2. The participants were driven by personal goals to acquire a college degree. Therefore, the participants incorporated a strategy to achieve their personal goal of acquiring a college degree that would also qualify them for employment by the FAA as an ATCS.

3. SCCT is an appropriate theoretical lens with which to examine the ATC career aspirations of African Americans.

4. AT-CTI institutions and the FAA need to recruit African Americans from urban settings into the ATC career field at high school ages.

The continuation of the FAA's mantra - safe, orderly, and expeditious movement of aircraft - is reliant on the agency's greatest asset - the air traffic controller. And for decades, the FAA and its controller workforce have found ways to work through the delicate issues of staffing and diversity while navigating numerous hurdles: outdated equipment, work stoppages, and terrorism. The agency that was formed over 60 years

ago is facing a growing aviation industry in which growth is projected across all forms of

air transportation over the next 20 years at an average rate in excess of 2% per year

(FAA, 2017). Therefore, the Equal Employment Opportunity Commission's requirement

that federal agencies position themselves to attract, develop, and retain a top-quality

workforce capable of meeting future demands that growth places on federal agencies

appears prudent. In order for the FAA to do this, it needs to continue to invest in a

diverse pool of future aviators capable of meeting the demands that are placed on the

national airspace system today and in the future. The agency needs to collaborate with

K-12 and higher education institutions to uncover this talent. Casting out a wide net to

expose women and minorities to the wonders of aviation and the importance of air traffic

control is a necessity for the future of flight and the FAA.

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Appendix A

FAA AT-CTI Institutions

Institution	Location	Institution	Location	Institution	Location	Institution	Location
Aims Community College	Greeley, Colorado	Florida Institute of Technology	Melbourne, Florida	Metropolitan State University of Denver	Denver, Colorado	Tulsa Community College	Tulsa, Oklahoma
Arizona State University	Meza, Arizona	Florida State College at Jacksonville	Jacksonville, Florida	Miami Dade College	Homestead, Florida	University of Alaska Anchorage	Anchorage, Alaska
Broward College	Pembroke Pines, Florida	Green River College	Auburn, Washington	Middle Georgia State University	Cochran, Georgia	University of North Dakota	Grand Fork, North Dakota
Community College of Baltimore County	Baltimore, Maryland	Hampton University	Hampton, Virginia	Middle Tennessee State University	Murfreesboro, Tennessee	University of Oklahoma	Norman, Oklahoma
Community College of Beaver County	Beaver Falls, Pennsylvania	Hesston College	Hesston, Kansas	Minneapolis Community and Technical College	Minneapolis, Minnesota	Vaughn College of Aeronautics and Technology	Flushing, New York
Daniel Webster College	Nashua, New Hampshire	InterAmerican University of Puerto Rico	Bayamón, Puerto Rico	Mount San Antonio College	Walnut, California	Western Michigan University	Battle Creek, Michigan
Dowling College	Oakdale, New York	Jacksonville University	Jacksonville, Florida	Purdue University	West Lafayette, Indiana		
Eastern New Mexico University Roswell	Roswell, New Mexico	Kent State University	Kent, Ohio	Sacramento City College	Sacramento, California		
Embry Riddle Aeronautical University — Daytona	Daytona Beach, Florida	LeTourneau University	Longview, Texas	St. Cloud State University	St. Cloud, Minnesota		

Embry Riddle Aeronautical University — Prescott	Prescott, Arizona	Lewis University	Romeoville, Illinois	Texas State Technical College — Waco	Waco, Texas		

Appendix B

Participant Introduction Letter

Greetings!

I am a Doctoral Candidate in St. John Fisher College's Executive Leadership Program. I'm currently conducting a study examining the experiences of African American Air Traffic Control Specialists (ATCS) who attended an Air Traffic – Collegiate Training Initiative (AT-CTI) college. I'm specifically reaching out to you because you have been identified as an AT-CTI alumnus that may be eligible for this study. To participate in this study, you must be a) African American, b) currently employed Federal Aviation Administration (FAA) ATCS, c) Certified Professional Controller (CPC), and d) hired by the FAA as an AT-CTI graduate. If you participate in this study, your participation will provide a better understanding of the experiences of African American ATCS who were interested in and ultimately pursued a career as an ATCS utilizing the AT-CTI path.

This letter serves as an official invitation to participate in this study. The study has been approved by St. John Fisher College's Institutional Review Board. Participation in this study consists of sharing your experiences during an interview designed to last between 45 and 70 minutes. The interview will be scheduled at a convenient time for you between now and July 31, 2018.

There is minimal risk associated with participating in this study, and you have the option to withdraw from this study at any point. You are not required to answer any questions(s) that cause you to feel uncomfortable, and your identity will be anonymous in any data that is reported from this study. All research data will be kept in password protected files on a password protected external hard drive. That hard drive will be kept in a locked cabinet or safe.

If you would like to participate or require further information about this study, please do not hesitate to contact me at:

wlw00245@sjfc.edu

Thank you in advance for your time and consideration. I look forward to hearing from you soon.

Sincerely,

Wycliffe L. Walcott Jr., M.S.

Dissertation Chair: Dr. Byron K. Hargrove, St. John Fisher College

Appendix C

Data Collection Instrument:

Air Traffic Control Specialist Semi-Structured Interview Protocol

(ATCS-SSIP)

Introduction & Key Components	
Thank you	I want to thank you for taking time to meet with me today.
Your name and purpose	My name is _____, and I would like to talk about your experiences as an African American air traffic controller who went to school to become a controller.
Duration	The interview should last approximately 1 hour – give or take 15 minutes.
How interview will be conducted	I will be taping this interview because I don't want to miss any of your comments. Even though I'll be taking notes, I can't write fast enough to get it all down. Please speak up so your comments are not missed. You do not have to talk about anything you don't want to, and you may end the interview at any time.
Anonymity and Confidentiality	I will ensure that the report will not identify you as the respondent. A pseudonym will be used in place of your real name. Your responses will only be correlated with your pseudonym. Once the interview has begun, I will not use your name during the interview. All responses will be kept confidential. This means that your interview responses and all research data will be kept in password protected files on a password protected external hard drive. That hard drive will be kept in a locked cabinet or safe. As a

	reminder, you do not have to talk about anything you don't want to. And, you may end the interview at any time.
Questions	Are there any questions about what I've just explained?

Consent part 1
    Has informed consent form been signed
    and returned?
 	
    Yes _____   No _____
 	
If Yes, start recording. Proceed to open ended questions.
 	
If no, do not proceed. End session.	

I would like to begin by getting to know a little bit about your academic background.
 	
For the next few questions, I'd like you to reflect on how your confidence has evolved over time in the ATCS career.
	1. Which of the following subjects would you consider yourself strong in academically?
	    a. Science
	
	       _____
	    b. Technology
	
	       _____
	    c. Engineering
	
	       _____
	    d. Math
	
	       _____
	2. What is the highest education level you completed prior to attending your AT-CTI college/university?
	    a. Associate's Degree
	
	       _____
	    b. Bachelor's Degree
	
	       _____
	    c. Master's Degree
	
	       _____
	    d. Doctorate
	
	       _____
	3. What other careers you had considered prior to pursuing ATC?
	4. Currently, how would you describe your degree of confidence in your general and specific abilities as an air traffic controller?

The next few questions will focus on the role of CONFIDENCE in your career.	5. Prior to attending your CTI school, how would you describe your confidence in your ability to become a future air traffic controller after learning about the career?
	6. Before you enrolled in the CTI program at your school, how would you describe your confidence in your ability to complete the CTI program?
	7. By the end of the CTI program, how would you describe your confidence level?
	8. What has been the most important factor that has helped you increase your confidence to complete the daily duties of the ATCS?
Now, I'd like to learn more about any positive or negative outcomes you may have expected prior to entering this ATCS career or during your training program. Have your expectations evolved over time in the ATCS career. The next few questions will focus on the role of OUTCOME EXPECTATIONS in your training and career.	9. Before becoming an air traffic controller and enrolling in the CTI program, how would you describe your general expectations about air traffic controller career?
	10. How would you describe the career "roadmap" or set of steps to get hired by the FAA as an air traffic controller?
	11. Before you enrolled in the CTI Program, how would you describe your overall expectations about the CTI Training?
	12. Describe the plan that was in place to get you through your CTI program and how you felt about it.
	13. In what ways did your expectations help you finish your training program?
Now, I'd like to hear your thoughts about recruitment.	14. In what ways have your expectations been met now working as an ATCS? Have there been any unmet expectations?

	15. What would you recommend the FAA do to recruit more African Americans to pursue ATC?
	16. What would you recommend the AT-CTI program do to recruit more African Americans to pursue ATC using their college pathway?
Closing Key Components	Is there anything more you would like to add?
Next steps: End recording.	
	The recording will be transcribed, and your name will not be given to the transcriber or transcription service.
Thank you	Thank you for your time.

St. John Fisher College
INFORMED CONSENT FORM

Title of study: The Decline in U.S. Air Traffic Controllers: A Qualitative Exploration of Current African American Air Traffic Controller Perspectives on Diversity Recruitment in Air Traffic Collegiate Training Initiative Schools

Name of researcher: Wycliffe L. Walcott Jr.

Faculty Supervisor: Dr. Byron K. Hargrove

Purpose of Study: The purpose of this qualitative methods study is to examine the experiences of currently employed African American Air Traffic Control Specialists (ATCS) who attended an Air Traffic – Collegiate Training Initiative (AT-CTI) college. What this study seeks is threefold: (a) identify what attracted African Americans to AT-CTI training programs and allowed them to enter into air traffic control (ATC) careers; (b) explore the educational and career-related self-efficacy beliefs and outcome expectations of African Americans who utilized the AT-CTI training pathway; and (c) discover specific ways to recruit more African American candidates to attend AT-CTI schools from the perspective of successful African American ATCS.

Length of participation: If you agree to participate in the study, you will be asked to participate in an interview that will range between 45 to 75 minutes in length.

Method of data collection: Data will be collected by an in-person or telephone interview.

Risks and benefits: There is minimal risk associated with participating in this study, and you have the option to withdraw from this study at any point. There are no direct benefits of participant in this study. Your participation in the study will provide a better understanding of the experiences of African American ATCS who were interested in and ultimately pursued a career as an ATCS utilizing the AT-CTI path.

Method for protecting confidentiality/privacy of subjects: Your identity will be kept anonymous and confidential. A pseudonym will be used instead of your name in all written documentation. All transcripts and audio recordings will be password protected in a password protected file and on a password protected external hard drive that will be locked inside a cabinet and/or safe. Your information may be shared with appropriate governmental authorities ONLY if you or someone else is in danger, or if we are required to do so by law. The data collected will be destroyed in 3 years.

Your rights: As a research participant, you have the right to:

1. Have the purpose of the study, and the expected risks and benefits fully explained to you before you choose to participate.
2. Withdraw from participation at any time without penalty.

3. Refuse to answer a particular question without penalty.
4. Be informed of the results of the study.

If you have any further questions regarding this study, please contact the researcher(s) listed above. If you experience emotional or physical discomfort due to participation in this study, please utilize one of the following: (1) your personal health care provider; (2) the FAA's Employee Assistance Programs' Magellan Healthcare program – a free program that provides FAA employees access to private and confidential range of services including expert clinical support (https://www.magellanhealthcare.com/employer/employee-assistance-programs.aspx); or (3) an appropriate crisis service provider through the use of APA.org – The Help Center (http://www.apa.org).

The Institutional Review Board of St. John Fisher College has reviewed this project. For any concerns regarding this study/or if you feel that your rights as a participant (or the rights of another participant) have been violated or caused you undue distress (physical or emotional distress), please contact Jill Rathbun by phone during normal business hours at (585) 385-8012 or irb@sjfc.edu. She will contact a supervisory IRB official to assist you.

All digital audio recordings and transcriptions of interviews will be maintained using a private, locked, and password-protected file and password-protected external hard drive stored securely in the private home of the principal researcher. Electronic files will include assigned identity codes and pseudonyms; they will not include actual names or any information that could personally identify or connect participants to this study. Other materials, including notes or paper files related to data collection and analysis, will be stored securely in unmarked boxes, locked inside a cabinet and/or safe in the private home of the principal researcher. Only the researcher will have access to electronic or paper records. The digitally recorded audio data will be kept by this researcher for a period of 3 years following publication of the dissertation. Signed informed consent documents will be kept for 3 years after publication. All paper records will be cross-cut shredded and professionally delivered for incineration. Electronic records will be cleared, purged, and destroyed from the hard drive and all devices such that restoring data is not possible. I have read the above, received a copy of this form, and I agree to participate in the above named study.

_____

Print name (Participant)   Signature   Date

_____

Print name (Investigator)   Signature   Date