5-2019

Aviation Professionalism: Examining the Concept of Professionalism within and between Major Subgroups of the Aviation Industry

Rüştü Tolga Turgut

Aviation Professionalism:
Examining the Concept of Professionalism within and between Major Subgroups of the Aviation Industry

by

Rüştü Tolga Turgut

Bachelor's of Science
Aviation Management
Florida Institute of Technology
Melbourne, FL
2011

Master's of Business Administration
Florida Institute of Technology
Melbourne, FL
2013

A dissertation submitted to the College of Aeronautics
Florida Institute of Technology
in partial fulfillment of the requirements
for the degree of

Doctor of Philosophy
in
Aviation Sciences

Melbourne, Florida
May, 2019

We the undersigned committee
hereby approve the attached dissertation

Aviation Professionalism:
Examining the Concept of Professionalism within and between
Major Subgroups of the Aviation Industry

by

Rüştü Tolga Turgut

Michael A. Gallo, Ph.D. Professor College of Aeronautics Committee Chair	John E. Deaton, Ph.D. Professor College of Aeronautics
Ulreen O. Jones, Ph.D. Assistant Professor College of Aeronautics	Semen Koksal, Ph.D. Professor Mathematical Sciences

Korhan Oyman, Ph.D., Dean, College of Aeronautics

ABSTRACT

TITLE: Aviation Professionalism: Examining the Concept of Professionalism within and between Major Subgroups of the Aviation Industry

AUTHOR: Rüştü Tolga Turgut

MAJOR ADVISOR: Michael A. Gallo, Ph.D.

The purpose of this study was to conduct a secondary analysis of Alhallaf's (2016) study on aviation professionalism by disaggregating his data into five subgroups: Aircraft Maintenance Technicians (AMT); Airport Managers (AM); Air Traffic Controllers (ATC); Non-Pilot Aviation Employees (NPAE), which consisted of business aviation, flight operations, and aviation colleges/universities; and Pilots. The study posed three research questions and endeavored to (a) determine factors related to professionalism in each subgroup, (b) determine the differences in levels of professionalism among the subgroups, and (c) examine each subgroup' perceptions of professionalism. The study used an explanatory correlational design to determine the relationship between the targeted factors and professionalism. Research factors included gender, marital status, age, race/ethnicity, income, education level, years of experience, number of FAA ratings, total flight hours, perceptions of professionalism, and level of professional activity/involvement measured by Kramer's (1974) Index of Professionalism (IOP). The dependent variable was professionalism, measured by Snizek's (1972) Hall's Professionalism Inventory. The

sample consisted of 674 participants: AMT = 68, AM = 76, ATC = 44, NPAE = 199, Pilots = 287).

With the exception of the ATC subgroup, IOP scores were significantly related to professionalism, particularly with respect to: number of professional courses taken, number of professional journal subscriptions, number of professional books purchased, number of weekly hours engaged in professional reading, and membership in professional organizations. Other significant factors within subgroups included: income (AMT), race/ethnicity and education (NPAE), and flight hours (Pilots). No significant factors were found in the ATC subgroup. For the between groups analysis, the Pilot and ATC subgroups had the highest and lowest levels of professionalism, respectively. Participants in all subgroups also perceived professionalism from a cognitive (attitudinal or a mind-set) perspective rather than from an empirical (practical and measurable) perspective. The findings supported Kern's (2011) Model of Professionalism, and help inform the aviation research community with respect to aviation subgroups' view of professionalism and factors significantly related to professionalism within these subgroups.

Table of Contents

Abstract iii

List of Figures xi

List of Tables xii

Acknowledgements xvi

Dedication xviii

Chapter 1: Introduction 1

Background and Purpose 1

Background 1

Purpose 13

Definition of Terms 15

Research Questions and Hypotheses 20

Research questions 20

Research hypotheses 20

Study Design 21

Significance of the Study 21

Study Limitations and Delimitations 23

Limitations 23

Delimitations 26

Chapter 2: Review of Related Literature 28

Introduction 28

Overview of Underlying Theory: Kern's Model of Professionalism....28
Level I professionalism....31
Level II professionalism....31
Level III professionalism....32
Review of Past Research Studies....35
Part A: The foundation of Alhallaf's study....36
Professionalism in healthcare/nursing....37
Professionalism in education....41
Professionalism in business/accounting....44
Professionalism in legal/law enforcement....47
Part B: The basis for the proposed study....48
The rationale for subgroups: The SHELL model....49
The strategy for between-group comparisons....51
Summary and Concluding Remarks....58
Chapter 3: Methodology....61
Population and Sample....61
Population....61
Sample....61
Power analysis....72
Instrumentation....75

Section A: Professionalism scale 76
Section B: Perceptions of professionalism 79
Section C: Aviation background 80
Section D: Professional activities and involvement 80
Section E: Demographics 83
Procedures 83
Research methodology 83
Human subjects research 84
Study implementation 85
Threats to internal validity 86
Treatment verification and fidelity 94
Data Analysis 96
Description of independent and dependent variables 96
Statistical strategy 99
Chapter 4: Results 100
Introduction 100
Descriptive Statistics 101
Section A: Professionalism scale 101
Section B: Perceptions of professionalism 116
Section C: Aviation background 124
Section D: Professional activities and involvement 124

Inferential Statistics 134
Overview 134
Preliminary analyses 136
Data set modifications 136
Missing data 139
Outlier analysis 141
Multicollinearity 144
Regression assumptions 145
Summary of preliminary analyses 152
Primary analysis 1: Hierarchical multiple regression 155
Primary analysis 2: Single-factor ANOVA. 169
Results of Hypothesis Testing 171
Null hypothesis 1a: The AMT subgroup 172
Null hypothesis 1b: The airport managers subgroup 172
Null hypothesis 1c: The ATC subgroup 173
Null hypothesis 1d: The NPAE subgroup 173
Null hypothesis 1e: The pilots subgroup 174
Null hypothesis 2 174
Chapter 5: Conclusions, Implications, and Recommendations 175
Summary of Study 175
Summary of Findings 180

Primary analysis 1: Hierarchical multiple regression 181
Primary analysis 2: Single-factor ANOVA. 183
Descriptive statistics for research question 3. 184
Conclusions and Inferences 185
Research question 1 185
Research question 2 199
Research question 3 202
Implications 204
Implications relative to theory 204
Implications relative to prior research 211
Implications relative to practice 219
Generalizability, Limitations, and Delimitations 226
Generalizability 226
Study limitations and delimitations 229
Recommendations for Future Research and Practice 234
Recommendations for future research relative to study limitations 234
Recommendations for future research relative to study delimitations 236
Recommendations for future research relative to implications 237
Recommendations for practice relative to implications 242

References 248

Appendix A: Aviation Professionalism Survey 256

Appendix B: Raw Data 261

List of Figures

Chapter 1

1.1 Kern's (2011) domains of professionalism and corresponding levels of professionals. 11

Chapter 2

2.1 Replication of Kern's (2011) domains of professionalism and corresponding levels of professionals (from Chapter 1)..... 29

2.2 Comparison between Leddy and Pepper's (1993) professional development model and Kern's (2011) professionalism model. 35

2.3 The SHELL model. Adapted from Hawkins (1987). 50

List of Tables

Chapter 3

3.1 Summary of Participants' Age and Marital Status by Gender per Subgroup 63

3.2 Summary of Participants' Race/Ethnicity by Gender per Subgroup 66

3.3 Summary of Participants' Income Level by Gender per Subgroup 67

3.4 Summary of Participants' Education Level by Gender per Subgroup 69

3.5 Summary of Participants' Years of Experience by Subgroup 70

3.6 Summary of Participants' FAA Ratings and Flight Hours for the Pilot Subgroup 71

3.7 Power Analysis and Calculated Powers for $\alpha = .05$ per Subgroup 73

3.8 Reliability of HPI by Subgroup 77

3.9 Reliability of IOP by Subgroup 83

3.10 Summary and Description of Independent and Dependent Variables 97

Chapter 4

4.1 Summary of Participants' Professionalism Scores on the HPI and IOP 103

4.2 Summary of Participants' Scores on the HPI and IOP by Gender and per Subgroup 103

4.3 Item Analysis of Hall's Professionalism Inventory for Aircraft Maintenance Technicians 105

4.4 Item Analysis of Hall's Professionalism Inventory for Airport Managers 107

4.5 Item Analysis of Hall's Professionalism Inventory for Air Traffic Controllers 110

4.6 Item Analysis of Hall's Professionalism Inventory for Non-Pilot Aviation Technicians 112

4.7 Item Analysis of Hall's Professionalism Inventory for Pilots 114

4.8 Ranking of Aircraft Maintenance Technicians' Perceptions of Professionalism 114

4.9 Ranking of Airport Managers' Perceptions of Professionalism 119

4.10 Ranking of Air Traffic Controllers' Perceptions of Professionalism 120

4.11 Ranking of Non-Pilot Aviation Employees' Perceptions of Professionalism 121

4.12 Ranking of Pilots' Perceptions of Professionalism 122

4.13 Overall Rankings of Perceptions of Professionalism by Subgroup 123

4.14 Item Analysis of Kramer's Index of Professionalism (IOP) for Aircraft Maintenance Technicians 126

4.15 Item Analysis of Kramer's Index of Professionalism (IOP) for Airport Managers 127

4.16 Item Analysis of Kramer's Index of Professionalism (IOP) for Air Traffic Controllers 129

4.17 Item Analysis of Kramer's Index of Professionalism (IOP) for Non-Pilot Aviation Employees 130

4.18 Item Analysis of Kramer's Index of Professionalism (IOP) for Pilots 132

4.19 Summary of Missing Data Resolution (Aircraft Maintenance Technicians) 140

4.20 Summary of Missing Data Resolution (Airport Mangers) 140

4.21 Summary of Missing Data Resolution (Air Traffic Controllers) 140

4.22 Summary of Missing Data Resolution (Non-Pilot Aviation Employees) 141

4.23 Summary of Missing Data Resolution (Pilots) 141

4.24 Summary of Remaining IVs After Preliminary Analyses by Subgroup 152

4.25 Summary of Results from Hierarchical Regression for the Aircraft Maintenance Technicians (AMT) Subgroup 156

4.26 Summary of Results from Hierarchical Regression for the Airport Managers Subgroup 158

4.27 Summary of Results from Hierarchical Regression for the Air Traffic Controllers (ATC) Subgroup 160

4.28 Summary of Results from Hierarchical Regression for the Non-Pilot Aviation Employees (NPAE) Subgroup 162

4.29 Summary of Results from Hierarchical Regression for the Pilots Subgroup 167

4.30 Summary of Pairwise Comparisons between Subgroups with Respect to HPI Scores 170

Chapter 5

5.1 Summary of the Results of Hypotheses Testing..... 181

Acknowledgements

Dr. Gallo, I would not have been able to complete this journey without you. I am and will forever be grateful to him for being my mentor, committee chair and major advisor in this long journey. It has been a privilege to be your PhD student and work with you. Thank you is simply not enough.

Drs. Deaton, Koksal, and Jones thank you so much for serving on my committee, I sincerely appreciate your support and guidance through this journey.

Dr. Korhan Oyman, the Dean of the College of Aeronautics, thank you for all your support and encouragement as my dean, but above all much thanks for being a supportive friend throughout our many years of friendship.

Elizabeth Turgut, my wife and my rock, thank you for being understanding and supportive in this long journey. You held the fort strong during the many hours/days I spent away from you and our wonderful daughter Zuhal in order to complete this journey. I could not have achieved this without you and our daughter.

Zuhal Turgut, my precious daughter, thank you for being so understanding for the many days that I came home tired and lacked the energy to play hide and seek or chase. I promise that I will make it up to you in many years to come my sweetie. More Disney days await you.

My parents, Reşat and Zuhal Turgut I would not be here without you. My brothers, Togan, Kaan and the entire Turgut family thank you for your love, unwavering encouragement, support and prayers.

Friends and colleagues thank you for being there for me. Every little thing you have done for me, especially your words of encouragement, support, positive thoughts, prayers and understanding made this accomplishment achievable.

Dedication

To my late father, Reşat Turgut (Lieutenant General, Turkish Air Force), my hero. He instilled the love for aviation from my birth until the day he departed from this world in 2007. Dad, you are always with me spiritually in every step of the way in life. I believe that you are watching from somewhere above and smiling with pride and joy. I would not be the person and the aviation professional that I am today if I did not have my father as my role model.

To my mother, Zuhal Turgut, my inspiration for strength, determination and perseverance in life. She has showed me how to be a harder worker, stronger, more compassionate and more empathetic person in life. She has supported me my entire life and has always encouraged me to be the best I can be in any endeavor that I undertook. I would not be the person I am without you as my inspiration.

And, for so many more reasons that words would not sufficiently describe, I dedicate this dissertation to my parents, Reşat and Zuhal Turgut.

Chapter 1

Introduction

Background and Purpose

Background. According to Aviation Benefits Beyond Borders (2018), the aviation industry's global economic impact is $2.7 trillion (directly, indirectly, and induced effects), supporting 65.5 million jobs worldwide, and accounts for 3.6% of the global gross domestic product (GDP). The Airport Council International (ACI, 2018) also reported that the aviation industry caters to almost 8.3 billion passengers a year. Worldwide passenger numbers increased by 7.5% in 2018 compared to the previous year. These figures are a testament to the air transport industry's importance for the global economy.

The commercial air transport value chain consists of several interlinked segments such as aircraft and aircraft component manufacturers, leasing firms and other sources of capital, airports, air navigation service providers, insurance providers, caterers, fuel suppliers, ground services providers, travel agents, tour operators, cargo integrators, and freight forwarders (Tretheway & Markhvida, 2014). Today, the air transportation industry is an essential component of tourism, leisure, commerce, export-import, business related travelling, human connectivity, and global economic integration (Wittmer & Bieger, 2011). When regarded as a system with all of the interlinked segments and directly or indirectly related industries, the aviation industry is a complex, dynamic environment where the consequences of

errors can result in catastrophic financial and fatal outcomes. In the complex, dynamic, tightly regulated environment of aviation, the consequences of an error in either aircraft piloting, air traffic control (ATC) handling, or management may be disastrous, and the importance of the human operator in the decision process is even more evident (Clamann & Kaber, 2004).

Within the aviation industry human operators play a crucial role, and the safety and success associated with all aspects of aviation rely heavily on the professionalism of its employees. Although there is considerable diversity among the various segments of the aviation industry, there is a common denominator: professionalism. As Holtman (2011) described, "Professionalism is at the heart of risk management in complex, dangerous work such as medicine, aviation, and military operations" (p. 395). Holtman also indicated "Professionalism is closely connected to expertise and is therefore closely connected to the ability to prevent and mitigate errors" (p. 395). Although the aviation industry requires predominantly licensed/certified personnel, this does not guarantee professionalism among its employees. For example, the National Transportation Safety Board (NTSB) reported there have been an increasing number of individual events of intentional misconduct, lack of commitment to critical tasks, or noncompliant behavior. These occurrences were described as erosion to professionalism. Error control is always enhanced as professionalism increases. Many NTSB accident and incident reports highlight

human error as a probable cause. Although the NTSB issues many recommendations to mitigate and decrease human failures, accidents and incidents continue to occur.

A clear example of lack of professionalism is the "Tenerife Airport Disaster," which was the worst accident in aviation history that occurred in Tenerife, Spain with a death toll of 583 passengers in 1977. This was a runway collision accident between a Pan American 747 and a KLM Royal Dutch Airlines 747. The captain of the KLM jet was particularly concerned about time because he wished to complete his round trip to Amsterdam before the number of hours he could legally fly between rest periods expired, otherwise he or his crew would be fined (Manion & Evan, 2002). According to the Netherlands Department of Civil Aviation, in an official report released by the Subsecreteria de Aviacion Civil in Spain, the probable cause of the disaster was the KLM aircraft had taken off without take-off clearance as a result of a misunderstanding between the air traffic controller and KLM flight crew (Manion & Evan, 2002). The premature take off of the KLM aircraft resulted in a runway collision with the Pan Am aircraft, which was still on the runway because it had missed the correct intersection. Thus, having proper credentials, certifications, and licenses do not necessarily infer errors in judgment will not be made. It also appears that the affective domain, in particular, attitude, also plays a critical role in professionalism.

The deadliest single aircraft accident, which was Japan Airlines (JAL) Flight 123 on August 12, 1985, also was attributed to lack of professionalism with respect

to repair work performed in important parts of the aircraft by Boeing technicians. This accident, which involved a Boeing 747SR aircraft carrying 524 people on board, suffered a sudden and rapid decompression 12 minutes into the flight causing the rupture of hydraulic lines and ejecting the vertical stabilizer. The aircraft crashed in a mountainous area within 62 miles of Tokyo. Casualties of the crash included all 15 crewmembers and 505 of 509 passengers. Japan Aircraft Accident Investigation Commission (FAA, 1985) reported that the major cause of the accident was faulty repair work performed by the Boeing Company for JAL in the aftermath of a tail strike that took place in 1978. This improper repair work completed by Boeing was related to the major structures of the aircraft and led to the eventual crash of the aircraft (FAA, 1985).

As another example, consider American Airlines flight 191, a McDonnell-Douglas DC-10-10, which crashed into an open field right after take-off in Chicago, Illinois on May 25, 1979. The two pilots, one flight engineer, 10 flight attendants, the 258 passengers aboard the airplane, and two people on the ground were killed and the aircraft was destroyed. The National Transportation Safety Board (NTSB, 1979) reported that the probable cause of the accident was most likely due to improper maintenance procedures. Once again, although aircraft maintenance workers are certified and properly licensed, this does not necessarily mean that they will have the proper attitude required to complete their duties in a responsible and professional manner at all times.

A lack of crew professionalism also was cited in several recent airline accidents within the United States. For example, Comair flight 5191, a Bombardier CRJ, crashed on takeoff when the crew accidently departed from the wrong runway at Lexington, Kentucky's airport on August 27, 2006. The captain, flight attendant, and 47 passengers were killed, the first officer received serious injuries, and the aircraft was destroyed. During the moments prior to the accident, crewmembers were not acting professionally: they were violating FAA and company policy by engaging in non-pertinent cockpit conversations during the taxi to the runway (NTSB, 2007).

Another example was Colgan Air flight 3407, a Bombardier DHC-8-400, which crashed while on approach to Buffalo, New York on February 12, 2009. The two pilots, two flight attendants, 45 passengers aboard the airplane, and one person on the ground were killed, and the aircraft was destroyed. Once again, the crewmembers did not adopt a professional approach to the flight. The NTSB (2010) reported that crewmembers were engaged in a continuous conversation that was mostly extraneous to flight operations throughout the flight, which delayed performance of flight related duties and caused the crash. Professionalism was cited as a possible factor related to that crash.

The costs of these events extend beyond human lives and economic losses. They erode the public trust in airlines, the aviation industry, and aviation safety as a whole. As a result, these events along with NTSB investigations continue to gather significant congressional, media, and public interest in the aviation profession

specifically targeting pilots and air traffic controllers (NTSB, 2012). These developments also led the NTSB in 2012 to add aviation professionalism to its "most wanted" list, which is a program that represents the NTSB's advocacy priorities. This program is designed to increase awareness and enhance the support for the most critical changes needed to reduce and prevent aviation accidents and incidents, and thus enhance the safety record of the industry.

To underscore the importance of professionalism in aviation former FAA Administrator Randy Babbitt (2011) observed:

> Professionalism is a level of excellence above and beyond minimum standards or basic legal requirements…You don't become a professional simply by earning certificates, adding ratings, or getting a paycheck for flying. Rather, professionalism is a mindset. It comes from having the attitude, the ethics, and the discipline to do the right thing every time, all the time, regardless who is watching. (p. 10)

Although Babbitt's comments describe what he believes should be the hallmarks of professionalism, he neither provides a formal definition nor a way in which to measure professionalism. This is not surprising. According to Kern (2011), professionalism seems like a straightforward and commonly understood term, but this has not proven to be the case. A recent example of this is the challenge the National Business Aviation Association (NBAA) encountered when it tried to define professionalism in business aviation. According to the NBAA Safety Committee

Professionalism Working Group, it was much easier to cite a lack of professionalism than it was to define it. The committee ultimately decided not to focus on an all-inclusive or universal definition, but instead focused on what it perceived to be core values that would provoke a broader discussion and interpretation from individuals as well as from organizations: "Professionalism in aviation is the pursuit of excellence through discipline, ethical behavior and continuous improvement" (NBAA, 2018a, para. 1). The NBAA also expanded on this definition by providing a set of complementary characteristics of professionalism for both individuals and organizations.

Sabet and Klinger (1993) posited that the concept of professionalism should be considered from either a structural or attitudinal perspective. For example, with respect to the former, professionalism would be defined by the number of formal certificates a person has earned, any specialized training or education a person has received, the extent to which a person participates in any professional organizations, and that organization's established code of ethics (Moore, 1970; Wilensky, 1964). When considered from this perspective, a technician who has acquired a particular set of skills through formal training, certification, and/or licensing would be considered a "professional" in his or her field. On the other hand, when defined from an attitudinal perspective, professionalism would include professional autonomy, a calling to the profession, professional ethics, and identification with the profession (Hall, 1968). Accenting this latter perspective, Maister (1997, p. 17) described

professionalism as more about an attitude of caring, not a set of competencies, and strongly believed that a real professional is a technician who cares: "Professionalism implies a pride in work, a commitment to quality, a dedication to the interests of the client, and sincere desire to help."

A recent example from the aviation industry that highlights the need to adopt Maister's (1997) attitude of caring and a "dedication to the interests of the client" (p. 17) is the involuntary removal of a passenger from United Express Flight 3411 on April 9, 2017. This breach of professional conduct displayed by United Airlines staff and law enforcement personnel became major news worldwide for several weeks and eroded the trust toward the brand of a major airline. Moreover, Oscar Munoz, CEO of United Airlines, sent a memorandum prematurely to his staff in which he complemented the employees involved in the incident. This memo ultimately went viral and further damaged the brand. The damage caused to the brand of the airline is quite difficult to assess at this point, but Eric Schiffer, CEO of Reputation Management Consultants, termed United's handling of the incident as "brand suicide" (Bacon & Mutzabaugh, 2017, para. 12). As a direct result of this incident, United Airlines' stock dropped steadily within the next 36 hours by almost 5% amounting to an estimated $255 million loss of the airline's market value (Bacon & Mutzabaugh, 2017). To mitigate further damage, United Airline's CEO went on an apologizing tour to mainstream media outlets for several days following the incident. The lack of professionalism conducted by United Airline's staff and CEO could have

been avoided if United Airlines' staff had taken a more professional approach, but instead it demonstrated a lack of pride and "caring" in work and commitment to quality.

When dealing with something as critical and provocative as professionalism, words matter a great deal. This was illustrated by former NTSB Chairwoman Deborah Hersman's introductory remarks in May 2010 at the National Transportation Board forum on "Professionalism in Aviation." Hersman said (as cited in Kern, 2011, p. 32): "So many in the industry recognize the issue of professionalism is a real challenge, how do you encourage people day in and day out to do the right thing every time when people aren't watching?" Kern (2011) accented this point when he reported that over 50 industry experts wrestled with this challenge for 3 days during the aforementioned NTSB conference without coming to a significant conclusion or even a shared definition of the concept or the level of problem it posed. Many of the aviation experts even argued that a public discussion of the topic put the industry in a bad light in the eyes of the general public. Evidently, it was clear that the aviation industry had a significant amount of work to do if the experts wanted make real progress on this issue.

Many professional organizations have wrestled with the concept of professionalism and their efforts have led to considerable differences in perceptions and disagreements as well as many varied definitions (Ghadirian, Salsali, & Cheraghi, 2014). To gain a clearer understanding of professionalism, it might be

helpful to first focus on what would be considered unprofessional similar to what the NBAA Working Group observed. According to Burton's (2013, p. 636) legal thesaurus, adjectives that describe what it means to be unprofessional include: amateurish, contrary to professional ethics, improper, imprudent, inappropriate, injudicious, non-expert, not of high standards, unbusinesslike, undignified, unethical, unfitting, unscholarly, unseemly, and unsuitable for the culture or profession. From these adjectives several key elements emerge that are helpful in defining professionalism. These include expertise, ethics, knowledge, judgment, and appearance, among others. However, can professionalism be defined by the absence of its negative, and if so, then to what extent could it be quantified? The answer to these two questions is a partial "yes," but relative to the published literature this answer is only relevant to certain professions, including: (a) accounting and business (Araugo & Beal, 2013; Bechervaise, McKenzie, & Beal, 2013; Boyt, Lusch, & Naylor, 2001; Nino, 2014; and Shafer, Park, & Liao, 2002), (b) education (Alemu, 2013; Ifanti & Fotopoulou, 2011; Messmann, Mulder, & Gruber, 2010; and Mat & Zabidi, 2010), (c) healthcare and nursing (DuPree, Anderson, McEvoy, & Brodman, 2011; Hwang et al., 2009; Kim-Godwin, Baek, & Wynd, 2010; Wilkinson, Wade, & Knock, 2009; and Wynd, 2003), and (d) the legal profession (Carlan & Lewis, 2009).

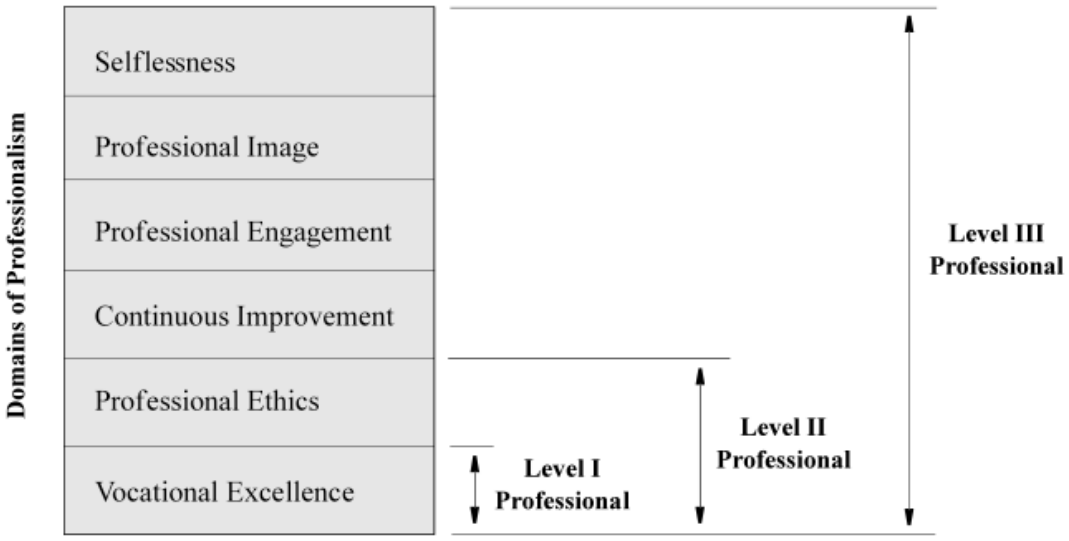

Figure 1.1. Kern's (2011) domains of professionalism and corresponding levels of professionals.

In the aviation profession, various attempts have been made to define professionalism, including one from the NBAA as noted earlier. Kern (2011) also developed a theoretical model in which professionalism in aviation was comprised of six domains (or stages), which are then partitioned into three levels of professionalism. This model, which is illustrated in Figure 1.1, is discussed more fully in Chapter 2, and served as the theoretical grounding of the current study. Kern also provided various illustrations of a lack of professionalism that have been reported over the past decade in all sectors of industry and government. A few examples are highlighted here:

- High end financial types spinning Ponzi schemes or taking on huge financial risks for their clients without any personal risk or remorse due to their golden parachute contracts.

- Surgeons operating on the wrong patient, the wrong part of the right patient, or botching the effort so badly it kills or maims the patient.
- Professional pilots, drunk in the cockpit, mistakenly landing on taxiways or overflying destinations while playing with their laptop computers.
- Air traffic controllers bringing a blanket and a pillow to work so they can take a nap during slow traffic periods.
- Clergy who abuse their positions of trust and authority, taking advantage of their parishioners, both physically and financially.
- Police officers taking bribes or extorting money or other favors from those they are sworn to serve and protect. (Kern, 2011, p. 23)

Citing the incident in which a Northwest Airlines flight crew lost situational awareness and overflew their intended destination by hundreds of miles with an airliner full of passengers, former FAA administrator Randy Babbitt emphasized the need for the aviation profession to refocus on professionalism (Kern, 2011). As described throughout this section, though, there continues to be lapses in professionalism since Babbitt's (2011) proclamation, and with few exceptions, there continues to be a dearth of published literature that examines the concept of professionalism within the aviation industry. One of the few noted exceptions is Alhallaf's (2016) seminal study of aviation professionalism. Alhallaf examined professionalism as an attitudinal variable across the entire spectrum of the aviation industry and reported that marital status, race/ethnicity, annual income, employment

status, and involvement in professional activities were significantly related to participants' level of professionalism. Although these significant factors were reflective of his final sample (N = 661), Alhallaf did not examine the extent to which these or other factors were related to professionalism within specific aviation subgroups such as aircraft mechanics, airport managers, air traffic controllers, pilots, business aviation personnel, government contractors and/or consultants, and college/university aviation faculty and students.

As a result, the current study endeavored to address this omission by disaggregating Alhallaf's (2016) data into five major subgroups: Aircraft Maintenance Technicians (AMTs); Airport Managers; Air Traffic Controllers (ATC); Non-Pilot Aviation Employees (NPAE), which included business, flight operations, and college/university faculty; and Pilots. This endeavor both addressed Babbitt's (2011) call for the aviation industry to refocus on professionalism, and helped fill the gap in the current literature with respect to understanding factors related to professionalism across the various segments of the aviation industry.

Purpose. The purpose of the current study was to conduct a secondary analysis of Alhallaf's (2016) data. Unlike Alhallaf who identified specific factors that were related to the concept of professionalism across the aviation industry from an aggregate perspective, the current study disaggregated Alhallaf's data into the five aforementioned subgroups and examined: (a) the factors that are strongly associated with professionalism within each targeted subgroup, (b) the differences in the levels

of professionalism across the targeted subgroups and (c) the differences in the perceptions of professionalism across the targeted subgroups. The corresponding analyses were conducted from both within- and between-groups perspectives. The current study also examined the same research factors Alhallaf targeted and partitioned these factors into three functional sets:

- Set A = Demographics consisted of traditional personological characteristics and included gender, age, marital status, race/ethnicity, education level, and annual income.
- Set B = Aviation Experiences consisted of participants' total years of experience working in the aviation profession, total number of FAA ratings (Pilot subgroup only), and total flight hours (Pilot subgroup only).
- Set C = Professional Activities consisted of factors related to activities participants might be involved in to keep current in their profession. Examples included membership and participation in professional organizations, continuing education and training, and networking and mentorship. Alhallaf (2016) measured these activities using Kramer's (1974) Index of Professionalism (IOP) scale where higher scores reflected higher involvement in professional activities.

Independent of these sets, the current study also assessed participants' perceived understanding of the concept of professionalism relative to each subgroup. This was measured using a series of ranked items that reflected either an attitudinal

or an empirical perspective of professionalism and is described in the Instrumentation section of Chapter 3. The dependent variable was participants' level of professionalism, which Alhallaf measured using Snizek's (1972) Hall's Professionalism Inventory (HPI). The HPI also is described in the Instrumentation section of Chapter 3.

Definition of Terms

Key terms and phrases relative to the current study are operationally defined as follows:

1. *Age* referred to the length of time in years participants have lived.
2. *Annual income* was defined as the amount of money participants earned annually in U.S. dollars working in their profession. Alhallaf (2016) used nine income groups: (a) less than $39,999; (b) $40,000 to $49,999; (c) $50,000 to $59,999; (d) $60,000 to $69,999; (e) $70,000 to $79,999; (f) $80,000 to $89,999; (g) $90,000 to $99,999; (h) $100,000 to $149,999; and (i) $150,000 or more. Due to disparate sample sizes among the groups, I restructured income levels into four groups: (a) under $50,000, (b) $50,000 to less than $100,000, (c) $100,000 to less than $150,000, and (d) more than $150,000.
3. *Aviation experience* represented Set B and included: (a) the total years of experience working in the aviation profession; (b) the total number of FAA pilot ratings such as PPL, instrument, CPL, ATP, CFI, CFII, and

MEI; and (c) the total number of flight hours. The latter two factors were related to the Pilot subgroup only. These data were self-reported by participants and disaggregated relative to the targeted subgroups.

4. *Aviation profession subgroups* referred to any vocation directly related to aviation. In the context of the current study, there were five aviation subgroups: Aircraft Maintenance Technicians (AMTs), Airport Managers, Air Traffic Controllers (ATC), Non-Pilot Aviation Employees (NPAE), and Pilots. The NPAE subgroup included business, flight operations, and college/university faculty.
5. *Demographics* represented Set A and consisted of participants' personological characteristics, which included gender, marital status, age, race/ethnicity, annual income, and education level. These data were self-reported by participants and disaggregated relative to each of the targeted subgroups. Definitions for these factors are described separately in this section.
6. *Education level* was defined as the highest level of formal education participants attained. Alhallaf (2016) used the following categories to classify education level: (a) high school degree or equivalent, (b) 2-year/associate's degree, (c) 4-year/bachelor's degree, (d) master's degree, and (e) doctoral degree. Because of the disparity in sample sizes among these groups, Alhallaf (2016) combined master's and doctoral degrees

into the single group "graduate degree." Due to disparate sample sizes among the subgroups within context of the current study, I further restructured education level into three categories: (a) Less than 4-year degree, (b) 4-year/bachelor's degree, and (c) graduate degree.

7. *Gender* referred to the traditional sex classification of males and females.
8. *Marital status* initially was defined by Alhallaf (2016) as Single (never married), Married, Divorced, Separated, and Widowed. Because of the disparity in sample sizes among these groups, Alhallaf restructured marital status into three groups: Single, Married, and Divorced, where Single included never married, separated, and widowed. Due to disparate sample sizes among the subgroups within context of the current study, I further restructured marital status into two levels. Married and Not Married, where Not Married comprised single, divorced, separated, and widowed.
9. *Perceptions of professionalism* referred to "participants' perceived understanding of the concept of professionalism within their vocation" (Alhallaf, 2016, p. 14). Alhallaf (2016) measured this construct by asking participants to respond to the statement, "I believe professionalism is based on or related to..." Participants then ranked a set of responses from most important to least important, which reflected their perception of

professionalism. A complete list of these responses is provided in Appendix A, Section B.

10. *Professional activities and involvement* represented Set C and was defined as a set of items that were part of Kramer's (1974) Index of Professionalism (IOP). Participants self-reported the extent to which they were involved in various professional activities such as the number of professional courses taken, subscriptions to professional journals, and the number of hours spent reading professional literature. These data were disaggregated relative to each of the targeted subgroups. A description of the specific activities is provided in Appendix A, Section D.
11. *Professional development* was defined as acquiring skills, knowledge, and attitudes consistent with the chosen profession (Seyler, 2012, p. 14). According to Maister (1997), skills can be taught but attitudes and character are inherent. Alhallaf (2016) used Kramer's (1974) Index of Professionalism to measure participants' professional development. These data were self-reported by participants and disaggregated relative to each of the targeted subgroups. A description of the corresponding items is provided in Appendix A, Section D.
12. *Professionalism* was defined as "a commitment to the profession, altruism, upholding code of ethics, respect for others, integrity and commitment to excellence" (Seyler, 2012, p. 14). Alhallaf (2016)

measured participants' level of professionalism using Snizek's (1972) Hall's Professionalism Inventory (HPI). In the current study, scores from the HPI were used as the dependent measure and disaggregated relative to each of the targeted subgroups. A copy of the HPI is provided in Appendix A, Section A.

13. *Professionals* were defined as individuals who embrace and continually improve in their profession. According to Kern (2011), there are three levels of professionalism, and professionals are classified across six domains of professionalism: Level 1 is vocational excellence; Level 2 includes professional ethics; and Level 3, which is the pinnacle of professionalism, comprises continuous improvement, professional engagement, professional image, and selflessness. In the current study, the targeted subgroups were examined relative to Kern's model. Although Kern (2017) subsequently has added a fourth level of professionalism that corresponds to a seventh domain, mentorship, the current study focused on Kern's initial six-domain model because this is the model Alhallaf (2016) used to ground his study.
14. *Race/ethnicity* initially was defined by Alhallaf (2016) as White Caucasian, African-American, Hispanic, Asian American, and Other. Because of the disparity in sample sizes among these groups, Alhallaf

redefined race/ethnicity as the dichotomy White Caucasian vs. nonwhite Caucasian. The current study also applied this dichotomy.

Research Questions and Hypotheses

Research questions. The primary research questions that guided the current study were as follows:

1. When examined from a hierarchical perspective with set entry order A-B-C, what is the predictive gain at each step of the analysis relative to each of the five-targeted subgroup's level of professionalism?
2. What is the difference in the level of professionalism across the targeted five subgroups?
3. In what way(s) do the subgroups differ in their perceptions of professionalism?

The reader will note that Research Question 3 has no corresponding hypothesis but instead was answered directly via descriptive statistics in Chapter 4.

Research hypotheses. The corresponding research hypotheses of the current study were as follows:

Hypothesis 1. When examined from a hierarchical perspective with set entry order A-B-C, there will be a predictive gain in the relationship with each of the five-targeted subgroup's level of professionalism at any stage of the analysis. The reader will note that this hypothesis is from a non-directional perspective because there was no corresponding past research or theory to guide a directional hypothesis. In

Chapter 4, this research hypothesis is partitioned into five respective null hypotheses of 1a, 1b, 1c, 1d, and 1e for each subgroup.

Hypothesis 2. At least one subgroup will have a different level of professionalism than the other subgroups. The reader again will note that this hypothesis is from a non-directional perspective because there was no corresponding past research or theory to guide a directional hypothesis.

Study Design

The current study incorporated two research methodologies. The first, which is relevant to Research Question 1, was explanatory and predictive correlational research. This methodology and design were appropriate because a correlational study examines relationships among variables. These relationships could then be used to make predictions. According to Ary, Jacobs, and Sorensen (2010) an explanatory study helps identify relationships among variables, which then can be used to help clarify an understanding of some phenomena. I endeavored to examine the relationship between the targeted sets of variables and the level of professionalism within each targeted subgroup to determine the predictive influence these factors have on each subgroup's level of professionalism.

The second methodology, which is relevant to Research Questions 2 and 3, was ex post facto. This methodology was appropriate because the composition of each subgroup was predetermined. For example, I could not assign a participant to the "Pilots" subgroup or another participant to the "ATC" subgroup. As a result, I

examined the differences in the level of professionalism among the subgroups as well as what way(s) the subgroups differed in their levels of professionalism. Because the group membership variable was on the IV side, the corresponding design was effects type. More specifically, I examined the effect of group membership on (a) differences in level of professionalism (Research Question 2) and (b) differences in perceptions of professionalism (Research Question 3).

The current study employed Alhallaf's (2016) researcher-constructed instrument, the Aviation Professionalism Survey (APS, see Appendix A), which was packaged into a single, multi-page questionnaire and made available electronically via *QuestionPro*. The targeted aviation professional organizations then distributed this link via an e-mail broadcast to their members with an invitation to participate. This is further elaborated on in Chapter 3.

Significance of the Study

The current study's significance is with respect to addressing the dearth of empirical research in the current literature relative to aviation professionalism. Although Alhallaf (2016) examined professionalism across the broad spectrum of the aviation profession, there have been no published studies that examined the level of professionalism both within specific subgroups of aviation as well as between these subgroups. Thus, the current study provides practical value to many individuals and researchers in aviation and other similar industries who are interested in exploring the different dimensions of professionalism and professional development. The

current study also can be used as a baseline to generate data to compare different subgroups' level of professionalism, and to clarify the perspectives of professional development within different aviation subgroups. For example, human resources departments of airlines, airports, consultants, aircraft maintenance companies, air traffic controllers, unions, aircraft manufacturers, universities, government institutions, and other aviation subgroups may utilize the diverse recommendations of the current study to examine their recruitment efforts and furthermore enhance the professional development of their employees.

Study Limitations and Delimitations

Similar to most cases in research, the current study was subject to various limitations and delimitations. Limitations are circumstances, conditions, or events that are beyond the control of the researcher and could limit the generalizability of the study's findings. Delimitations are researcher-imposed circumstances, conditions, or events that are necessary to make the study manageable and feasible to be implemented, but further limit the generalizability of a study's findings. As a result, the reader is advised to take into consideration the limitations and delimitations outlined here when interpreting the results of the current study.

Limitations. The limitations of the current study were as follows:

1. Integrity of the archived data. The current study involved a secondary analysis of Alhallaf's (2016) data as discussed earlier. Therefore, I did not have any control over the integrity of the data, including the number of participants and the

honesty of their responses. Furthermore, the data also were acquired via a questionnaire that participants accessed electronically at a remote survey website. Therefore, similar studies that involve a different number of participants and data collection procedures might get different results.

2. Sample representativeness. As noted earlier, the current study disaggregated Alhallaf's (2016) data into five targeted subgroups of Aircraft Maintenance Technicians (AMTs), Airport Managers, Air Traffic Controllers (ATC), Non-Pilot Aviation Employees (NPAE) and Pilots. The NPAE subgroup included business, flight operations, and college/university faculty. How representative these subgroups were to their respective target populations is unknown because Alhallaf focused on the aviation profession as a whole and not as independent subgroups. Furthermore, Alhallaf restricted his sample to the U.S. aviation industry. Therefore, subsequent studies that focus on different subgroups, or focus on the same subgroups but outside the U.S., might get different results.

3. Sample size. Because the current study was a secondary analysis of Alhallaf's (2016) data, the sample size was limited to the number of participants within each of the aviation subgroups who completed the questionnaire. Therefore, subsequent studies that employ larger or smaller sample sizes for each subgroup might get different results.

4. Type and source of study. The current study was a secondary analysis of Alhallaf's (2016) data and therefore was restricted to his archived data. As a result, if

a similar study were to be conducted that collected data directly from participants in the five subgroups being targeted, the results might be different.

5. Time factor. The data collection period for the study was the consecutive 4-month period that ended August 2015. Therefore, similar studies that use a different data collection period might not get the same results. This is important to note because the awareness of the importance of professionalism has increased in aviation within the last few years.

6. Data collection instruments. The current study utilized Alhallaf's (2016) archival data, which were acquired from an instrument he prepared. This instrument may include unknown flaws with respect to validity and reliability. Therefore, similar studies that use a different data collection instrument to collect participants' perceptions of professionalism, aviation experience, and demographics, or use different standardized instruments to measure professionalism, might not get the same results.

7. Sampling sources. The current study was limited to Alhallaf's (2016) data. Participants who provided these data were members, employees, or subscribers of the following organizations: National Air Traffic Controllers Association, American Association of Airport Executives, University Aviation Associations, Society of Aviation and Flight Educators, Curt Lewis & Associates' mailing list, International Society of Air Safety Investigators, National Association of Flight Instructors, National Business Aviation Association, alumni from Embry-Riddle Aeronautical

University and Florida Institute of Technology, Aeronautical Repair Station Association, and Aviation Technician Education Council. Therefore, similar studies that use different sampling sources within the aviation industry might not get the same results.

Delimitations. The delimitations of the current study were as follows:

1. Formation of subgroups. The formation of the five subgroups was guided by three key factors. The first factor was data-driven and consisted of participants' responses to the background section of Alhallaf's (2016) questionnaire. As part of this section Alhallaf asked participants to self-report their employment status, field or position of employment, the aviation segment they worked in, and their work setting or employer. These data were examined from a content analysis perspective, which led to the emergence of 12 major factions within the aviation industry. The second factor was theory-driven and was based on Edwards' (1981) SHELL model. The last factor was personal experience-driven. I applied my 2 decades of personal industrial experience within the aviation profession to the results from the first two factors to determine the final five subgroups. As a result, subsequent studies that analyze Alhallaf's (2016) data by forming different subgroups might not get the same results.

2. Incomplete cases. According to Alhallaf (2016), his initial data set consisted of 1,100 cases, of which 439 cases (39%) were incomplete because of missing data. Although Alhallaf chose to delete these cases, I followed Cohen,

Cohen, West, and Aiken's (2003) guidelines for missing data. Therefore, subsequent studies that disaggregate Alhallaf's data but treat his missing data differently might get different results.

3. Statistical strategies. The current study employed a hierarchical multiple regression strategy to test Hypothesis 1, a between groups ANOVA strategy to test Hypothesis 2, and descriptive statistics to answer Research Question 3. Therefore, subsequent studies that disaggregate Alhallaf's (2016) data but use different statistical strategies might get different results.

Chapter 2

Review of Related Literature

Introduction

This chapter is organized into three main sections. The first section presents information about the theoretical grounding of the current study, and contains an overview of Kern's (2011) model of professionalism for the aviation community. Included in the presentation is a discussion of how the findings of Alhallaf's (2016) study supported Kern's model. The second section is separated into two parts. The first part contains a summary of the salient aspects of the past research Alhallaf cited and how these studies informed his study with respect to: (a) demonstrating the need for examining and measuring professionalism in aviation, (b) identifying relevant factors for measuring professionalism, and (c) determining what instrument would be appropriate for measuring professionalism. The second part provides support from the literature for the rationale/need to partition Alhallaf's sample into the targeted subgroups, and to examine the concept of professionalism from both within- and between-groups perspectives, which was the primary objective of the current study. The last section presents a summary of the related literature and a discussion of its implications to the current study.

Overview of Underlying Theory: Kern's Model of Professionalism

The current study hypothesized that within each of the five targeted aviation subgroups (aircraft maintenance technicians, airport managers, air traffic

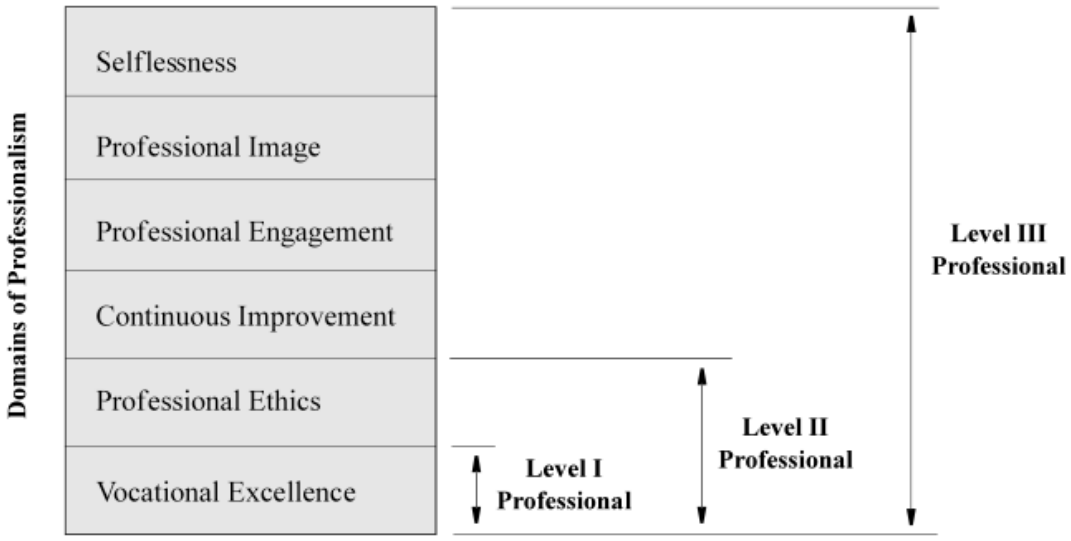

Figure 2.1. **Replication of Kern's (2011) domains of professionalism and corresponding levels of professionals (from Chapter 1).**

controllers, non-pilot aviation employees and pilots) participants' personological characteristics, aviation experiences, and professional activities will have a direct relationship with their level of professionalism. This hypothesized relationship is based on Alhallaf (2016) who grounded his study on Kern's (2011) model of professionalism, which was presented in Figure 1.1 in Chapter 1 and is replicated here in Figure 2.1 for the reader's convenience.

As illustrated in Figure 2.1, Kern's (2011) model is partitioned into six domains. Working from lowest to highest, these domains are: (a) vocational excellence, which reflects the concept of "doing the right things right" such as paying attention to detail and being diligent in performing a task; (b) professional ethics, which reflects the concept of "doing the right thing" such as telling the truth and not withholding critical information; (c) continuous improvement, which reflects

the concept of "getting better at doing the right thing" such as improving performance and demonstrating continual learning; (d) professional engagement, which reflects the concept of "sharing and learning with others" such as actively participating in professional organizations and fostering teamwork; (e) professional image, which reflects the concept of "looking and acting the part as you do the right thing" such as being respectful of others, promoting a positive perception, and maintaining a professional appearance; and (f) selflessness, which reflects the concept of "helping others and the world by doing the right things right" such as putting in extra time to complete a task and mentoring others. Subsequent to publishing this model, Kern removed the activity of mentorship from the selflessness domain, incorporated it separately as a seventh domain, and added a fourth level of professionalism, which comprises all seven domains. Thus, Kern's most recent model consists of seven domains and four levels professionalism. For the current study, though, Kern's initial model as illustrated in Figure 2.1 was applied because this was the model on which Alhallaf (2016) grounded his study.

Kern (2011) designed his model of professionalism specifically for the aviation profession, and it is highly regarded in the industry, especially in the aftermath of aviation professionalism being added to the National Transportation Safety Board's Most Wanted List in 2011–2012 (NTSB, 2012). Furthermore, in 2015, the National Business Aviation Association (NBAA) established the Dr. Tony Kern Aviation Professionalism Award, which "recognizes individual aviation

professionals…who have demonstrated their outstanding professionalism and leadership in support of aviation safety in the business aviation industry" (NBAA, 2018b, para. 1). Kern's model has served as a theoretical foundation for examining aviation professionalism, and has contributed to enhancing professionalism in an industry where there has been a struggle in agreeing on a common definition of professionalism. The three stages of Kern's model are as follows:

Level I professionalism. As shown in Figure 2.1, a Level I professional has acquired vocational excellence. These individuals are well qualified to earn a salary, but are not necessarily compliant with all the policies, procedures and regulatory guidelines associated with their vocation. According to Kern (2011), Level I professionals may be thought of as entry-level professionals who generally claim, "I'm a pro because I earn a pay check in the industry" (p. 69).

Level II professionalism. As shown in Figure 2.1, a Level II professional includes individuals who are as competent as Level I professionals, but are more adamant followers of ethical requirements. They are known as compliers to all the policies, procedures, and regulatory guidelines. However, they may never fully reach their potential due to lack of effort in personal development and investment, and hence tend to be status quo professionals. According to Kern (2011), Level II professionals are those who stake their claim as, "I'm a pro because I meet and maintain the standards" (p. 70).

Level III professionalism. As shown in Figure 2.1, a Level III professional includes individuals who embrace and continually improve across the six domains of professionalism. According to Kern (2011), a Level III pro is an elite performer who strives to meet the following definition of professionalism: "Meticulous adherence to undeviating courtesy, honesty, and responsibility in one's dealings with customers and associates, plus a level of excellence that goes over and above the commercial considerations and legal requirements" (p. 72). With respect to the six-domain model, a Level III professional is the pinnacle of professionalism.

Alhallaf (2016) reported that his study supported Kern's (2011) initial six-domain model:

> The findings of the current study support Kern's (2011) model of professionalism. Kern's Levels I and II would apply to younger, nonfull-time employees. According to Kern, these individuals would have a lower level of professionalism than their counterparts, namely, older, full-time employees. This is exactly what the current study found. Similarly, Kern's Level III would apply to individuals who pursue continuous improvement via formal education and who are actively engaged in their profession. Once again, the findings of the current study support Kern's Level III as evidenced by the significant factors of education and those of the IOP. Thus, the study's participant's professional development was linked to the level of maturation

> as well as to the level of involvement, which could lead to higher level professionalism. (Alhallaf, 2016, p.159)

Alhallah (2016) also conducted an independent analysis between participants' level of professionalism scores as measured by Snizek's (1972) Hall's Professionalism Inventory (HPI), and their scores on Kramer's (1974) Index of Professionalism (IOP) scale, which measured participants' level of professional activities and involvement. Alhallaf reported a significant relationship between these two sets of scores, and the significant IOP factors were (a) number of professional journal subscriptions, (b) number of professional book purchases, (c) activity/membership in professional organizations, (d) number of professional speeches, and (e) activity within the employing organization. These findings are consistent with Kern's (2011) model of Level III professionalism, which includes domains of continuous improvement and professional engagement. Thus, to be a productive professional one is required to be actively involved within the profession.

Given the degree to which Alhallaf's (2016) study—which examined aviation professionalism from an aggregate perspective—supported Kern's (2011) model of professionalism, the current study, which disaggregated Alhallaf's data into five subgroups, sought to determine whether the data within each subgroup also supported Kern's (2011) model. Thus, for the current study, the objective was to see if the disaggregated archival data of Alhallaf supported or refuted Kern's model of aviation professionalism for the five-targeted subgroups. I also endeavored to

examine the relationship between the level of professionalism and the targeted factors both within and across the targeted subgroups within the aviation profession. With respect to Kern's model, it was hypothesized that at least one subgroup would have a different level of professionalism than the other subgroups.

In addition to Kern's (2011) model, Alhallaf (2016) also grounded his study in Leddy and Pepper's (1993) Stages of Professional Development model, which was designed for nursing professionals and based on Erikson's (1982) Eight Stages of Development. To bring context to the aviation profession, Alhallaf juxtaposed Kern's and Leddy and Pepper's respective models as illustrated in Figure 2.2. Although the current study was not grounded in Leddy and Pepper's theoretical model, the reader will note that Alhallaf's findings also supported Leddy and Pepper's model. For example, Alhallaf reported that older and more educated participants scored higher on the HPI than less educated and younger participants. The specific factors that were significant included age, education level, employment status, and key IOP factors, which focused on levels of professional activity/involvement and were the same as those reported earlier. From Figure 2.2, these results paralleled Kern's model with respect to the upper domains, which correspond to a Level III professional.

Leddy and Pepper's (1993) Stages of Professional Development	Kern's (2011) Domains of Professionalism
The Older Professional	Selflessness
The Productive Professional	Professional Image
The Maturing Professional	Professional Engagement
The Professional with Own Identity	Continuous Improvement
The Growing Professional—Developing Expertise	Professional Ethics
The Young Professional—Moving into Independence	Vocational Excellence
The Beginning Professional Nurse—Postorientation	
The Beginning Professional—Orientation	

***Figure 2.2*. Comparison between Leddy and Pepper's (1993) professional development model and Kern's (2011) professionalism model.**

Given that the findings from Alhallaf (2016) supported both Kern's as well as Leddy and Pepper's (1993) respective models, this suggests that as participants got older, gained more experience, and developed within the profession, their level of professionalism increased. Alhallaf's findings also confirmed that to be a Level III professional or to be placed in the upper components of Leddy and Pepper's model, one must actively be involved in all aspects of the profession, from subscribing to professional journals to memberships in professional organizations to being involved within the organization.

Review of Past Research Studies

As noted in the introduction to this chapter, the literature review is separated into two parts. The first part contains a summary of the salient aspects of the past research Alhallaf (2016) cited. Because the current study was a secondary analysis of

Alhallaf's data and examined factors associated with the concept of professionalism across five subgroups within the aviation profession, the research factors were predetermined and therefore no new variables were targeted and no new data were collected. As a result, information about these factors relative to how they were determined and their relevance with respect to Alhallaf's findings is warranted to provide context to the current study. The second part of the literature review provides support from past studies for partitioning Alhallaf's sample into the targeted subgroups, and examined the concept of professionalism from both within- and between-groups perspectives, which was the primary objective of the current study.

Part A: The foundation of Alhallaf's study. The purpose of Alhallaf's (2016) study was to examine the relationship between various factors and participants' (aviation employees and students) level of professionalism across the aviation profession from an aggregate perspective. The factors Alhallaf targeted included participants': (a) demographics, which included gender, age, marital status, age, race/ethnicity, annual income, and education level; (b) aviation background, which included years working in the aviation profession, employment status, the field/position of employment, and the aviation segment in which participants worked; and (c) the level of professional activities participants were involved in, which included the number of professional courses they completed, the number of professional journals they subscribed to, number of hours spent per week reading professional literature, and membership/participation in professional organizations.

Because of the lack of empirical studies in aviation professionalism, Alhallaf drew parallels to aviation from other industries in which professionalism was examined. These included healthcare/nursing, education, accounting/business, and legal/law enforcement. It was these professions from which Alhallaf both identified the factors he targeted and the data collection instruments he used, including Snizek's (1972) Hall's Professionalism Inventory (HPI) and Kramer's (1974) Index of Professionalism (IOP). Following is a summary of the key studies Alhallaf cited that related to (a) demonstrating the need for examining and measuring professionalism in aviation, (b) identifying relevant factors for measuring professionalism, (c) determining what instruments would be appropriate for measuring professionalism, and (d) how the results of his study compared against those from these other professions.

Professionalism in healthcare/nursing. Wilkinson, Wade, and Knock (2009) assessed professionalism in the health care system and had four aims: (a) to synthesize the various definitions and interpretations of professionalism, (b) to describe a toolbox of possible assessment tools, (c) to produce a blueprint that matches assessment tools to the identified elements of professionalism, and (d) to identify gaps where professionalism elements were not well matched by assessment tools. According to Alhallaf (2016) Wilkinson et al.'s study demonstrated that professionalism could be understood better using a combination of assessments.

Alhallaf concluded that the results of his study were consistent with the findings of Wilkinson et al.:

> More specifically, the level of education independent of IOP scores was a significant predictor of professionalism: As the level of education increased, participants' level of professionalism also increased. Similarly, participant's level of activity/involvement as measured by the IOP also was significant: Participants with a higher level of involvement within their profession also had a higher level of professionalism. (p. 160)

The conclusion drawn by Alhallaf relative to Wilkinson et al.'s study also is related partly to one of the research questions of the current study that dealt with the relationship between participants' personal demographics, professional activities, and their level of professionalism with respect to each subgroup.

The second study Alhallaf (2016) cited from the healthcare/nursing profession was Kim-Godwin, Baek, and Wynd (2010) who examined the level of professionalism among Korean American registered nurses (RNs). Kim-Godwin et al. used Snizek's (1972) Hall's Professionalism Inventory (HPI) to measure levels of professionalism among the nurses and examined factors associated with professionalism. These factors included work setting, employment status, and the extent to which the nurses were engaged in professional activities. Alhallaf's findings were partially consistent with those of Kim-Godwin et al. According to Alhallaf:

> The results of the current study found that work setting, employment status, and professional activities/involvement were associated with the participants' level of professionalism. The consistency in the findings between Kim-Godwin et al. and the current study also give credibility to the applicability of the HPI to the aviation profession. (p. 161)

The findings of Kim-Godwin et al.'s (2010) study were generally consistent with the findings of previous studies that used the HPI involving American RNs. However, the findings also showed some unexpected results. According to Wynd (2003), today's nurses place greater importance on autonomy and membership in professional organizations, whereas nurses in the past readily identified beliefs in public service and a sense of calling as attributes of professionalism. The findings suggest that multiple internal and external factors are associated with professionalism among Korean American RNs and provide an understanding of trends in professionalism from an international perspective.

The final study Alhallaf (2016) cited from the healthcare/nursing profession was Wynd (2003), which also was focused on registered nurses. Wynd (2003) evaluated the current attitudes toward professionalism among a sample of RNs and examined the differences and relationships among degrees of professionalism, levels of education and experience, membership in professional organizations, and specialty certification. Wynd used Hall's (1968) model as the conceptual framework for organizing her research, and she defined professionalism operationally as the

total score achieved on the Professionalism Inventory (Hall, 1968; Snizek, 1972). A descriptive comparative/correlational design was used to describe five attitudinal attributes of professionalism and the degree to which they were present in a random sample of RNs licensed in the state of Ohio. Wynd's study demonstrated that the total score for professionalism had a strong correlation with the age of the nurses, years of experience as a registered nurse, membership in professional organizations, and certification. Use of professional organization as a referent group was associated significantly with years of experience as an RN, membership in an organization, certification, service as an officer in the organization, and a higher educational degree in nursing. Age and experience as an RN also were significantly related to higher scores for public service, and autonomy was associated significantly with membership in professional organizations, higher educational degrees, and certification. The results of Wynd's study showed a significant relationship between various facets of professionalism and years of experience. For example, RNs with more years of experience (≥ 31 years in the study) had significantly higher scores on the Professional Inventory scale, significantly higher involvement within professional organizations, and (c) significantly higher autonomy and sense of calling. According to Alhallaf (2016):

> Based on these results, Wynd (2003) concluded that professionalism among RNs was related significantly to years of experience, level of education, membership in professional organizations, service as an officer in the nursing

> organization, and specialty certification. These results informed the current study with respect to many of the targeted variables. All the factors Wynd found to be significantly related to levels of professionalism among RNs have been also incorporated in this study to see if these relationships also hold in the aviation community. (p. 42)

Wynd's (2003) study also indicated that nurses should thoroughly examine their support for professional organizations. Because there appears to be a symbiotic relationship, nurses who join professional organizations begin to perceive themselves as more professional, and the organizations continue to grow based on the support of their members. Nurses with longer years of practice experience had higher professionalism in keeping with the levels of professionalism found in physicians. In fact, this finding in which experienced RNs strived to keep with levels of professionalism found in physicians is a good example of the interrelationships the current study aimed to explore. Given my 2 decades of experience in the aviation industry, I strongly believe that interpersonal relationships between subgroups such as, pilots with aircraft maintenance technicians, pilots with airport managers, pilots with air traffic controllers, and pilots with non-pilot aviation employees are pivotal for safe and successful aviation operations.

Professionalism in education. The first salient study Alhallaf (2016) cited from the education profession was Mat and Zabidi (2010), which explored the

practice of professionalism dimensions at public universities in Malaysia. Mat and Zabidi also used Hall's (1968) Professionalism Inventory (HPI) to measure professionalism similar to the studies from the healthcare/nursing profession presented above, although they modified the HPI items to reflect an academician context. Nevertheless, the application of the HPI in Mat and Zabidi's study provided support to the robustness of the HPI as an instrument for measuring professionalism across many disciplines. According to Alhallaf (2016):

> Participants rated various factors of professionalism based on their perception of what professionalism means to them. As a result, I have incorporated a "perceptions of professionalism" section into my instrument that asks participants to rank a list of 10 factors that the literature has identified as being related to professionalism. (Alhallaf, 2016, p.52)

The second relevant study Alhallaf (2016) cited from the education profession was Ifanti and Fotopoulou (2011), which examined teachers' perceptions of professionalism and professional development by investigating the views of in-service primary teachers in Greece. According to Alhallaf (2016):

> They concluded that teachers in their study regarded professionalism and professional development as a multidimensional and complicated process. They also remarked how the teachers stressed the importance of acquiring more knowledge and skills throughout their career because this inevitably will enhance their status within the teaching profession. To fulfill the

> ongoing requirements for lifelong professional development, the teachers underscored the need to be involved in specific education and training programs. (p. 163)

Furthermore, Alhallaf reported that the conclusion from Ifanti and Fotopoulou's study also was consistent with Alemu's (2013) study, which used the HPI. This further strengthens the argument that HPI is a preferred instrument to measure professionalism levels.

Alemu (2013) developed a cross-sectional survey to examine the state of professionalism and professional development of teachers in higher education at Gondar University in Ethiopia. According to Alemu (2013), the questionnaire for the study was designed after an extensive literature review. Reference was also made to Richards and Farrell's (2005) professional perspectives, Hall's (1968) Professionalism Inventory (HPI), and the recommendation of Snizek (1972) on how to use the HPI. As a result of this input, 16 open-ended questions in three categories with seven questions each—questions about professional authority, career development and questions about the institutional atmosphere for career development—were used to get the responses of the teaching personnel on diverse issues of professionalism. According to Alhallaf (2016):

> Alemu reported that organizations/institutions should arrange professional development training and workshops targeted specifically to areas of their practices. They also should consider subscribing to or making accessible

> foreign and local journals so that faculty can keep up with current knowledge in teaching theories and methods to shore up quality and to develop professionally. (p. 164)

The conclusion drawn by Alhallaf relative to Alemu's study also was partially related to Research Question 1 of the current study that dealt with the relationship between participants' professional activities and their level of professionalism with respect to each subgroup.

Professionalism in business/accounting. The first salient study Alhallaf (2016) cited from the business/accounting profession was Araugo and Beal (2013), which studied the concept of professionalism as a reputation capital for organizations. They investigated contemporary perceptions of professionalism in various business practices in Australia. Araugo and Beal's (2013) purpose was to identify the factors contributing to the development of professionalism in the workplace and ultimately its role on the strategic advantage of an organization in the form of reputational capital. In pursuit of what it means to be fully professional for both the individual and the firm, and how that affects reputational capital, Araugo and Beal's study explored the current perceptions of a broad range of respondents identified as displaying professionalism by their workplace peers.

Araugo and Beal's (2013) study included four adult focus groups comprising of 7 to 10 participants, and one student focus group comprising of 10 senior high school students. The adult group participants were peer selected from

four industries, which were implied to be information technology, business, military, and other professions. Araugo and Beal conducted a content analysis of the data from these sessions, and the results from the content analysis formed the basis of their findings.

Araugo and Beal (2013) summarized elements of professionalism under four broad fields: moral compass and integrity, skills and knowledge/expertise, approach to role and tasks, and role based identity. Based on these four commonly identified features, Araugo and Beal established the following operational definition for professionalism that incorporated a tentatively identified difference between professional bearing and actual performance:

> Professionalism is accepted as being a passionate commitment to excellent performance in the individual's role through the application of high level of expertise and personal integrity in meeting or exceeding the observable interest of clients and the professional community though constrained by the greater interest of society. (p. 360)

Araugo and Beal (2013) reported that the most consistently discussed mark of professionalism in every focus group was the maintenance of personal integrity. Common reference to personal reputation within the organization, within the industry, among peers, colleagues and family consistently suggested that respondents would leave rather than compromise their reputation. Araugo and Beal argued that each individual's professional reputation within an organization forms the basis of a

collective reputation, commonly theorized as reputational capital. When this argument is accepted, individual professionalism becomes a crucial feature in the strategic landscape—observable though not always quantifiable. Araugo and Beal concluded that with their content analyses of data from this Australian business study, they provided contemporary perceptions of professionalism through a critical historical development and related these to currently held values, perceptions, and expectations of working professionals across a range of product and service industries. According to Alhallaf (2016):

> The results of the current study are partially in agreement with Araugo and Beal (2013). For instance, the anecdotal comments (Appendix C) from the participants of the current study indicated that professionalism is a personal characteristic that can be learned. In addition, from both the anecdotal comments and the IOP results, continuous learning emerged as a major factor when it comes to developing professional identity to achieve the highest levels of professionalism. (p. 165)

The second relevant study Alhallaf (2016) cited from the business/accounting profession was Shafer, Park, and Liao's (2002) study on professionalism among management accountants. Shafer et al. (2002) explored the effects of professionalism on organizational conflict and outcomes on their related work. A reduced 20-item HPI was used to reflect a management accounting

perspective from 1,000 randomly selected certified management accountants (CMAs). According to Alhallaf (2016):

> The results of the current study also are consistent with the findings of Shafer, Park, and Liao's (2002) study on professionalism among management accountants. One of their findings was that participants' job (industry, public accounting, other), gender, years of experience and education level (bachelors, masters, other) had no significant effect on responses to the professionalism scale. With the exception of education level, this is exactly what was found in the current study. (p. 165)

The conclusion drawn by Alhallaf relative to Shafer et al.'s study also was partially related to Research Question 1 of the current study, which dealt with the relationship between participants' education background and their level of professionalism with respect to each subgroup.

Professionalism in legal/law enforcement. The relevant study Alhallaf (2016) cited from the legal/law enforcement profession was Carlan and Lewis (2009), which investigated the relationship between professionalism and personal demographics, professional demographics, and education among law enforcement officers. Carlan and Lewis reported they did not find a significant difference between professionalism and the personal demographic variables of age, race, gender, and marital status. According to Alhallaf (2016):

> The results of the current study were, to a degree, inconsistent with results of Carlan and Lewis (2009). Specifically, age, race/ethnicity, and marital status were significant predictors of aviation professionalism. Also, participants' level of education independent of IOP scores was significantly associated with aviation professionalism. However, the other demographic variables and the work environment variables were not significantly associated with aviation professionalism. Once again, the level of consistency between the results of Carlan and Lewis's study and the current study demonstrate the applicability of the HPI as a robust instrument to measure professionalism across many different disciplines. (p. 166)

In summary, Alhallaf (2016) concluded that the findings of his study were consistent with those from the healthcare/nursing, education, accounting/business, and legal/law enforcement professions. The consistency of these findings implies that with respect to the concept of professionalism, the aviation profession is similar to these other professions. This was not surprising given that the aviation profession consists of similar subgroups identical to nurses, educators, business personnel, and lawyers.

Part B: The basis for the current study. As indicated in the introductory section of the chapter, this part of the literature review provides support from the published literature for (a) the rationale/need to partition Alhallaf's (2016) sample into the targeted subgroups and (b) to examine the concept of professionalism from

both within- and between-groups perspectives, which were the primary objectives of the current study.

The rationale for subgroups: The SHELL model. According to the FAA (2012), one approach to safety through human factors in aviation is based on the SHEL model, which was developed by Edwards (1981) in the aftermath of the increasing number of fatal accidents in the 1970s. Edwards' initial model represented the interactions among four different components of human factors: Software, Hardware, Environment, and Liveware. Hawkins (1987) modified Edwards' conceptual model by including a second Liveware component to represent "person" as central entity. As shown in Figure 2.3, this modified SHELL model depicts the interactions between the central Liveware (the person) and each of other four systems. In the context of the current study, the applicable component of the SHELL model is the Liveware–Liveware interaction, which involves the interrelationships among individuals within and between subgroups, including the flight crew (pilots), airport managers, air traffic controllers, maintenance personnel, operations personnel, instructors/students, ground crew, engineers/designers, and managers/supervisors. Thus, safe and successful operations in aviation require harmony among these interrelationships, which infers similar or complementing levels of professionalism among these subgroups. The reader will note that the five subgroups targeted for the current study are consistent with the Liveware-–Liveware component of the SHELL model.

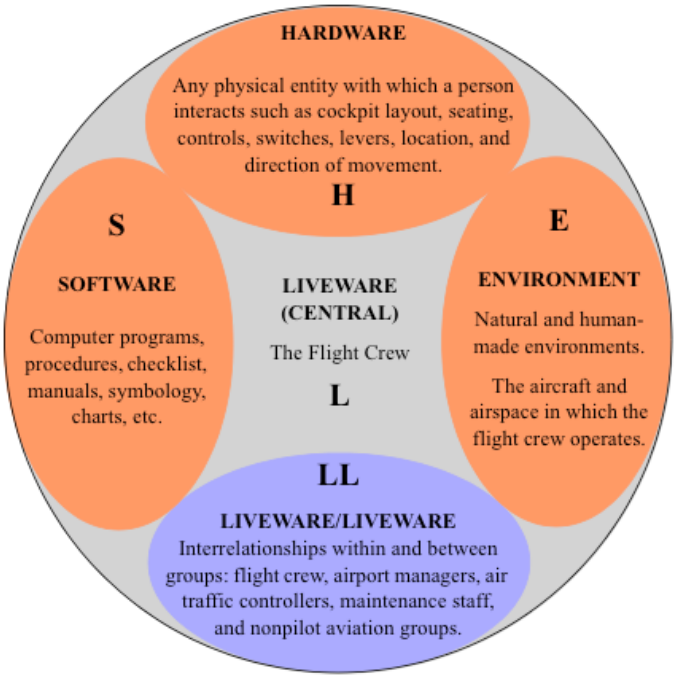

Figure 2.3. **The SHELL model. Adapted from Hawkins (1987).**

In addition to the SHELL model providing guidance on what subgroups to consider, Alhallaf's (2016) study, which was a holistic perspective, implied in various sections of his dissertation that perhaps different results could be achieved by disaggregating his data. He also included his holistic approach as one of the limitations due to the broad spectrum of the aviation profession. In fact, Alhallaf included a replication study as part of his recommendations for future research:

> Therefore, a recommendation for future research is to replicate the study using the same methods and instrumentation in a different population. For example, the study could target pilots or maintenance personnel working in a specific segment of the aviation industry rather than the

> approach of the current study, which was a holistic perspective. This would provide a different perspective in examining the concept of aviation professionalism. (p. 177)

The current study augmented Alhallaf's study by disaggregating his data and investigating the concept of professionalism from the perspective of distinct aviation subgroups. The rationale for examining these subgroups was grounded in both the SHELL model and Alhallaf's recommendation for future research. Alhallaf's (2016) findings also provided guidance in establishing the relationship between the level of professionalism and the targeted factors within each subgroup, and are expressed in Research Question 1 and the corresponding hypotheses.

The strategy for between-group comparisons. Given the unique characteristics of the different professions within aviation, it is reasonable to expect there would be different levels of professionalism across the targeted subgroups. As a result, and with respect to Kern's (2011) model, it was hypothesized that at least one subgroup would have a different level of professionalism than the other subgroups. The reader again will note that this hypothesis is from a non-directional perspective because there was no corresponding past research or theory to guide a directional hypothesis. This hypothesis also was based on the nature of the profession relative to each subgroup as well as the initial training/certification, refresher training, and development required by regulatory bodies and related associations. For example, when compared to aircraft maintenance personnel and

non-pilot aviation employees, these requirements are more rigorous for pilots, airport managers, and air traffic controllers. Following is a brief presentation that highlights this rigor among these three groups.

Pilots and air traffic controllers. Current regulations governing airline pilots require they complete a minimum of 1,500 flight hours before they are permitted to be a first officer (co-pilot) followed by simulation training every 6 months. Pilots also must receive periodical physical and medical examinations. Air traffic controllers also are subject to rigorous initial training and certification, refresher training, and development required by regulatory bodies and related associations. In fact, pilots and air traffic controllers are the two subgroups in the aviation industry that heavily rely on refresher simulation training. This is because lapses in professionalism could lead to catastrophic errors, including fatalities. Therefore, these two subgroups conduct the most intensive training on the ground and in a more controlled and safe environment such as simulators.

The professional activities performed by pilots and air traffic controllers can be viewed from two perspectives of professionalism: technical competence (extrinsic or structural) vs. social competence (intrinsic or attitudinal). According to Baldwin (2014), in the aftermath of a 2010 NTSB forum and a 2009 Air Line Pilots Association International white paper, causal definitions of professionalism typically touched on two components: technical proficiency, and emotional and relational proficiency. Similarly, Ron Nielsen (a retired airline captain and industry expert)

who participated on a discussion panel in the NTSB's May 2010 forum on professionalism, defined professionalism as "encompassing two aspects: technical competence and social competence" (Baldwin, 2014, para.15). Technical competence is inarguably a foundational element of professionalism. Furthermore, it is more tangible, quantifiable, and relatively easier to assess in comparison to social competencies, which are more intrinsic, intangible, and harder to assess empirically. In the same article by Baldwin, NTSB member Robert Sumwalt claimed, "professionalism is a mindset that includes precise checklist usage, precise callouts, precise compliance with SOPs (standard operating procedures) and regulations, and staying abreast and current with knowledge and skills" (para. 9).

One very infamous testament to technical mastery of piloting is the successful ditching of US Airways Flight 1549 in the Hudson River after both engines were damaged immediately after take-off due to bird strikes. In the successful ditching, the technical competence or extrinsic skills of Captain Sullenberg and First Officer Skiles were complemented by social competence or intrinsic skills. Social competence in this case was displayed by excellent crew resource management skills led by Captain Sullenberg, including an unflappable calm after a startling event, quick decision-making, and total focus on duty as well as critical priorities. These characteristics illustrate a textbook example of high-level professionalism where both technical and social competencies were displayed in perfect synchronization.

With respect to professionalism among air traffic controllers, the FAA's Air Traffic Investigations Division initiated the National Air Traffic Professionalism (NATPRO) in the beginning of the millennium. According to Pounds and Ferrante (2003), the NATPRO project is an example of how information identified by operation error analysis can be turned into strategy and skill enhancement. Rather than relying solely on knowledge-based training, this NATPRO approach integrates performance coaching using an awareness seminar coupled with a practicum. NATPRO training is expected to improve air traffic safety and efficiency by increasing the air traffic controller's attention and perception skills (Scarborough, Bailey, & Pounds, 2005). This is another example of the technical competence component of professionalism.

Similar to pilots, air traffic controllers also have professional associations and organizations that promote and develop professionalism such as the Air Traffic Control Association (ATCA) and the National Air Traffic Control Association (NATCA). In fact, NATCA bestows national professionalism awards to several of its members every year. According to NATCA, its Professional Standards program is to maintain and promote professionalism across all of NATCA's bargaining units and it can be achieved through a commitment to safety and through upholding the public's trust (NATCA, 2018, para. 1). This is similar to the manner in which the National Business Aviation Association (NBAA)—which is a trade group that represents more than 11,000 companies that operate general aviation aircraft and

lobbies for the interests of private and corporate jet owners—promotes and encourages professionalism in aviation. As observed earlier in this chapter, the NBAA established the NBAA Dr. Tony Kern Professionalism in Aviation Award, which "recognizes individual aviation professionals (pilots, maintenance technicians, flight attendants, dispatchers or other aviation professionals) who have demonstrated their outstanding professionalism and leadership in support of aviation safety in the business aviation industry" (NBAA, 2018b, para. 1.). Nominees are required to have exhibited leadership qualities, outstanding achievements, and significant contributions in the six domains of professionalism as described in Figure 2.1. Those six domains of professionalism comprise Kern's (2011) "The Integrated Model of Professionalism," which formed the grounding theory of the current study.

Airport managers. Professionalism among airport managers are encouraged and promoted via various associations and organizations such as the American Association of Airport Executives (AAAE), Airport Council International (ACI), and International Civil Aviation Organization (ICAO). These associations and organizations encourage and promote advancement in professionalism through avenues of professional development and certification programs, training programs, and international events/meetings. In particular, AAAE in the United States is highly focused on recognizing the value of the advancement of aviation through individuals who are fully committed to the industry (AAAE, 2018, para. 1). That is

why AAAE offers numerous professional development and certification programs, training opportunities, and over 90 domestic and international meetings a year. The Accredited Airport Executive (A.A.E.) and Certified Member (CM) programs also are highly recognized and respected within the industry. Many airport managers who complete these programs proudly carry those recognitions on their business cards. Candidates in the AAE program obtain the designation by completing a three-step process "(1) a 180-question, multiple-choice examination; (2) a management research paper, case study, proctored essay examination, or proof of an advanced degree; and (3) a final interview with a panel of A.A.E.s" (AAAE, 2018, para. 1). To cater to a wider network of professionals, AAAE offers the A.A.E. program to its affiliate members and the International Association of Airport Executives (IAAE). On a personal note, I also served as a board member of IAAE between 2003 and 2008. IAAE is the international affiliate of AAAE and addresses the challenges of managing airports in a global economy, including advanced airport management education and professional development around the world (IAAE, 2018, para. 1). As a board member, I have attended numerous international meetings, conferences, and helped coordinate AAAE and IAAE professional development programs and international events. This has contributed immensely to my professional development as an airport manager and aviation consultant.

According to the Airports Council International (ACI), which is the largest platform that lobbies for airports globally, and where airports voice their opinion within the industry: "Airport management, as a profession, has been faced with growing pressure to establish ways and means of promoting its credibility and ensuring an appropriate degree of standardization of related expertise globally" (ACI, 2018, para. 1). Because of this need, ACI and ICAO established a formal partnership to provide accessible, affordable, and universally available specialized management training to the global airports community. This initiative gave birth to the highly-regarded Airport Management Professional Accreditation Programme (AMPAP) within the industry (ACI, 2018, para. 2). Successful completion of the AMPAP Program results in being designated an International Airport Professional (IAP). ACI and ICAO recognize the holders of IAP designation as having achieved highly rigorous standards for expertise in the field of airport management.

Mechanics and non-pilots. Although aircraft maintenance personnel and the various entities associated with the non-pilot aviation employees subgroup (business, flight operations, and college/university faculty) have their own set of requirements and associations, the requirements are not as rigorous. For example, to become an aircraft mechanic, the FAA requires (a) 18 months of practical on-the-job (OTJ) experience working with either airframes or power plants, (b) 30 months OTJ training working on both airframes and power plants, or (c) graduation from an FAA-approved aviation maintenance technician school (FAA, 2018). No additional

follow-up training is required once mechanics have passed the FAA's written and oral/practical tests. The official trade group for aviation mechanics, the Professional Aviation Maintenance Association (PAMA), promotes a high degree of professionalism among aviation maintenance personnel. However, the opportunities available to PAMA members are not as extensive as those provided by the professional organizations associated with pilots, air traffic controllers, and airport managers.

Summary and Concluding Remarks

As noted in Chapter 1, the primary objective of the current study was to conduct a secondary analysis of Alhallaf's (2016) data by disaggregating his data set into specific subgroups within the aviation profession, and then examining factors associated with the concept of professionalism within and between these subgroups. With respect to this objective, the material presented in this chapter served several purposes.

First, the literature review summarized the salient information of studies that Alhallaf (2016) used to: (a) demonstrate the need for examining and measuring professionalism in aviation, (b) identify relevant factors for measuring professionalism, and (c) determine what instruments would be appropriate for measuring professionalism. These studies provided the foundation and rationale for the factors that were targeted in the current study. These studies also provided support for using Snizek's (1972) Hall's Professionalism Inventory (HPI) to measure

participants' level professionalism as well as Kramer's (1974) Index of Professionalism (IOP) scale to measure participants' level of professional activities and involvement. Included in this discussion was Kern's (2011) six-domain model of professionalism in aviation (Figure 2.1), which was used as the theoretical grounding for Alhallaf's study. Based on the results of his data analysis, Alhallaf confirmed that his data were consistent with Kern's model and therefore provided empirical evidence in support of the model. As a result, the current study also was grounded in Kern's six-domain model and presumed that the disaggregated data relative to each of the targeted subgroups also supported the model.

The literature review also provided rationale and justification for partitioning Alhallaf's (2016) holistic perspective of professionalism in aviation into subgroups. The subgroups targeted— aircraft maintenance technicians (AMTs), airport managers, air traffic controllers (ATCs), non-pilot aviation employees (NPAEs: business, flight operations, and college/university faculty), and pilots—were guided in part by data, theory, and personal experience. With respect to data, I was restricted to the subgroups that participated in Alhallaf's study. With respect to theory, I focused on Hawkins' (1987) modification of Edwards' (1982) conceptual SHEL model, which provides guidance for examining aviation safety issues via a human factors approach by considering the interactions among Software, Hardware, Environment, and Liveware. Hawkins' modification included a second L to represent the person as central entity (Figure 2.3). The Liveware–Liveware interaction

involves the interrelationships among individuals within and between groups, and the groups specified by the model included the subgroups that have been targeted in the current study. An implication of the Liveware–Liveware interaction is that aviation safety requires harmony among these interrelationships, which infers that the levels of professionalism among these subgroups should be similar. With respect to personal experience, I relied on my 2 decades of employment in the aviation industry to shed light on the appropriateness of the subgroups. As a result, the current study endeavored to (a) determine which factors within each group were significantly related to professionalism, (b) determine which of the subgroups had the highest level of professionalism, and (c) examine participants' perceptions of professionalism relative to each subgroup. Furthermore, based on their respective training/certification requirements, ongoing training requirements, and development required by regulatory bodies and related associations, the published literature reviewed in this chapter provided guidance on which subgroups were expected to have higher levels of professionalism.

Chapter 3

Methodology

Population and Sample

Population. The target population for the current study was individuals who work or study in the aviation industry in the United States. The accessible population was delimited to the individuals who responded to Alhallaf's (2016) study. These included pilots, air traffic controllers, airport managers, aviation students and faculty, flight instructors, aviation mechanics, and business aviation employees. Alhallaf's participants were recruited by various aviation professional organizations that announced his study and invited their membership to complete his questionnaire. These organizations included the National Air Traffic Controllers Association (NATCA), American Association of Airport Executives (AAAE), University Aviation Association (UAA), Society of Aviation and Flight Educators (SAFE), Curt Lewis & Associates, International Society of Air Safety Investigators (ISASI), National Association of Flight Instructors (NAFI), National Business Aviation Association (NBAA), Embry-Riddle Aeronautical University, Florida Institute of Technology, Aeronautical Repair Station Association (ARSA), and Aviation Technician Education Council (ATEC).

Sample. The sample for the study was acquired from Alhallaf's (2016) initial sample ($N = 990$), which was comprised of individuals who volunteered to complete his questionnaire. The sampling strategy used by Alhallaf was

convenience sampling. Thus, his sample consisted of those individuals who were willing to participate in the study. Alhallaf enlisted the support of the professional organizations cited in the previous paragraph to help him with his recruitment efforts by requesting that they announce the study to their respective memberships electronically with an invitation to participate. According to Alhallaf, the study's participants were targeted on several occasions for completion of the questionnaire to maximize the response rates. Unlike Alhallaf, I partitioned Alhallaf's sample and examined factors associated with the concept of professionalism across various subgroups within the aviation profession. These subgroups included Aircraft Maintenance Technicians (AMT), Airport Managers, Air Traffic Controllers (ATC), Pilots, and Non-Pilot Aviation Employees, (NPAE), which included business, flight operations, and college/university faculty. The analyses were conducted from both within and between subjects' perspectives.

As reported in Table 3.1, of the participants who reported their gender: (a) 61 of 64 (95.3%) were males in the AMT subgroup, (b) 58 of 74 (78.4.0%) were males in the Airport Managers subgroup, (c) 36 of 44 (81.8%) were males in the ATC subgroup, (d) 151 of 197 (76.6 %) were males in the NPAE subgroup, and (e) 243 of 276 (88.0 %) were males in the Pilots subgroup. With respect to age, of the participants who reported their age (in years): (a) the overall mean age for the AMT subgroup was $M = 46$ ($SD = 12.8$), and females on average were 3.2 years younger than males ($M_M = 46.2$, $M_F = 43.0$); (b) the overall mean age for the Airport

Table 3.1

Summary of Participants' Age and Marital Status by Gender per Subgroup

Aircraft Maintenance Technicians (AMT; *N* = 68)								
		Age			Married		Not Married[a]	
Group	***N***	***N***	***M***	***SD***	***N***	**%**	***N***	**%**
Female	3	3	43.0	13.1	2	4.0	1	7.0
Male	61	59	46.2	12.9	48	96.0	13	93.0
Overall	64	62	46.0	12.8	50	100.0	14	100.0
Airport Managers (*N* = 76)								
		Age			Married		Not Married[a]	
Group	***N***	***N***	***M***	***SD***	***N***	**%**	***N***	**%**
Female	16	16	31.1	11.3	8	15.7	8	34.8
Male	58	58	41.6	12.9	43	84.3	15	65.2
Overall	74	74	40.2	12.6	51	100.0	23	100.0
Air Traffic Controllers (ATC; *N* = 44)								
		Age			Married		Not Married[a]	
Group	***N***	***N***	***M***	***SD***	***N***	**%**	***N***	**%**
Female	8	8	39.5	6.8	4	11.5	4	44.5
Male	36	36	48.0	11.3	31	88.5	5	55.5
Overall	44	44	46.4	11.0	35	100.0	9	100.0
Non-Pilot Aviation Employees (NPAE; *N* = 199)								
		Age			Married		Not Married[a]	
Group	***N***	***N***	***M***	***SD***	***N***	**%**	***N***	**%**
Female	46	45	34.6	11.9	22	17.3	24	34.0
Male	151	144	44.4	14.3	105	82.7	46	66.0
Overall	197	189	42.0	14.4	127	100.0	70	100.0
Pilots (*N* = 287)								
		Age			Married		Not Married[a]	
Group	***N***	***N***	***M***	***SD***	***N***	**%**	***N***	**%**
Female	33	32	39.6	15.4	14	9.0	19	17.0
Male	243	234	44.0	15.3	150	91.0	93	83.0
Overall	276	266	43.5	15.4	164	100.0	112	100.0

Note. Not all participants reported their gender, age, and/or marital status.
[a]Not Married included Single-but Never Married, Divorced, Separated, and Widowed, respectively, as follows: Aircraft Maintenance Technicians (*n* = 10, 4, 0, 0), Airport Managers (*n* = 17, 5, 0, 1), Air Traffic Controllers (*n* = 7, 1, 0, 1), Non-Pilot Aviation Employees (*n* = 63, 5, 1, 1), and Pilots (*n* = 86, 25, 1, 0).

Managers subgroup was $M = 40.2$ ($SD = 12.6$), and females on average were 10.5 years younger than males ($M_M = 41.6$, $M_F = 31.1$); (c) the mean age for the ATC subgroup was $M = 46.4$ ($SD = 11.0$), and females on average were 8.5 years younger than males ($M_M = 48.0$, $M_F = 39.5$); (d) the mean age for the NPAE subgroup was $M = 42$ ($SD = 14.4$), and females on average were 9.8 years younger than males ($M_M = 44.4$, $M_F = 34.6$); and (e) the mean age for Pilots subgroup was $M = 43.5$ ($SD = 15.4$), and females on average were 4.4 years younger than males ($M_M = 44.0$, $M_F = 39.6$).

Thus, across all subgroups, the vast majority of participants were males ranging from 77% for the NPAE subgroup to 95% for the AMT subgroup, and the overall mean age (in years) across the subgroups were nearly the same, ranging from $M = 40.2$ for the AMT subgroup to $M = 46.4$ for the ATC subgroup. Furthermore, males were on average older than females for each subgroup, and this mean age difference varied from 3.2 years for the AMT subgroup to 10.5 years for Airport Managers.

With respect to marital status: (a) 50 of 64 (78.1%) participants in the AMT subgroup reported they were married, and among those married 48 (96%) were males; (b) 51 of 74 (69.0%) participants in the Airport Managers subgroup reported they were married, and among those married 43 (84.3%) were males; (c) 35 of 44 (79.5%) participants in the ATC subgroup reported they were married, and among those married 31 (70.5%) were males; (d) 127 of 197 (64.4%) participants in the

NPAE subgroup reported they were married, and among those married 105 (82.7%) were males; and (e) 164 of 276 (59.4%) participants in the Pilots subgroup reported they were married, and among those married 150 (91.5%) were males.

As reported in Table 3.2, race/ethnicity was examined relative to two groups: White Caucasian and non-White Caucasian, which included African American, Asian American, Hispanic, and Other. Of the participants who reported their race/ethnicity: (a) 47 of 64 (73.4%) were White Caucasian in the AMT subgroup, (b) 54 of 74 (73.0%) were White Caucasian in the Airport Managers subgroup, (c) 21 of 44 (47.7%) were White Caucasian in the ATC subgroup, (d) 114 of 197 (57.9%) were White Caucasian in the NPAE subgroup, and (e) 210 of 276 (76.0 %) were White Caucasian in the Pilots subgroup. Thus, across four of the five subgroups, the majority of participants were White Caucasian ranging from 52% for the NPAE subgroup to 76% for the Pilots subgroup. The only exception was the ATC subgroup where there was nearly a 50% split between the White Caucasian and non-White Caucasian.

As reported in Table 3.3, of the participants who reported their income level: (a) 50 of 64 (78.1%) participants in the AMT subgroup had annual incomes of at least $50,000, (b) 59 of 72 (82.0%) participants in the Airport Managers subgroup had annual incomes of at least $50,000, (c) 36 of 44 (81.8%) participants in the ATC subgroup had annual incomes of at least $50,000, (d) 128 of 189 (68.0%) participants in the NPAE subgroup had annual incomes of at least $50,000,

Table 3.2

Summary of Participants' Race/Ethnicity by Gender per Subgroup

Aircraft Maintenance Technicians (AMT; *N* = 68)					
		White Caucasian		Non-White Caucasian[b]	
Group	***N***	***N***	**%**	***N***	**%**
Female	3	3	6.4	0	0.0
Male	61	44	93.6	15	100.0
Overall	64	47	100.0	17	100.0
Airport Managers (*N* = 76)					
		White Caucasian		Non-White Caucasian[b]	
Group	***N***	***N***	**%**	***N***	**%**
Female	16	13	24.0	2	12.0
Male	58	41	76.0	15	88.0
Overall	74	54	100.0	17	100.0
Air Traffic Controllers (ATC; *N* = 44)					
		White Caucasian		Non-White Caucasian[b]	
Group	***N***	***N***	**%**	***N***	**%**
Female	8	4	19.0	4	21.0
Male	36	17	81.0	15	79.0
Overall	44	21	100.0	19	100.0
Non-Pilot Aviation Employees (NPAE; *N* = 199)					
		White Caucasian		Non-White Caucasian[b]	
Group	***N***	***N***	**%**	***N***	**%**
Female	46	24	21.0	19	27.0
Male	151	90	79.0	52	73.0
Overall	197	114	100.0	71	100.0
Pilots (*N* = 287)					
		White Caucasian		Non-White Caucasian[b]	
Group	***N***	***N***	**%**	***N***	**%**
Female	33	28	13.4	5	9.0
Male	243	182	86.6	53	91.0
Overall	276	210	100.0	58	100.0

Note. Not all participants reported their gender and/or race/ethnicity.
[a]Non-White Caucasian included African American, Asian American, Hispanic, and Other, respectively, as follows: Aircraft Maintenance Technicians (*n* = 4, 3, 1, 7), Airport Managers (*n* = 2, 9, 3, 3), Air Traffic Controllers (*n* = 4, 7, 3, 5), Non-Pilot Aviation Employees (*n* = 9, 24, 15, 21), and Pilots (*n* = 11, 5, 9, 34).

Table 3.3

Summary of Participants' Income Level by Gender per Subgroup

Aircraft Maintenance Technicians (AMT; *N* = 68)						
	Female		Male		Overall[a]	
Income Level	***N***	**%**	***N***	**%**	***N***	**%**
Less than $50,000	1	7.0	13	93.0	14	18.0
$50,000–$99,999	1	3.0	31	97.0	32	57.0
$100,000–$149,999	1	10.0	9	90.0	10	12.5
$150,000 or more	0	0.0	8	78.0	8	12.5
Total	3	4.7	61	95.3	64	100.0
Airport Managers (*N* = 76)						
	Female		Male		Overall[a]	
Income Level	***N***	**%**	***N***	**%**	***N***	**%**
Less than $50,000	3	23.0	10	77.0	13	21.9
$50,000–$99,999	9	22.0	32	78.0	41	50.0
$100,000–$149,999	1	11.0	8	89.0	9	15.6
$150,000 or more	2	22.0	7	78.0	9	12.5
Total	15	21.0	57	79.0	72	100.0
Air Traffic Controllers (ATC; *N* = 44)						
	Female		Male		Overall[a]	
Income Level	***N***	**%**	***N***	**%**	***N***	**%**
Less than $50,000	3	37.5	5	62.5	8	18.2
$50,000–$99,999	5	16.7	25	83.3	30	68.2
$100,000–$149,999	0	10.0	1	100.0	1	2.2
$150,000 or more	0	0.0	5	100.0	5	11.4
Total	8	4.7	36	95.3	44	100.0
Non-Pilot Aviation Employees (NPAE; *N* = 199)						
	Female		Male		Overall[a]	
Income Level	***N***	**%**	***N***	**%**	***N***	**%**
Less than $50,000	21	35.0	40	65.0	61	32.3
$50,000–$99,999	15	20.0	61	80.0	76	40.2
$100,000–$149,999	7	17.0	34	83.0	41	21.7
$150,000 or more	1	9.0	10	91.0	11	5.8
Total	44	23.3	145	76.7	189	100.0
Pilots (*N* = 287)						
	Female		Male		Overall[a]	
Income Level	***N***	**%**	***N***	**%**	***N***	**%**
Less than $50,000	11	17.0	53	83.0	64	24.5
$50,000–$99,999	10	13.5	64	86.5	74	28.4
$100,000–$149,999	3	5.6	51	94.4	54	20.7
$150,000 or more	7	10.0	62	90.0	69	26.4
Total	31	11.9	230	88.1	261	100.0

Note. Not all participants reported their gender and/or income level.

[a]Overall percentages represent the ratio between *N* for each income level and total *N*.

and (e) 197 of 261 (75.5 %) participants in the Pilots subgroup had annual incomes of at least $50,000. Thus, for three of the five subgroups—AMT, Airport Managers, and ATC—the majority of the participants' annual income was between $50,000 and $99,000. For the NPAE subgroup, the majority of participants (72%) earned less than $100,000, whereas for the Pilots subgroup, the annual incomes were nearly evenly split among the four income categories.

As reported in Table 3.4, which provides a summary of participants' education level: (a) nearly one-half (42%) of the participants in the AMT group had less than a 4-year degree; (b) 66 of 74 (89%) participants in the Airport Managers subgroup had at least a 4-year degree, with one-half of the subgroup (37 of 74) having a graduate degree; (c) nearly one-half (41%) of the participants in the ATC group had a 4-year degree; (d) 164 of 197 (83%) participants in the NPAE subgroup had at least a 4-year degree, with one-half of the subgroup (99 of 197) having a graduate degree; and (e) three-fourths of the participants in the Pilots subgroup (209 of 276) had at least a 4-year degree, with 81 (29%) having a graduate degree. Thus, the majority of the subgroups comprised of highly educated professionals. Among all the subgroups, airport managers (50%) and non-pilot aviation employees (50.2%) had the highest percentage of participants reported having a graduate degree (master's or doctoral) as their highest level of education.

Table 3.4

Summary of Participants' Education Level by Gender per Subgroup

Aircraft Maintenance Technicians (AMT; *N* = 68)							
		< 4-Year Degree[a]		4-Year Degree		Graduate Degree[b]	
Group	***N***	***N***	**%**	***N***	**%**	***N***	**%**
Female	3	1	3.7	1	5.5	1	6.6
Male	61	26	96.3	17	94.5	14	93.4
Overall	64	27	100.0	18	100.0	15	100.0
Airport Managers (*N* = 76)							
		< 4-Year Degree[a]		4-Year Degree		Graduate Degree[b]	
Group	***N***	***N***	**%**	***N***	**%**	***N***	**%**
Female	16	3	50.0	4	14.0	8	21.0
Male	58	3	50.0	25	86.0	29	79.0
Overall	74	6	100.0	29	100.0	37	100.0
Air Traffic Controllers (ATC; *N* = 44)							
		< 4-Year Degree[a]		4-Year Degree		Graduate Degree[b]	
Group	***N***	***N***	**%**	***N***	**%**	***N***	**%**
Female	8	2	16.7	3	16.7	1	16.7
Male	36	10	83.3	15	83.3	5	83.3
Overall	44	12	100.0	18	100.0	6	100.0
Non-Pilot Aviation Employees (NPAE; *N* = 199)							
		< 4-Year Degree[a]		4-Year Degree		Graduate Degree[b]	
Group	***N***	***N***	**%**	***N***	**%**	***N***	**%**
Female	46	5	21.0	10	15.4	30	30.3
Male	151	19	79.0	55	84.6	69	69.7
Overall	197	24	100.0	65	100.0	99	100.0
Pilots (*N* = 287)							
		< 4-Year Degree[a]		4-Year Degree		Graduate Degree[b]	
Group	***N***	***N***	**%**	***N***	**%**	***N***	**%**
Female	33	3	6.0	14	11.0	14	17.0
Male	243	49	94.0	114	89.0	67	83.0
Overall	276	52	100.0	128	100.0	81	100.0

Note. Not all participants reported their gender and/or education level.

[a]< 4-Year Degree = High School/Equivalent and 2-Year/Equivalent, respectively, as follows: Aircraft Maintenance Technicians (*n* = 8, 12), Airport Managers (*n* = 0, 5), Air Traffic Controllers (*n* = 0, 11), Non-Pilot Aviation Employees (*n* = 6, 15), and Pilots (*n* = 23, 24). [b]Graduate Degree = Master's Degree and Doctoral Degree, respectively, as follows: Aircraft Maintenance Technicians (*n* = 14, 1), Airport Managers (*n* = 36, 1), Air Traffic Controllers (*n* = 4, 2), Non-Pilot Aviation Employees (*n* = 80, 18), and Pilots (*n* = 66, 14).

Table 3.5

Summary of Participants' Years of Experience by Subgroup

Subgroup	*N*	*M*	*Mdn*	*SD*	Range
Aircraft Maintenance Technicians	57	23.7	28.0	13.2	0–47
Airport Managers	76	15.1	14.0	10.3	1–40
Air Traffic Controllers	43	21.9	20.0	12.2	1–46
Non-Pilot Aviation Employees[a]	177	17.6	15.0	13.4	0–58
Pilots	246	22.2	22.0	14.6	1–60

Note. Non-Pilot Aviation Employees include business, flight operations, and college/university faculty.

As reported in Table 3.5, of the participants who reported their years of experience: (a) the mean and median years of experience for the AMT subgroup were $M = 23.7$ ($SD = 13.2$) with $Mdn = 28$, (b) the mean and median years of experience for the Airport Managers subgroup were $M = 15.1$ ($SD = 10.3$) with $Mdn = 14$; (c) the mean and median years of experience for the ATC subgroup were $M = 21.9$ ($SD = 12.2$) with $Mdn = 20.0$, (d) the mean and median years of experience for the NPAE subgroup were $M = 17.6$ ($SD = 13.4$) with $Mdn = 15.0$, and (e) the mean and median years of experience for the Pilots subgroup were $M = 22.2$ ($SD = 14.6$) with $Mdn = 22.0$. Thus, overall, the most experienced subgroup was AMT followed by Pilots and ATC, which were then followed by NPAE and Airport Managers subgroups.

As reported in Table 3.6, which contains summary data exclusive to the Pilots subgroup, the two FAA ratings with the highest frequencies were ATP ($N = 170$) and Commercial Pilot ($N = 168$). Following ATP and CP were Instrument

Table 3.6

Summary of Participants' FAA Ratings and Flight Hours for the Pilot Subgroup

FAA Ratings[a]	
Certificate Level[b]	***N***
Private Pilot (PPL)	113
Instrument Pilot (IP)	141
Commercial Pilot (CP)	168
ATP	170
CFI	115
CFII	111
MEI	97
Total	915

Number of FAA Ratings Overall			
M	***Mdn***	***SD***	**Range**
2.6	2	1.8	0–7

Note. [a]Participants could have more than one rating. [b]ATP = Airline Transport Pilot, CFI = Certified Flight Instructor, CFII = Certified Flight Instructor/Instrument, and MEI = Multiengine Instructor.

Flight Hours Overall			
M	***Mdn***	***SD***	**Range**
7,578.0	5,000.0	7,823	27–36,000

N = 287, but 60 did not report flight hours.

rating (*N* = 141), CFI (*N* = 115), PPL (*N* = 113), CFII (*N* = 111), and MEI (*N* = 97). These data suggest that majority of the participants in the Pilots subgroup were professional pilots working for commercial airlines, business aviation, or other private organizations. The reader is reminded that participants in the Pilots subgroup could have reported more than one rating. With respect to flight hours the mean and median times were *M* = 7,578.0 (*SD* = 7,823) with *Mdn* = 5,000. Flight hours also ranged between 27 and 36,000 hours. The range and standard deviation were wide because this subgroup also included student pilots as well as those with only a PPL rating.

Power analysis. A power analysis can be considered from two perspectives: a priori and post hoc. An a priori power analysis was performed and reported for the current study when the study was initially proposed to determine the minimum sample size needed. At this stage of the current study, though, a post hoc power analysis is appropriate, and the results are summarized in Table 3.7. Because I partitioned Alhallaf's (2016) sample and examined factors associated with the concept of professionalism across the targeted five subgroups, the research questions and corresponding hypotheses posed in Chapter 1 required different statistical strategies to answer and test. As a result, I conducted separate post hoc power analyses with respect to each subgroup.

Aircraft maintenance technicians (AMTs). As reported in Table 3.7 the power values for the AMT subgroup are based on a sample size of $N = 68$, which was the final sample size used for inferential statistics (see Table 4.25, Chapter 4). The overall power for the AMT subgroup was .97, and the respective powers for each remaining set after preliminary analyses for hierarchical multiple regression were .37 for Set A and .95 for Set C. The reader is reminded that Set B comprised of aviation experience that included three predictors but only X_7 (total years of experience) was applicable to all subgroups other than the Pilots subgroup.

Airport managers. As reported in Table 3.7 the power values for the Airport Managers subgroup are based on a sample size of $N = 76$, which was the final sample size used for inferential statistics (see Table 4.26, Chapter 4). The

Table 3.7

Power Analysis and Calculated Powers for α = .05 per Subgroup

Model[a]	Actual Value	Actual *ES*	Number of Predictors (*k*)	Approx. Power
Aircraft Maintenance Technicians (AMT; *N* = 68)				
Overall	$R^2 = .21$	0.27	2	.97
Set A = Demographics	$sR^2 = .04$	0.04	1	.37
Set B = Aviation Experience				
Set C = Professional Activities	$sR^2 = .17$	0.20	1	.95
Airport Managers (*N* = 76)				
Overall	$R^2 = .15$	0.18	4	.83
Set A = Demographics	$sR^2 = .07$	0.07	3	.44
Set B = Aviation Experience				
Set C = Professional Activities	$sR^2 = .08$	0.09	1	.73
Air Traffic Controllers (ATC; *N* = 44)				
Overall	$R^2 = .11$	0.12	3	.42
Set A = Demographics	$sR^2 = .04$	0.04	2	.19
Set B = Aviation Experience				
Set C = Professional Activities	$sR^2 = .03$	0.03	1	.20
Non-Pilot Aviation Employees (NPAE; *N* = 199)				
Overall	$R^2 = .30$	0.43	5	> .99
Set A = Demographics	$sR^2 = .14$	0.16	3	> .99
Set B = Aviation Experience	$sR^2 = .04$	0.04	1	.80
Set C = Professional Activities	$sR^2 = .12$	0.14	1	> .99
Pilots (*N* = 287)				
Overall	$R^2 = .16$	0.19	4	> .99
Set A = Demographics	$sR^2 = .03$	0.03	2	.75
Set B = Aviation Experience	$sR^2 = .04$	0.04	1	.92
Set C = Professional Activities	$sR^2 = .09$	0.10	1	> .99

Note. This power analysis is based on a hierarchical multiple regression strategy.

[a]Overall represents the collective relationship the targeted variables have with the dependent measure of level of professionalism. Set A = Demographics and consisted of Gender (Female vs. Male), Marital status (Married vs. Not married), Age, Race/Ethnicity (White Caucasian vs. nonWhite Caucasian), Annual Income (3 IVs representing 4 income groups), and Education level (2 IVs representing 3 education groups). Set B = Aviation Experience and consisted of Total years of experience, Number of pilot ratings (Pilot subgroup), and Number of flight hours (Pilot subgroup). Set C = Professional Activities and consisted of aggregate scores on Kramer's (1974) Index of Professionalism.

overall power for the Airport Managers subgroup was .83, and the respective powers for each remaining set after the completion of preliminary analyses for hierarchical multiple regression were .44 for Set A and .73 for Set C. The reader is reminded that Set B comprised of aviation experience that included three predictors but only X_7 (total years of experience) was applicable to groups other than the Pilots subgroup.

Air traffic controllers (ATC). As reported in Table 3.7 the power values for the ATC subgroup are based on a sample size of $N = 44$, which was the final sample size used for inferential statistics (see Table 4.27, Chapter 4). The overall power for the ATC subgroup was .42, and the respective powers for each remaining set after the completion of preliminary analyses for hierarchical multiple regression were .19 for Set A and .20 for Set C. The reader is reminded that Set B comprised of aviation experience that included three predictors but only X_7 (total years of experience) was applicable to all subgroups other than the Pilots subgroup.

Non-pilot aviation employees (NPAE). As reported in Table 3.7 the power values for the NPAE subgroup are based on a sample size of $N = 199$, which was the final sample size used for inferential statistics (see Table 4.28, Chapter 4). The overall power for the NPAE subgroup was .99, and the respective powers for each remaining set after the completion of preliminary analyses for hierarchical multiple regression were greater than .99 for Sets A and C, and .80 for Set B.

Pilots. As reported in Table 3.7 the power values for the Pilots subgroup are based on a sample size of $N = 287$, which was the final sample size used for inferential statistics (see Table 4.29, Chapter 4). The overall power for the Pilots subgroup was .99, and the respective powers for each remaining set after the completion of preliminary analyses for hierarchical multiple regression were greater than .75 for Set A, .92 for Set B, and greater than .99 for Set C.

As a result, with the exception of ATC subgroup's overall power of .34, all the other subgroups' power values were greater than Cohen, Cohen, West and Aiken's (2003) recommended minimum power of .8. This can be attributed to the fact that the ATC subgroup had the smallest sample size with 44 participants among the five subgroups.

Instrumentation

The data used for the current study were collected from Alhallaf's (2016) Aviation Professionalism Survey (APS), which consisted of five sections: (a) Snizek's (1972) Hall's Professionalism Inventory (HPI), which served as the dependent variable; (b) a researcher-developed perceptions of professionalism scale; (c) aviation background; (d) Kramer's (1974) Index of Professionalism (IOP) scale; and (e) demographics. Alhallaf prepared two copies of the questionnaire: a paper copy, which was administered personally or sent via mail, and an electronic version hosted by *QuestionPro*, which is now owned by *SurveyMonkey*. The corresponding link to the electronic version was sent to the targeted professional organizations. A

brief description of each section of Alhallaf's questionnaire follows, and a copy of the APS is given in Appendix A.

Section A: Professionalism scale. To measure participants' level of professionalism, which was the dependent variable, Alhallaf (2016) used Snizek's (1972) Hall's Professionalism Inventory (HPI), which is a 25-item attitudinal scale that has been used to measure professionalism across many industries, including business, health care, and law enforcement. The HPI, which is a modified version of Hall's (1968) Professionalism Inventory, measures five dimensions (subscales) of professionalism (five items per dimension): (a) use of the professional organization as a major referent, (b) belief in public services, (c) belief in self-regulation, (d) a sense of calling to the field (individual commitment to the profession), and (e) a feeling of autonomy. All items are measured on a traditional Likert response scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. Thus, overall scores could range from 25 to 125, with higher scores signifying a higher level of professionalism. Eleven of the 25 items in the HPI were oppositely worded. An example of an oppositely worded statement is "I don't have much opportunity to exercise my own judgment," and an example of a positively worded statement is "I make my own decisions in regard to what is to be done in my work" (Snizek, 1972).

Snizek's (1972) revision of Hall's (1968) original HPI has been used numerous times in various academic studies, including research projects, master's

Table 3.8
Reliability of HPI by Subgroup

		Reliability[a]											
		APS Subscales						Reported Subscales					
Subgroup[b]	***N***	**S1**	**S2**	**S3**	**S4**	**S5**	**C**	**S1**	**S2**	**S3**	**S4**	**S5**	**C**
AMT	68	.48	.30	.77	.47	.39	.40	.62	.64	.69	.58	.73	.78 to .84
AM	76	.63	.55	.65	.49	.52	.71	.62	.64	.69	.58	.73	.78 to .84
ATC	44	.26	.63	.62	.57	.32	.50	.62	.64	.69	.58	.73	.78 to .84
NPAE	199	.64	.45	.69	.59	.60	.77	.62	.64	.69	.58	.73	.78 to .84
Pilots	287	.61	.60	.71	.59	.46	.70	.62	.64	.69	.58	.73	.78 to .84

Note. HPI = Snizek's (1972) Hall's Professionalism Inventory (HPI) is a 25-item scale that uses a traditional Likert scale with responses ranging from 1 = Strongly Disagree to 5 = Strongly Agree. Thus, overall scores could range from 25 to 125, with higher scores signifying a higher level of professionalism. The instrument also is comprised of five subscales with each subscale containing five items.
[a]The Aviation Professionalism Survey (APS), which was used by Alhallaf (2016), and the HPI reliability coefficients for the combined scales (C) were determined using Cronbach's alpha (see McCloskey & McClain, 1987 for HPI alphas). The APS reliability coefficients for the HPI subscales also were determined using Cronbach's alpha. However, the Reported subscale reliability coefficients reported in the literature for the HPI were determined using Kudor-Richardson Formula 20. The five subscales are as follows: S1 = "Organization as a major referent" consisted of Items 1, 4, 11, 15, 17. S2 = "Belief in public service" consisted of Items 2, 5, 8, 12, 22. S3 = "Belief in self-regulation" consisted of Items 6, 13, 16, 20, 23. S4 = "Sense of calling to the field" consisted of Items 7, 9, 14, 18, 24. S5 = "Autonomy" consisted of Items 3, 10, 19, 21, 25.
[b]AMT = Aircraft Maintenance Technicians, AM = Airport Managers, ATC = Air Traffic Controllers, NPAE = Non-Pilot Aviation Employees.

and doctoral theses/dissertations in many fields. According to Kim-Godwin, Baek, and Wynd (2010), the overall reliability of the scale has been reported as $\alpha = .78$ (Snizek, 1972), $\alpha = 84$ (Hall, 1968), and $\alpha = .80$ (Wynd, 2003). Based on a sample size of $N = 661$, Alhallaf reported an overall Cronbach's alpha of $\alpha = .72$, and Cronbach alphas for the respective subscales were .59, .53, .69, .55, and .50. Table 3.8 contains a summary of the calculated Cronbach's alphas for the HPI and its five subscales based on the current study's data with respect to each of the subgroups:

Aircraft maintenance technicians (AMTs). The overall Cronbach alpha of the HPI relative to the AMT subgroup ($N = 68$) was $\alpha = .40$, and Cronbach alphas

for the respective subscales were α = .48, .30, .77, .47, and .39. An item analysis of the AMT subgroup's HPI scores is provided in Table 4.3 in Chapter 4.

Airport managers. The overall Cronbach alpha of the HPI relative to the Airport Managers subgroup ($N = 76$) was α = .71, and Cronbach alphas for the respective subscales were α = .63, .55, .65, .49, and .52. An item analysis of the Airport Managers' HPI scores is provided in Table 4.4 in Chapter 4.

Air traffic controllers (ATC). The overall Cronbach alpha of the HPI relative to the ATC subgroup ($N = 44$) was α = .50, and Cronbach alphas for the respective subscales were α = .26, .63, .62, .57, and .32. An item analysis of the ATC subgroup's HPI scores is provided in Table 4.5 in Chapter 4.

Non-pilot aviation employees (NPAE). The overall Cronbach alpha of the HPI relative to the NPAE subgroup ($N = 199$) was α = .77, and Cronbach alphas for the respective subscales were α = .64, .45, .69, .59, and .60. An item analysis of NPAE subgroup's HPI scores is provided in Table 4.6 in Chapter 4.

Pilots. The overall Cronbach alpha of the HPI relative to the Pilots subgroup ($N = 287$) was α = .70, and Cronbach alphas for the respective subscales for this subgroup were α = .61, .60, .71, .59, and .46. An item analysis of the Pilots subgroup's HPI scores is provided in Table 4.7 in Chapter 4.

Overall, the HPI reliability coefficients of the current study were consistent with and/or acceptable to those reported in the literature for three of the five

subgroups (Airport Managers, NPAE, and Pilots). For the other two subgroups (AMT and ATC), the respective coefficients of $\alpha = .40$ and $\alpha = .50$ are of some concern. This is addressed in Chapter 5. One plausible reason for these low reliability coefficients is that both subgroups had the smallest sample sizes.

Section B: Perceptions of professionalism. This section of the APS is what Alhallaf (2016) prepared to assess participants' perceived understanding of what they believe the concept of professionalism means within their vocation. Alhallaf described this section as follows:

> Perceptions will be measured by presenting participants with the phrase "I believe professionalism is based on or related to," followed by a set of 10 responses that they will rank from most important to least important. The possible responses are; being compliant with procedures, being ethical and trustworthy, being competent, being qualified and reliable, the number of certificates or licenses obtained, the number of years of experience, level of formal education, and earning professional certificates from professional organizations. (Alhallaf, 2016, p. 81)

The 10 responses were designed to reflect a dichotomy between a belief grounded in cognition (an attitude or mind-set) and a belief grounded in empiricism (practical and measurable). The first five responses reflected the former and the last five responses reflected the latter. The ranked perceptions of each subgroup are summarized in Tables 4.8–4.11 (Chapter 4), and a comparison across all five

subgroups is provided in Table 4.13 (Chapter 4). A discussion with respect to any noteworthy differences that exist in the way each subgroup perceived the concept of professionalism is presented in Chapter 4.

Section C: Aviation background. This section of the APS is what Alhallaf (2016) prepared to determine: (a) which field or position within the aviation profession participants worked (e.g., airport managers, ATCs, pilots, etc.), (b) whether they worked full- or part-time, (c) the aviation segment associated with their employment (e.g., commercial airlines, general aviation, education, etc.), (d) the number of years they have been working in the aviation industry, (e) flight hours (for pilots), and (f) other work-related information. The data acquired from this section of the APS were used to form the five subgroups for the current study.

Section D: Professional activities and involvement. To measure participants' professional activity and involvement, Alhallaf (2016) used Kramer's (1974) Index of Professionalism (IOP). The IOP consists of nine items that measure professional activities and engagements such as subscriptions to professional journals, purchases of books associated with the related profession, professional speeches given with respect to the related profession, and hours spent in professional reading. For example, one item asked participants to enter the number of professional journals they subscribe to that is related to their profession, with possible responses of none, one, two, three, and four or more. A Likert-type

response scale was used for the nine items, but varied among the items. For example:

- D1, which asked participants to report the number of professional courses they took that were related to their profession, was scored 0 = None, 1 = One, 2 = Two, 3 = Three, and 4 = Four or more.
- D2, which asked participants to report the number of professional journals they subscribed to that were related to their profession, was scored 0 = None, 1 = One, 2 = Two to three, and 3 = Four or more.
- D3, which asked participants to report the number of professional books they purchased that were related to their profession, was scored 0 = None, 1 = One to two, 2 = Three to five, and 3 = Six or more.
- D4, which asked participants to report the number of hours per week they spent engaged in professional reading that was related to their profession, was scored 0 = None, 1 = One to two, 2 = Three to four, 3 = Five to seven, and 4 = Eight or more.
- D5, which asked participants to report their level of activity/membership in professional organizations related to their profession, was scored 0 = None, 1 = Member only, 2 = Some activity once per year, 3 = Two to five activities per year, 4 = Six to 11 activities per year, and 5 = Monthly or more.

- D6, which asked participants to report the number of publications related to their profession that were published in the professional literature, was scored 0 = None, 1 = One, and 2 = Two or more.
- D7, which asked participants to report the number of professional speeches they gave related to their profession, was scored 0 = None, 1 = One to two, 2 = Three to four, and 3 = Five or more.
- D8, which asked participants to identify their role with respect to offices they held or leadership roles within professional organizations related to their profession was scored 0 = None, 1 = Committee member, 2 = Committee chairperson, and 3 = Officer in district/regional organization.
- D9, which asked participants to indicate the extent of their professional activity within their employing organization, was scored 0 = None, 1 = Member of at least one committee, and 2 = Committee chairperson.

McCloskey and McClain (1987) reported a test-retest correlation coefficient of .99, and Cronbach alpha reliability coefficients of α = .62, .63, and .71. Table 3.9 contains a summary of the calculated Cronbach's alphas for the IOP based on the current study's data with respect to each of the five subgroups. The reader will note that across all five subgroups, these reliability coefficients exceeded those reported in the literature and ranged from α = .72 for the AMT subgroup to α = .83 for the NPAE subgroup.

Table 3.9
Reliability of IOP by Subgroup

		Reliability[a]	
Subgroup	***N***	**APS**	**Reported**
Aircraft Maintenance Technicians	68	.72	.62 to .71
Airport Managers	76	.79	.62 to .71
Air Traffic Controllers	44	.81	.62 to .71
Non-Pilot Aviation Employees	199	.83	.62 to .71
Pilots	287	.76	.62 to .71

Note. Kramer's (1974) Index of Professionalism (IOP) consisted of nine items that measured professional behaviors. (See Tables 4.14–4.18 in Chapter 4.) The overall scores could range from 0 to 29, with higher scores signifying a higher level of professional involvement or activity.
[a]The Aviation Professionalism Survey (APS), which was used by Alhallaf (2016), and the IOP reliability coefficients repprted in the literature (McCloskey & McClain, 1987) were determined using Cronbach's alpha.

Section E: Demographics. The last section of the APS is what Alhallaf (2016) prepared to acquire sample demographics, including gender, marital status, age, race/ethnicity, annual income, years of experience in the aviation profession, and educational background. This section also included a separate question that asked pilots to report their current FAA ratings and their number of flight hours. As noted in Table 3.10, some of the data from this section of the APS was included in both Set A = Demographics and Set B = Aviation Experiences.

Procedures

Research methodology. The current study incorporated two research methodologies. The first, which is relevant to Research Question 1, is explanatory and predictive correlational research. This methodology and design were appropriate because a correlational study examines relationships among variables. These

relationships could then be used to make predictions. I endeavored to examine the relationship between the targeted sets of variables and the level of professionalism within each targeted subgroup to determine the predictive influence these factors have on each subgroup's level of professionalism. The second methodology, which is relevant to Research Questions 2 and 3, is ex post facto. This methodology was appropriate because, with the exception of the NPAE subgroup, the composition of each subgroup was predetermined. For example, I could not assign a participant to the "Pilots" subgroup or another participant to the "ATC" subgroup. As a result, I examined the differences in the level of professionalism among the subgroups as well as what way(s) the subgroups differed in their levels of professionalism. Because the group membership variable was on the IV side, the corresponding design was effects type. More specifically, I examined the effect of group membership on (a) differences in level of professionalism (Research Question 2) and (b) differences in perceptions of professionalism (Research Question 3).

Human subject research. Unlike Alhallaf (2016) who collected data directly from participants, the current study did not directly involve human subjects but instead was a secondary analysis of Alhallaf's data. As a result, the data for the current study were considered archival. Furthermore, because these data have been stripped of all identifying information, making it impossible to associate the data with the corresponding provider, an application to the university's Institutional

Review Board (IRB) was not warranted (L. Steelman, personal communication, August 25, 2017).

Study implementation. The current study was implemented as a secondary analysis of Alhallaf's (2016) archived data. Alhallaf collected these data in both electronic form as well as paper form between May and August of 2015. As noted earlier, Alhallaf placed the electronic form of the APS online via *QuestionPro* (now *SurveyMonkey*) and solicited the participation of members from the professional organizations cited earlier in this chapter. The participants completed the questionnaire online without providing any self-identifying information. Alhallaf also personally distributed paper copies in April 2015 to attendees at the 2015 World Aviation Training Conference and Tradeshow (WATS 2015), and he distributed paper copies to individuals at Embry-Riddle Aeronautical University during this same time period.

With respect to the implementation of the current study, I did not collect any data but instead disaggregated Alhallaf's (2016) data by partitioning his data set into five discrete subgroups: Aircraft Maintenance Technicians, Airport Managers, Air Traffic Controllers, Non-Pilot Aviation Employees, and Pilots. As noted in Chapter 2, the determination of these subgroups was guided by and grounded in Hawkins' (1987) SHELL model. Working with each subgroup independently, I analyzed the data relative to each subgroup (Research Question 1), and then compared the results across all subgroups (Research Questions 2 and 3).

Given the cross-sectional nature of Alhallaf's data collection, the results of the current study reflect the state of aviation professionalism relative to the five subgroups at that particular point in time (2016).

Threats to internal validity. Internal validity refers to the extent to which observations made in the dependent variable can be directly and solely attributed to the independent variable(s) rather than some extraneous factors (Ary et al., 2010). For example, Alhallaf (2016) reported "divorced participants had a significantly higher level of professionalism than married participants" (p. 124). When considered from an internal validity perspective, the question is "to what extent is this difference in level of professionalism between married and divorced participants working in the aviation industry truly a function of marital status and not to some other factor?" For instance, perhaps the divorced participants were older, more mature in their attitudes toward their vocation, and/or more motivated to excel in their profession than married participants.

Ary et al. (2010) identified 12 threats to internal validity: history, maturation, testing, instrumentation, statistical regression, selection bias, experimental mortality (attrition), selection-maturation interaction, experimenter effect, subject effects, diffusion, and location. In the context of the current study, which was a secondary data analysis, the concept of internal validity is presented from a slightly different perspective than from a primary data analysis. Because the data were collected previously, a discussion of the threats to internal validity is

relative to what Alhallaf (2016) reported. This enables readers to determine how much confidence they have in any relationships between the IVs and DV reported in the current study relative to each subgroup, as well as to the extent to which the results of the current study would be generalizable to other groups. The reader also should note the inherent weaknesses in the correlational design of the current study were the lack of control of the independent variables and lack of randomization of the participants. A discussion of these 12 threats and how they were minimized or controlled follows.

History. A history threat refers to specific events or conditions other than the treatment that could have occurred during the course of a study and produced changes in the dependent variable (Ary et al., 2010). Examples of such events include major political, economic, or cultural events. Alhallaf (2016) reported two possible history threats during his study's implementation. One was the media coverage of the Germanwings flight 925, which crashed in the Alps en route from Barcelona to Duesseldorf on March 24, 2015, killing all 150 passengers and crew on board. The most likely cause of this crash was that its 28 year-old co-pilot intentionally downed the flight. Alhallaf indicated that this crash could have increased participants' sensitivity to the concept of professionalism in aviation. The second possible history threat is associated with the National Business Aviation Association (NBAA) Safety Committee Professionalism Working Group, which was established in early 2015 and announced their findings in August 2015. It is

possible that NBAA participants' responses might have been influenced by this workgroup's report. As a result, the reader should consider these two instances as possible alternative explanations for the results of the current study.

Maturation. Maturation refers to biological or psychological changes within the subjects that may occur over time. For example, subjects may perform differently on the dependent variable because they are older, wiser, more fatigued, or less motivated (Ary et al., 2010). A maturation threat usually is more applicable to studies involving children because of their high maturation rate. With respect to the current study, Alhallaf (2016) reported that all participants were adults (18 years or older) and that he perceived there was no presence of a maturation threat. As a result, maturation was not considered a threat for the current study.

Testing. The testing effect is a potential threat to internal validity in any study in which participants are administered a pre-assessment prior to an intervention and then administered the same instrument as a post-assessment after the intervention. In such instances it is conceivable that participants might perform better on the post-assessment because of their pre-exposure to the items on the assessment, the format of the assessment, the testing environment, or because they have developed a strategy to perform better on the second assessment (Ary et al., 2010). With respect to the current study, Alhallaf's (2016) did not administer any type of pre- and post-assessments. He simply administered the APS one time and hence this threat was not applicable. However, Alhallaf did report that it was

possible for participants to review the items on the questionnaire as many times as they wanted before responding. Thus, there is the possibility of pre-exposure to the instrument's items, which could be a concern. Because of this possible threat, Alhallaf compared the "source" records of those who viewed the APS to those who completed the APS. If there were any matches, then he removed these participants' responses from the final data set, and therefore these participants would not have been included in the five data sets used for the current study.

Instrumentation. An instrumentation threat refers to changes in the manner in which a dependent variable is measured from the first time to the second time that could bring about the observed outcome rather than the treatment itself (Ary et al., 2010). An instrumentation threat also may be posed when the reliability of the instrument is questionable. Ary et al. (2010) further examined this threat into three components. The first component was instrument decay, which refers to different interpretations of results because of changes made to an instrument over the course of the study. The second component was data collector characteristics, which refer to specific characteristics of the data collector such as gender, age, and ethnicity, and how the dependent variable may be impacted if these characteristics change. The third component was data collector bias, which refers to inconsistent administration of an instrument or the distortion of data by the data collector or the scorer. Because Alhallaf (2016) administered the APS one time and made no changes to the instrument, and because the APS was hosted electronically, there

were no concerns for data collector characteristics or data collector bias. As a result, this threat was not applicable to the current study.

Statistical regression. Statistical regression refers to the tendency for extremely high or low scorers on a pre-assessment to regress toward the mean on a post-assessment. Statistical regression might be a threat when extremely high or low scorers are selected from a group on this basis because the subgroup will tend to score less extremely even on a retest (Ary et al., 2010). Although I partitioned Alhallaf's (2016) sample into five mutually exclusive subgroups, these subgroups were independent of each other and Alhallaf did not administer the APS to any member of his sample more than one time. As a result, the regression threat was not applicable to the current study.

Selection. A selection threat refers to the concept of group equivalency, which involves confirming there are no important differences among the members of experimental and control groups even before a study begins (Ary et al., 2010). In other words, the selection threat addresses the question, "Are the groups equivalent at the beginning of the study?" If nonrandom selection methods are used, then this could lead to comparison groups that are not equivalent a priori. This threat was of concern in the current study because the sample consisted of individuals who volunteered to participate in Alhallaf's (2016) study. According to Ary et al. (2010), people who volunteer to participate in a study may differ in some important respects than from those non-volunteers. The best ways to control for selection bias

include using random assignment, randomized matching, using homogenous samples, and holding certain variables constant. The only control method I could have employed given the nature of the current study was to use homogenous samples, which is exactly what I did by partitioning the participants in Allhallaf's data into subgroups and then comparing homogeneous aviation subgroups. The reader should note that I viewed this threat as a study limitation because I had no control over the selection of the participants.

Mortality. A mortality threat refers to the loss of participants (attrition) during the implementation of a study and is of concern because the loss of specific types of participants could impact the outcome of a study. For example, if participants with a high degree of professionalism (i.e., those who would score high on the HPI) chose not to participate, then this would result in a sample that has a lower degree of professionalism, which potentially could represent a different population. Mortality was a threat to internal validity in Alhallaf's (2016) study. He reported, "… of the 990 participants who viewed the APS electronically, nearly half (439) of the submissions were incomplete" (p. 91). Alhallaf also indicated that even for those participants who completed all of the study's protocols, many of the items were left blank, resulting in missing data. In the current study, mortality was not considered an applicable threat to internal validity because no participants actually could have dropped out of the study. However, some attrition did occur in

the current study because I had to delete several cases that had incomplete responses. This is further discussed in Chapter 4.

Diffusion. A diffusion threat, which also is referred to as design contamination, is related to the question, "Did the control group know anything about what was taking place in the treatment group?" If "yes," then this communication of information about the treatment to participants in the control group could influence their response, behavior, or performance, which could result in similar performance on the dependent measure between treatment and control groups. Alhallaf (2016) reported that the diffusion threat was not applicable to his study because there were no treatment and control groups, and therefore diffusion did not have any impact on the current study.

Selection-maturation interaction. The selection-maturation interaction threat to internal validity refers to the combined influence of selecting participants who have specific characteristics and as result mature faster than the other group over the course of the study (Ary et al., 2010). As an example, consider a 5-year longitudinal study that compares a group of 20-year-old pilots to a group of 50-year-old pilots with respect to their level of professionalism. If both groups are assessed once every year, it is possible that the 20-year-old groups' level of professionalism might change considerably at the end of the 5-year period than that of the 50-year-old group. This is because the 20-year-old group (presumably) would have had a higher rate of maturity than the 50-year-old group. For example,

the 20-year-olds might have gotten married and had children, which could have altered their attitudes toward professionalism. As a result, this interaction between selection and maturation could be mistaken for a treatment effect. Although this threat is more applicable to intervention studies, it also can occur when using volunteer groups (Ary et al., 2010). Because Alhallaf (2016) reported that this threat was not applicable to his study, I also considered that it was not applicable to the current study.

Experimenter effect. An experimenter effect threat refers to the influence a person who is administering treatment might have on the outcome. This could include the implementer's personological characteristics such as age, gender, level of education, as well as any unintended biases. For example, an implementer might have a preference for a specific method over another and this preference could account for increased performance by the participants who are being taught by this method. Alhallaf (2016) reported that this threat was not a concern in his study because there was no intervention. As a result, the experimenter effect threat to internal validity was not applicable to the current study as well.

Subject effects. A subject effects threat refers to participants' attitudes that were developed in response to the research situation (Ary et al., 2010). For example, the Hawthorne effect could occur when participants in a treatment group respond to the increased attention or recognition they are being given, which could result in changes in their performance that are unrelated to the treatment.

Conversely, the John Henry effect could occur when participants in a control group respond to the increased attention or recognition given to the treatment group and therefore engage in a display of "one-upmanship." This effect, also known as compensatory rivalry, can lead to changes in performance in the control group that rival the treatment group. This threat was not a concern in the current study because there was no intervention. As a result, the subject effects threat was neither a concern nor applicable to the current study.

Location. The location threat refers to the possibility of different locations affecting the results of a study. As an example, consider the situation where a treatment group is being assessed in an environment with better lighting, more room, and air-conditioning compared to an environment in which the control group is being assessed. It is conceivable that the treatment group might perform better than the control group as a result of location and not as a result of treatment. Alhallaf (2016) reported that although participants completed the electronic version of the APS in different locations such as their place of work or at home, he presumed that whatever environment they chose it would have been a comfortable and stress-free environment. As a result, Alhallaf did not believe this threat had any impact on his study. However, I partially disagreed with Alhallaf and believe the location threat might be applicable to the current study.

Treatment verification and fidelity. The concept of treatment verification and fidelity refers to the measures a researcher employs to confirm, "that the

manipulation of the independent variable occurred as planned" (Moncher & Prinz, 1991, p. 247). Thus, attention to treatment verification and fidelity provides confirmation that a study was implemented exactly as intended or, in the case of dissertation research, as proposed. When examined from a traditional perspective of an intervention study that involves treatment and control groups, attention to treatment verification and fidelity is critical because there must be some way to confirm that fidelity to the actual implementation of treatment was maintained. Doing so not only enhances the integrity of the independent variables but it also helps promote the generalizability of a study's results (Shaver, 1983).

In the current study, though, there was no specific treatment and therefore the concern for treatment verification and fidelity was not in the traditional sense. Instead, the focus of treatment and fidelity was relative to generalizability. When examined from this perspective, Shaver (1983) offers three areas on which researchers need to focus: (a) complete description of the variables, (b) data collection procedures, and (c) data analysis methods. With respect to each of Shaver's points: (a) The narrative and corresponding Table 3.10 provided in the "Description of independent and dependent variables" part of the Data Analysis section in this chapter provide a detailed description of the current study's variables; (b) The "Study Implementation" section of this chapter provides specific information about how the data were collected; and (c) The Data Analysis section of

this chapter includes a description of the data analysis procedures used to analyze the data.

Data Analysis

Description of independent and dependent variables. The current study included 13 independent variables (IVs) and one dependent variable (DV). As summarized in Table 3.10, these variables were grouped into four functional sets (Cohen et al., 2003) and are described below.

Set A = Demographics. Set A was comprised of nine variables: X_1 = Gender was categorical and dummy coded to represent the comparison between males and females with Males as the reference group. X_2 = Marital status was categorical and dummy coded to represent the comparison between Married and Not Married. Although Alhallaf (2016) initially considered four "Not Married" groups (single, divorced, separated, and widowed), the disparate sample sizes among these groups warranted treating this IV as a dichotomy in the current study. This IV was dummy coded with Married as the reference group. X_3 = Age was continuous and represented participants' chronological age in years. X_4 = Race/Ethnicity was categorical and dummy coded to represent the comparison between White Caucasian and non-White Caucasian. Although Alhallaf initially considered four non-White Caucasian groups (African American, Hispanic, Asian American, and Other), the disparate sample sizes among these groups warranted treating this IV as a dichotomy in the current study. This IV was dummy coded with White-Caucasian

Table 3.10

Summary and Description of Independent and Dependent Variables

Sets/Variables	Description
Set A = Demographics	
X_1 = Gender	X_1 was categorical and dummy coded to represent the comparison between males and females with Males as the reference group.
X_2 = Marital status	X_2 was categorical and dummy coded to represent the comparison between Married and Not Married, where Not Married comprised single, divorced, separated, and widowed, with Married as the reference group.
X_3 = Age	X_3 was continuous and measured in years.
X_4 = Race/Ethnicity	X_4 was categorical and dummy coded to represent the comparison between White Caucasian vs. non-White Caucasian where non-White Caucasian comprised African American, Hispanic, Asian American, and Other, with White Caucasian as the reference group.
X_{5a}, X_{5b}, X_{5c} = Annual income	X_{5a}, X_{5b}, and X_{5c} were categorical and represented four levels of annual income, which were dummy coded with \$50K to \$100K as the reference group: X_{5a} = Less than \$50K vs. \$50K to \$100K, X_{5b} = \$100K to \$150K vs. \$50K to \$100K, and X_{5c} = More than \$150K vs. \$50K to \$100K.
X_{6a}, X_{6b} = Education level	X_{6a} and X_{6b} were categorical and represented three levels of education, which were dummy coded with 4-year degree as the reference group. X_{6a} = Less than 4-year degree vs. 4-year degree and X_{6b} = Graduate degree vs. 4-year degree.
Set B = Aviation Experience	
X_7 = Years of experience	X_7 was continuous and represented total years of experience in the aviation profession.
X_8 = FAA ratings (Pilots subgroup only)	X_8 was continuous and represented the total number of FAA ratings such as PPL, instrument, CPL, ATP, CFI, CFII, and MEI.
X_9 = Total flight hours (Pilot subgroup only)	X_9 was continuous and represented total number of flight hours.
Set C = Professional Activity/Involvement	
X_{10} = IOP scores	X_{10} was continuous and represented scores on Kramer's (1974) Index of Professionalism (IOP) scale.
Set D = Dependent Variable	
Y = Level of professionalism	Set D was a single, continuous variable that represented scores on Snizek's (1972) Hall's Professionalism Inventory (HPI) scale.

as the reference group. $X_{5a,}$ X_{5b} and X_{5c} = Annual income were categorical and represented three levels of participants' annual income: (a) under $50,000, (b) $100,000 to $150,000, and (c) more than $150,000. Although Alhallaf initially considered nine income levels (less than $39,000, $40,000–$49,000, $50,000–$59,000…$90,000–$99,000, $100,000–$149,000, $150,000 or more), the disparate sample sizes among these groups warranted treating this IV as four groups in the current study. This IV was dummy coded with $50,000 to $100,000 as the reference group. X_{6a} and X_{6b} = Education level were categorical and represented three levels of participants' highest level of education: (a) less than a 4-year degree, (b) 4-year degree, and (c) graduate degree. Although Alhallaf initially considered four levels of education (high school or equivalent, 2-year degree, 4-year degree, and graduate degree), the disparate sample sizes among these groups warranted treating this IV as three groups in the current study. This IV was dummy coded with 4-year degree as the reference group.

Set B = Aviation background. Set B was comprised of three variables. X_7 = Years of experience was continuous and represented the total number of years of experience participants had working in the aviation profession. X_8 = FAA ratings was continuous and represented the total number of FAA ratings or certificates pilots had, including PPL, instrument, CPL, ATP, CFI, CFII, and MEI. This IV was applicable to the Pilots subgroup only. X_9 = Flight hours was continuous and

represented pilots' total number of flight hours. This IV was applicable to the Pilots subgroup only.

Set C = Professional activity/involvement. Set C was a single factor set, which consisted of various activities participants were involved in to keep current in their profession and to advance in their careers. X_{10} = IOP scores was continuous and represented participants' Index of Professionalism scores, which Alhallaf (2016) measured using Kramer's (1974) Index of Professionalism scale.

Set D = Level of professionalism. Set D was a single factor set, which was the dependent variable. Y = Level of professionalism was continuous and represented participants' scores from Snizek's (1972) HPI. Alhallaf (2016) measured this from an aggregate approach. In the current study, these scores were partitioned relative to the five subgroups.

Statistical strategy. Data analysis for the current study was accomplished with the performance of descriptive and inferential statistics. The former included calculating measures of central tendency, variability, and position, and the latter involved hierarchical multiple regression as well as analysis of variance (ANOVA). The results of these analyses are discussed and presented in both narrative and table forms in Chapter 4.

Chapter 4

Results

Introduction

This chapter is organized and presented in three main sections. The first section contains a summary of the descriptive statistics relative to the non-demographic sections of the Aviation Professionalism Survey (APS), which Alhallaf (2016) used as his primary data collection instrument. Included in this section are summaries of each subgroup's professionalism scores on the HPI and the IOP, and corresponding item analyses of each instrument. Furthermore, the first section also encompasses the discussion of the results of Research Question 3, which was "In what way do the subgroups differ in their perceptions of professionalism?" This is the only research question among three research questions that has no corresponding hypothesis but instead is answered directly via descriptive statistics.

The second section contains a summary of the inferential statistics results per each subgroup and is partitioned into two subsections: preliminary and primary analyses. The preliminary data analysis subsection contains a discussion of (a) the modifications made to the data set to prepare it for primary data analysis, (b) missing data, (c) outlier analysis, (d) multicollinearity, and (d) the assumptions of multiple regression and ANOVA, which were the two primary statistical strategies employed. The primary data analysis subsection contains a discussion relative to

both hierarchical multiple regression and single-factor ANOVA. The first statistical strategy was used to test the hypotheses associated with Research Question 1, which involved an explanatory and predictive correlational research methodology. The second statistical strategy was used to test the hypotheses associated with Research Question 2, which involved an ex post facto methodology. As a result, two different statistical procedures were employed. The last section of the chapter presents the results of hypothesis testing that corresponded to the first two research questions as outlined in Chapter 1.

Before presenting and discussing these findings, the reader is reminded that the current study involved a secondary analysis of Alhallaf's (2016) data. Alhallaf collected these data directly from participants via the APS. As a result, the data for the current study are considered archival, and no new data were collected.

Descriptive Statistics

As noted in the Introduction, this section contains a summary of the descriptive statistics related to each subgroup's responses to the sections of the APS as well as the results associated with Research Question 3. Absent from this discussion, though, are the descriptive statistics associated with the demographic items of the APS. The reader is reminded that a summary of these data per each subgroup was provided in Chapter 3 in Tables 3.1–3.6.

Section A: Professionalism scale. To measure participants' level of professionalism, which was the dependent variable, Alhallaf (2016) used Snizek's

(1972) Hall's Professionalism Inventory (HPI), which is a 25-item attitudinal scale that has been used to measure professionalism across many industries, including business, health care, and law enforcement. The HPI, which is a modified version of Hall's (1968) Professionalism Inventory, measures five dimensions (subscales) of professionalism (five items per dimension): (a) use of the professional organization as a major referent, (b) belief in public services, (c) belief in self-regulation, (d) a sense of calling to the field (individual commitment to the profession), and (e) a feeling of autonomy. All items were measured on a traditional Likert response scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. Thus, overall scores could range from 25 to 125, with higher scores signifying a higher level of professionalism. Eleven of the 25 HPI items were oppositely worded and reverse scored prior to the data analysis. A summary of each subgroup's responses to the HPI follows.

Aircraft maintenance technicians (AMTs). As summarized in Table 4.1, the overall mean HPI score for the AMT subgroup was $M = 83.7$ ($SD = 8.6$), and the overall range was from 69 to 107 with a midrange of 88. This suggests that the AMT subgroup's overall mean level of professionalism was moderately high given that both the mean and midrange were between the second and third quartiles relative to the scale of 25 to 125. As summarized in Table 4.2, when the data were disaggregated by gender, there was a 3-point difference in mean HPI scores with females ($M = 86.9$, $SD = 7.6$) having a higher level of professionalism than males

Table 4.1

Summary of Participants' Professionalism Scores on the HPI and IOP

		HPI[b]		IOP[c]	
Subgroup	***N*[a]**	***M***	***SD***	***M***	***SD***
Aircraft Maintenance Technicians	68	83.7	8.6	14.9	5.1
Airport Managers	76	83.3	8.4	14.9	6.3
Air Traffic Controllers	44	80.5	7.2	12.8	6.0
Non-Pilot Aviation Employees	199	82.8	10.2	14.6	6.5
Pilots	287	84.9	8.7	16.1	5.9
Overall	674	83.7	9.1	15.2	6.1

Note. [a]Sample sizes are relative to Research Question 1. [b]Snizek's (1972) Hall's Professionalism Inventory is a 25-item instrument that uses a traditional Likert response scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. Thus, overall scores could range from 25 to 125, with higher scores signifying a higher level of professionalism. [c]Kramer's (1974) Index of Professionalism consists of nine items measure professional behaviors. Overall scores could range from 0 to 29, with higher scores reflecting a higher level of professional involvement.

Table 4.2

Summary of Participants' Scores on the HPI and IOP by Gender and per Subgroup

Snizek's (1972) Hall's Professional Inventory (HPI)[a]

				Gender[c]					
	Overall			Female			Male		
Subgroup[b]	***N***	***M***	***SD***	***N***	***M***	***SD***	***N***	***M***	***SD***
AMT (*N* = 68)	64	83.7	8.6	3	86.9	7.6	61	83.9	8.7
Airport (*N* = 76)	74	83.3	8.4	16	85.2	8.1	58	82.8	8.6
ATC (*N* = 44)	44	80.5	7.2	8	82.6	10.5	36	80.1	6.4
NPAE (*N* = 199)	197	82.8	10.2	46	81.9	9.4	151	83.4	9.7
Pilot (*N* = 287)	276	84.9	8.7	33	86.9	6.5	243	84.7	9.0

Kramer's (1974) Index of Professionalism (IOP)[d]

				Gender[c]					
	Overall			Female			Male		
Subgroup[b]	***N***	***M***	***SD***	***N***	***M***	***SD***	***N***	***M***	***SD***
AMT (*N* = 68)	64	14.9	5.1	3	12.7	2.3	61	15.3	4.9
Airport (*N* = 76)	74	14.9	6.3	16	13.6	4.6	58	14.9	6.6
ATC (*N* = 44)	44	12.8	6.0	8	10.1	5.5	36	13.4	6.0
NPAE (*N* = 199)	197	14.6	6.5	46	14.5	6.8	151	14.7	6.5
Pilot (*N* = 287)	276	16.1	5.9	33	16.9	6.3	243	15.9	5.9

Note. N = 674.

[a]The HPI is a 25-item instrument that use a traditional Likert response scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. Overall scores could range from 25 to 125, with higher scores reflecting a higher level of professionalism. [b]See Table 4.1's Subgroup column for full descriptions of each subgroup; sample sizes are relative to Research Question 1. [c]Not all participants reported their gender. [d]The IOP consists of nine items that measure professional behaviors. Overall scores could range from 0 to 29, with higher scores reflecting a higher level of professional involvement.

(M = 83.9, SD = 8.7). The reader is cautioned not to make any generalizations of this difference, though, because of disparate sample sizes (N_F = 3, N_M = 61), where females represented less than 5% of the sample of aircraft maintenance technicians.

A summary of the item analysis of the AMT subgroup's responses to the HPI is provided in Table 4.3. The reader will note from Table 4.3 that the majority of the mean responses were hovered around 3.0, which corresponds to the neutral/undecided category. There were some noteworthy exceptions, though. For example, Items A6 ("My fellow professionals have a pretty good idea about each other's competence"), A7 ("People in this profession have a real 'calling' for their work"), and A11 ("I believe that the professional organization[s] should be supported") had mean scores ranging from M = 3.85 to 4.37, which indicates that participants generally "agreed" with these items. On the other hand, although the mean score for A19 ("My own decisions are subject to review") was M = 3.86, this was an oppositely worded item and therefore when reverse scored, AMT subgroup participants mostly "disagreed" with this item. Similarly, there were other items oppositely worded and reverse scored in which participants generally "agreed" with those items. For example, Items A10 ("I don't have much opportunity to exercise my own judgment"), A13 ("A problem in this profession is that no one really knows what his/her colleagues are doing"), and A17 ("Although I would like to, I really don't read the journals too often") had mean scores ranging from M = 2.24 to

Table 4.3

Item Analysis of Hall's Professionalism Inventory for Aircraft Maintenance Technicians

Item[a]	Statement[b]	*M*	*SD*
A1	I systematically read the professional journals.	3.69	1.05
A2*	Other professions are actually more vital to society than mine.	2.68	1.10
A3	I make my own decisions in regard to what is to be done in my work.	3.72	1.02
A4	I regularly attend professional meetings at the local level.	3.35	1.07
A5	I think that my profession, more than any other, is essential for society.	3.28	0.99
A6	My fellow professionals have a pretty good idea about each other's competence.	3.85	0.82
A7	People in this profession have a real "calling" for their work.	4.03	0.77
A8*	The importance of my profession is sometimes over stressed.	2.65	1.28
A9	The dedication of people in this field is most gratifying.	3.76	0.79
A10*	I don't have much opportunity to exercise my own judgment.	2.24	1.05
A11	I believe that the professional organization(s) should be supported.	4.37	0.69
A12*	Some other occupations are actually more important to society than is mine.	3.31	0.95
A13*	A problem in this profession is that no one really knows what his/her colleagues are doing.	2.56	1.10
A14	It is encouraging to see the high level of idealism, which is maintained by people in this field.	3.61	0.79
A15*	The professional organization doesn't really do too much for the average member.	3.01	1.19
A16*	We really have no way of judging each other's competence.	2.63	1.14
A17*	Although I would like to, I really don't read the journals too often.	2.59	1.24
A18	Most people would stay in the profession even if their incomes were reduced.	2.93	1.20
A19*	My own decisions are subject to review.	3.86	0.77
A20*	There is not much opportunity to judge how another person does his work.	2.68	1.04
A21	I am my own boss in almost every work-related situation.	3.00	1.11
A22	If ever an occupation is indispensable, it is this one.	2.75	1.19
A23	My colleagues pretty well know how well we all do in our work.	3.60	0.93
A24	There are very few people who don't really believe in their work.	3.38	0.96
A25*	Most of my decisions are reviewed by other people.	3.38	1.04

Note. $N = 68$. Snizek's (1972) Hall's Professionalism Inventory (HPI) is a 25-item instrument that uses a traditional 5-point Likert response scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. Thus, overall scores could range from 25 to 125, with higher scores signifying a higher level of professionalism.

[a]Starred items (*) were oppositely worded and the reported corresponding *M* and *SD* reflect the raw data prior to reverse scoring. When the oppositely worded items were reverse scored, the overall mean was 83.7, which reflects a relatively high level of professionalism. [b]Items A1, A4, A11, A15, A17 corresponded to the "organization as a major referent" dimension. Items A2, A5, A8, A12, A22 corresponded to the "belief in public service" dimension. Items A6, A13, A16, A20, A23 corresponded to the "belief in self-regulation" dimension. Items A7, A9, A14, A18, A24 corresponded to the "sense of calling to the field" dimension. Items A3, A10, A19, A21, A25 corresponded to the "autonomy" dimension. See Table 3.8 for corresponding reliability information.

2.59, which in raw form indicate a general disagreement. However, when reverse scored, AMTs generally "agreed" with these items.

Airport managers. As summarized in Table 4.1, the overall mean HPI score for the Airport Managers subgroup was $M = 83.3$ ($SD = 8.4$), and the overall range was from 65 to 110 with a midrange of 87.5. This suggests that the Airport Managers subgroup's overall mean level of professionalism was moderately high given that both the mean and midrange were between the second and third quartiles relative to the scale of 25 to 125. As summarized in Table 4.2, when the data were disaggregated by gender, there was a 2.4-unit mean difference in HPI scores with females ($M = 85.2$, $SD = 8.1$) having a higher level of professionalism than males ($M = 82.8$, $SD = 8.6$). Once again, the reader is cautioned not to make any broad generalizations of this difference because of disparate sample sizes ($N_F = 16$, $N_M = 58$), where females represented 21.6% of the sample of airport managers.

A summary of the item analysis of the Airport Managers subgroup's responses to the HPI is provided in Table 4.4. As was the case with the AMT subgroup, most of the mean responses were around 3.0, which corresponded to the neutral/undecided category. However, there were some noteworthy exceptions. For example, Items A7 ("People in this profession have a real "calling" for their work"), A9 ("The dedication of people in this field is most gratifying"), and A11 ("I believe that the professional organization(s) should be supported") had mean scores ranging from $M = 3.72$ to 4.32, which indicate that participants generally

Table 4.4

Item Analysis of Hall's Professionalism Inventory for Airport Managers

Item[a]	Statement[b]	*M*	*SD*
A1	I systematically read the professional journals.	3.48	0.87
A2*	Other professions are actually more vital to society than mine.	2.69	0.99
A3	I make my own decisions in regard to what is to be done in my work.	3.64	0.95
A4	I regularly attend professional meetings at the local level.	3.66	1.11
A5	I think that my profession, more than any other, is essential for society.	3.13	0.96
A6	My fellow professionals have a pretty good idea about each other's competence.	3.68	0.82
A7	People in this profession have a real "calling" for their work.	3.83	0.76
A8*	The importance of my profession is sometimes over stressed.	2.87	1.01
A9	The dedication of people in this field is most gratifying.	3.72	0.92
A10*	I don't have much opportunity to exercise my own judgment.	2.12	1.05
A11	I believe that the professional organization(s) should be supported.	4.32	0.64
A12*	Some other occupations are actually more important to society than is mine.	3.45	1.04
A13*	A problem in this profession is that no one really knows what his/her colleagues are doing.	2.42	1.00
A14	It is encouraging to see the high level of idealism, which is maintained by people in this field.	3.80	0.73
A15*	The professional organization doesn't really do too much for the average member.	2.59	1.13
A16*	We really have no way of judging each other's competence.	2.38	0.92
A17*	Although I would like to, I really don't read the journals too often.	2.89	1.05
A18	Most people would stay in the profession even if their incomes were reduced.	2.89	1.04
A19*	My own decisions are subject to review.	3.75	0.87
A20*	There is not much opportunity to judge how another person does his work.	2.62	1.01
A21	I am my own boss in almost every work-related situation.	2.99	1.14
A22	If ever an occupation is indispensable, it is this one.	2.63	0.99
A23	My colleagues pretty well know how well we all do in our work.	3.51	0.95
A24	There are very few people who don't really believe in their work.	3.36	0.93
A25*	Most of my decisions are reviewed by other people.	3.34	1.09

Note. $N = 76$. Snizek's (1972) Hall's Professionalism Inventory (HPI) is a 25-item instrument that uses a traditional 5-point Likert response scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. Thus, overall scores could range from 25 to 125, with higher scores signifying a higher level of professionalism.

[a]Starred items (*) were oppositely worded and the reported corresponding *M* and *SD* reflect the raw data prior to reverse scoring. When the oppositely worded items were reverse scored, the overall mean was 83.3, which reflects a relatively high level of professionalism. [b]Items A1, A4, A11, A15, A17 corresponded to the "organization as a major referent" dimension. Items A2, A5, A8, A12, A22 corresponded to the "belief in public service" dimension. Items A6, A13, A16, A20, A23 corresponded to the "belief in self-regulation" dimension. Items A7, A9, A14, A18, A24 corresponded to the "sense of calling to the field" dimension. Items A3, A10, A19, A21, A25 corresponded to the "autonomy" dimension. See Table 3.8 for corresponding reliability information.

"agreed" with these items. On the other hand, although the mean score for A19 ("My own decisions are subject to review") was $M = 3.75$, this was an oppositely worded item and therefore when reverse scored airport managers mostly "disagreed" with this item. Similarly, there were other items oppositely worded and reverse scored in which participants generally "agreed" with those items. For example, Items A10 ("I don't have much opportunity to exercise my own judgment"), A13 ("A problem in this profession is that no one really knows what his/her colleagues are doing"), A15 ("The professional organization doesn't really do too much for the average member"), and A16 ("We really have no way of judging each other's competence") had mean scores ranging from $M = 2.12$ to 2.59, which in raw form indicate a general disagreement. However, when reverse scored, Airport Managers generally "agreed" with these items.

Air traffic controllers (ATCs). As summarized in Table 4.1, the overall mean HPI score for the ATC subgroup was $M = 80.5$ ($SD = 7.2$), and the overall range was from 64 to 104 with a midrange of 84. This suggests that ATC subgroup's overall mean level of professionalism was moderately high given that both the mean and midrange were between the second and third quartiles relative to the scale of 25 to 125. As summarized in Table 4.2, when the data were disaggregated by gender, there was a 2.5-unit mean difference in mean HPI scores with females ($M = 82.6$, $SD = 10.5$) having a higher level of professionalism than males ($M = 80.1$ $SD = 6.4$). The reader is once again cautioned not to make any

broad generalizations of this difference because of disparate sample sizes (N_F = 8, N_M = 36), where females represented 18.0% of the sample of air traffic controllers.

A summary of the item analysis of ATC subgroup's responses to the HPI is provided in Table 4.5. As noted in Table 4.5, most of the mean responses were around 3.0, which corresponded to the neutral/undecided category. However, there were some noteworthy exceptions. For example, Items A3 ("I make my own decisions in regard to what is to be done in my work") and A11 ("I believe that the professional organization[s] should be supported") had mean scores ranging from M = 3.68 to 4.00, which indicates that participants generally "agreed" with these items. On the other hand, although the mean score for A19 ("My own decisions are subject to review") was M = 3.73, this was an oppositely worded item and therefore when reverse scored, ATC subgroup participants mostly "disagreed" with this item.

Non-pilot aviation employees (NPAE). As summarized in Table 4.1, the overall mean HPI score for the NPAE subgroup was M = 82.8 (SD = 10.2), and the overall range was from 37 to 108 with a midrange of 72.5. This suggests that the NPAE subgroup's overall mean level of professionalism was somewhat mediocre given that the mean was between the second and third quartiles but the midrange was between the first and second quartiles relative to the scale of 25 to 125. Furthermore, the NPAE subgroup also had the highest standard deviation among all the subgroups, which indicates there was a considerable amount of variability among the participants' responses. One plausible explanation for this variability is

Table 4.5

Item Analysis of Hall's Professionalism Inventory for Air Traffic Controllers

Item[a]	Statement[b]	*M*	*SD*
A1	I systematically read the professional journals.	3.48	0.98
A2*	Other professions are actually more vital to society than mine.	3.02	1.11
A3	I make my own decisions in regard to what is to be done in my work.	3.68	0.98
A4	I regularly attend professional meetings at the local level.	3.52	1.05
A5	I think that my profession, more than any other, is essential for society.	3.23	1.14
A6	My fellow professionals have a pretty good idea about each other's competence.	3.64	0.87
A7	People in this profession have a real "calling" for their work.	3.61	0.92
A8*	The importance of my profession is sometimes over stressed.	3.39	1.08
A9	The dedication of people in this field is most gratifying.	3.50	0.93
A10*	I don't have much opportunity to exercise my own judgment.	2.70	1.11
A11	I believe that the professional organization(s) should be supported.	4.00	0.84
A12*	Some other occupations are actually more important to society than is mine.	3.32	1.05
A13*	A problem in this profession is that no one really knows what his/her colleagues are doing.	2.68	1.22
A14	It is encouraging to see the high level of idealism, which is maintained by people in this field.	3.57	1.15
A15*	The professional organization doesn't really do too much for the average member.	3.34	1.10
A16*	We really have no way of judging each other's competence.	2.82	1.19
A17*	Although I would like to, I really don't read the journals too often.	3.18	1.00
A18	Most people would stay in the profession even if their incomes were reduced.	3.48	1.02
A19*	My own decisions are subject to review.	3.73	0.95
A20*	There is not much opportunity to judge how another person does his work.	2.84	1.06
A21	I am my own boss in almost every work-related situation.	3.00	1.12
A22	If ever an occupation is indispensable, it is this one.	3.07	1.07
A23	My colleagues pretty well know how well we all do in our work.	3.59	0.76
A24	There are very few people who don't really believe in their work.	3.43	1.15
A25*	Most of my decisions are reviewed by other people.	3.25	1.01

Note. $N = 44$. Snizek's (1972) Hall's Professionalism Inventory (HPI) is a 25-item instrument that uses a traditional 5-point Likert response scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. Thus, overall scores could range from 25 to 125, with higher scores signifying a higher level of professionalism.

[a]Starred items (*) were oppositely worded and the reported corresponding *M* and *SD* reflect the raw data prior to reverse scoring. When the oppositely worded items were reverse scored, the overall mean was 80.5, which reflects a relatively high level of professionalism. [b]Items A1, A4, A11, A15, A17 corresponded to the "organization as a major referent" dimension. Items A2, A5, A8, A12, A22 corresponded to the "belief in public service" dimension. Items A6, A13, A16, A20, A23 corresponded to the "belief in self-regulation" dimension. Items A7, A9, A14, A18, A24 corresponded to the "sense of calling to the field" dimension. Items A3, A10, A19, A21, A25 corresponded to the "autonomy" dimension. See Table 3.8 for corresponding reliability information.

that unlike the other subgroups, the NPAE subgroup was comprised of participants from across many different disciplines, including business, flight operations, and college/university faculty. As summarized in Table 4.2, when the data were disaggregated by gender, there was a 1.5-unit mean difference in HPI scores with males (M = 83.4 SD = 9.7) having a higher level of professionalism than females (M = 81.9, SD = 9.4). The reader should note that the NPAE subgroup was the only subgroup where females had lower mean HPI scores than males. Furthermore, the percentage of females also was the highest (23%) when compared to the female representation in the other four subgroups (N_F = 46, N_M = 151).

A summary of the item analysis of NPAE subgroup's responses to the HPI is provided in Table 4.6. The reader will note from Table 4.6 that the majority of the mean responses were around 3.0, which corresponds to the neutral/undecided category. There were some noteworthy exceptions, though. For example, Items A7 ("People in this profession have a real "calling" for their work") and A11 ("I believe that the professional organization(s) should be supported") had mean scores ranging from M = 3.92 to 4.20, which indicate that participants generally "agreed" with these items. On the other hand, although the mean score for A19 ("My own decisions are subject to review") was M = 3.72, this was an oppositely worded item and therefore when reverse scored, NPAE subgroup participants mostly "disagreed" with this item. Similarly, there were other items oppositely worded and

Table 4.6

Item Analysis of Hall's Professionalism Inventory for Non-Pilot Aviation Employees

Item[a]	Statement[b]	*M*	*SD*
A1	I systematically read the professional journals.	3.37	1.12
A2*	Other professions are actually more vital to society than mine.	2.84	1.10
A3	I make my own decisions in regard to what is to be done in my work.	3.44	1.08
A4	I regularly attend professional meetings at the local level.	3.36	1.09
A5	I think that my profession, more than any other, is essential for society.	3.33	1.03
A6	My fellow professionals have a pretty good idea about each other's competence.	3.72	0.92
A7	People in this profession have a real "calling" for their work.	3.92	0.88
A8*	The importance of my profession is sometimes over stressed.	2.88	1.19
A9	The dedication of people in this field is most gratifying.	3.77	0.97
A10*	I don't have much opportunity to exercise my own judgment.	2.38	1.11
A11	I believe that the professional organization(s) should be supported.	4.20	0.73
A12*	Some other occupations are actually more important to society than is mine.	3.45	1.01
A13*	A problem in this profession is that no one really knows what his/her colleagues are doing.	2.45	1.04
A14	It is encouraging to see the high level of idealism, which is maintained by people in this field.	3.57	0.92
A15*	The professional organization doesn't really do too much for the average member.	2.84	1.02
A16*	We really have no way of judging each other's competence.	2.47	1.05
A17*	Although I would like to, I really don't read the journals too often.	2.97	1.20
A18	Most people would stay in the profession even if their incomes were reduced.	3.19	1.09
A19*	My own decisions are subject to review.	3.72	0.92
A20*	There is not much opportunity to judge how another person does his work.	2.58	1.06
A21	I am my own boss in almost every work-related situation.	3.00	1.16
A22	If ever an occupation is indispensable, it is this one.	2.85	1.13
A23	My colleagues pretty well know how well we all do in our work.	3.68	0.83
A24	There are very few people who don't really believe in their work.	3.38	0.98
A25*	Most of my decisions are reviewed by other people.	3.41	1.12

Note. $N = 199$. Snizek's (1972) Hall's Professionalism Inventory (HPI) is a 25-item instrument that uses a traditional 5-point Likert response scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. Thus, overall scores could range from 25 to 125, with higher scores signifying a higher level of professionalism.

[a]Starred items (*) were oppositely worded and the reported corresponding *M* and *SD* reflect the raw data prior to reverse scoring. When the oppositely worded items were reverse scored, the overall mean was 82.8, which reflects a relatively high level of professionalism. [b]Items A1, A4, A11, A15, A17 corresponded to the "organization as a major referent" dimension. Items A2, A5, A8, A12, A22 corresponded to the "belief in public service" dimension. Items A6, A13, A16, A20, A23 corresponded to the "belief in self-regulation" dimension. Items A7, A9, A14, A18, A24 corresponded to the "sense of calling to the field" dimension. Items A3, A10, A19, A21, A25 corresponded to the "autonomy" dimension. See Table 3.8 for corresponding reliability information.

reverse scored in which participants generally "agreed" with those items. For example, Items A13 ("A problem in this profession is that no one really knows what his/her colleagues are doing"), A16 ("We really have no way of judging each other's competence"), and A20 ("There is not much opportunity to judge how another person does his work") had mean scores ranging from $M = 2.45$ to 2.58, which in raw form indicate disagreement. However, when reverse scored, NPAEs generally "agreed" with these items.

Pilots. As summarized in Table 4.1, the overall mean HPI score for the Pilots subgroup was $M = 84.9$ ($SD = 8.7$), and the overall range was from 53 to 116 with a midrange of 84.5. This suggests that pilots overall level of professionalism was quite high given that both the mean and midrange were between the second and third quartiles relative to the scale of 25 to 125. In fact, the Pilot subgroup's overall level of professionalism was the highest among all subgroups. As summarized in Table 4.2, when the data were disaggregated by gender there was 2.2-unit difference in mean HPI scores with females ($M = 86.9$, $SD = 6.5$) having a higher level of professionalism than males ($M = 84.7$ $SD = 9.0$). Once again, this difference should be cautiously interpreted because of disparate sample sizes ($N_F = 33$, $N_M = 243$), where females represented 12.0% of the sample of pilots.

A summary of the item analysis of pilots' responses to the HPI is provided in Table 4.7. The reader will note from Table 4.7 that the majority of the mean responses were around 3.0, which corresponds to the neutral/undecided category.

Table 4.7

Item Analysis of Hall's Professionalism Inventory for Pilots

Item[a]	Statement[b]	*M*	*SD*
A1	I systematically read the professional journals.	3.60	1.08
A2*	Other professions are actually more vital to society than mine.	2.83	1.12
A3	I make my own decisions in regard to what is to be done in my work.	3.48	0.96
A4	I regularly attend professional meetings at the local level.	3.37	1.10
A5	I think that my profession, more than any other, is essential for society.	3.25	1.12
A6	My fellow professionals have a pretty good idea about each other's competence.	3.88	0.87
A7	People in this profession have a real "calling" for their work.	3.96	0.89
A8*	The importance of my profession is sometimes over stressed.	2.87	1.11
A9	The dedication of people in this field is most gratifying.	3.86	0.79
A10*	I don't have much opportunity to exercise my own judgment.	1.93	0.96
A11	I believe that the professional organization(s) should be supported.	4.26	0.67
A12*	Some other occupations are actually more important to society than is mine.	3.57	1.06
A13*	A problem in this profession is that no one really knows what his/her colleagues are doing.	2.31	1.01
A14	It is encouraging to see the high level of idealism, which is maintained by people in this field.	3.54	0.92
A15*	The professional organization doesn't really do too much for the average member.	2.62	1.02
A16*	We really have no way of judging each other's competence.	2.12	0.95
A17*	Although I would like to, I really don't read the journals too often.	2.46	1.13
A18	Most people would stay in the profession even if their incomes were reduced.	3.08	1.09
A19*	My own decisions are subject to review.	3.78	0.91
A20*	There is not much opportunity to judge how another person does his work.	2.41	1.03
A21	I am my own boss in almost every work-related situation.	3.08	1.07
A22	If ever an occupation is indispensable, it is this one.	2.74	1.13
A23	My colleagues pretty well know how well we all do in our work.	3.67	0.87
A24	There are very few people who don't really believe in their work.	3.40	0.99
A25*	Most of my decisions are reviewed by other people.	3.35	1.02

Note. $N = 287$. Snizek's (1972) Hall's Professionalism Inventory (HPI) is a 25-item instrument that uses a traditional 5-point Likert response scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. Thus, overall scores could range from 25 to 125, with higher scores signifying a higher level of professionalism.

[a]Starred items (*) were oppositely worded and the reported corresponding *M* and *SD* reflect the raw data prior to reverse scoring. When the oppositely worded items were reverse scored, the overall mean was 84.9, which reflects a relatively high level of professionalism. [b]Items A1, A4, A11, A15, A17 corresponded to the "organization as a major referent" dimension. Items A2, A5, A8, A12, A22 corresponded to the "belief in public service" dimension. Items A6, A13, A16, A20, A23 corresponded to the "belief in self-regulation" dimension. Items A7, A9, A14, A18, A24 corresponded to the "sense of calling to the field" dimension. Items A3, A10, A19, A21, A25 corresponded to the "autonomy" dimension. See Table 3.8 for corresponding reliability information.

However, there were some noteworthy exceptions. For example, Items A6 (“My fellow professionals have a pretty good idea about each other's competence”), Items A7 (“People in this profession have a real ‘calling’ for their work”), A9 (“The dedication of people in this field is most gratifying”), and A11 (“I believe that the professional organization[s] should be supported”) had mean scores ranging from $M = 3.86$ to 4.26, which indicate that participants generally “agreed” with these items. On the other hand, although the mean score for A19 (“My own decisions are subject to review”) was $M = 3.78$, this was an oppositely worded item and therefore when reverse scored, Pilots subgroup participants mostly “disagreed” with this item. Similarly, Item A20 (“There is not much opportunity to judge how another person does his work”) had a mean score of $M = 2.41$, which in raw form indicates disagreement. However, because this item was oppositely worded, when it was reverse scored pilots generally “agreed” with this item.

In summary:

- All subgroups “agreed” (mean scores around 4.0) with Item A11 = “I believe that the professional organization(s) should be supported.”
- All subgroups except for Air Traffic Controllers “agreed” with Item A7 = “People in this profession have a real ‘calling’ for their work.”
- All subgroups “disagreed” (mean scores around 2.0) with Item A19 = “My own decisions are subject to review.”

- Among the five subgroups, AMTs, Airport Managers and Pilots were most closely aligned with each other's mean responses to the 25 HPI items.
- Among the five subgroups, Pilots ($N = 287$) had the highest overall mean HPI score ($M = 84.9$, $SD = 8.7$), and Air Traffic Controllers ($N = 44$) had the lowest mean HPI score ($M = 80.5$, $SD = 7.2$).

Section B: Perceptions of professionalism. This section of the APS is what Alhallaf (2016) prepared to assess participants' perceived understanding of what they believe the concept of professionalism means within their vocation. As described by Alhallaf (p. 81), participants were presented with the phrase "I believe professionalism is based on or related to…" This was then followed by a set of 10 responses that participants ranked from 1 = Most Important to 10 = Least Important. The possible responses were: (a) being compliant with procedures, (b) being ethical, (c) being competent, (d) being qualified and reliable, (e) demonstrated excellence, (f) the number of certificates or licenses obtained, (g) number of ratings, (h) total of years of experience, (i) level of formal education, and (j) earning professional certificates from professional organizations. These 10 responses were designed to reflect a dichotomy between a belief grounded in cognition (attitudinal or mind-set) and a belief grounded in empiricism (practical and measurable). The first five responses (a–e) reflected the former, and the last five responses (f–j) reflected the latter. A summary of each subgroup's ranked

perceptions of the concept of professionalism is provided in Tables 4.8 to 4.12, and a discussion relative to each subgroup follows.

Aircraft maintenance technicians (AMTs). As summarized in Table 4.8, the top five perceptions—which are those with the lowest mean—reported by aircraft maintenance technicians with respect to their belief about what professionalism is based on or related to were: (1) being ethical, $M = 2.35$; (2) being competent, $M = 3.34$; (3) being compliant with procedures, $M = 3.37$; (4) demonstrated excellence $M = 3.74$; and (5) being qualified and reliable, $M = 3.76$.

Table 4.8

Ranking of Aircraft Maintenance Technicians' Perceptions of Professionalism

	Rank[a]										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	M_{weighted}[b]
I believe professionalism is based on or related to …											
1. being compliant w/proc.	14	9	15	10	14	3	2	0	0	1	3.37 (3)
2. being ethical	24	22	9	7	2	2	1	1	0	0	2.35 (1)
3. being competent	9	12	19	17	6	0	2	2	1	0	3.34 (2)
4. being qualified & reliable	4	13	12	23	8	4	1	1	1	1	3.76 (5)
5. demonstrated excellence	12	7	9	7	29	1	2	1	0	0	3.74 (4)
6. number of certificates	0	0	2	0	0	19	19	12	12	4	7.31 (7)
7. number of ratings	0	0	0	1	1	3	17	20	11	15	8.16 (9)
8. total years of experience	1	1	0	1	5	22	9	17	5	7	7.03 (6)
9. level of formal edu.	2	2	1	1	2	8	9	6	24	13	7.76 (8)
10. earning prof. certificates	2	2	1	1	1	5	6	9	14	27	8.21 (10)

Note. $N = 68$. All participants ranked each factor. In the first choice, "w/proc." = with procedures, and in the last choice, "prof." = professional.

[a]Ranked in order of importance (1 = most important, 10 = least important. [b]Weighted mean was derived by multiplying the number of responses by the corresponding rank to get a weighted sum and then dividing the weighted sum by *N*. For example, in the first perception, "being compliant w/procedures," the weighted mean was (14 × 1) + (9 × 2) + (15 × 3) + (10 × 4) + (14 × 5) + (3 × 6) + (2 × 7) + (0 × 8) + (0 × 9) + (1 × 10) = 229 and 229 / 68 = 3.37 (rounded to two decimal places).

The means of the remaining five perceptions were in clear contrast relative to the top five perceptions and ranged from the perception that professionalism is based on total years of experience (M = 7.03), which was ranked sixth, to earning professional certificates (M = 8.21), which was ranked 10th. Thus, the AMT subgroup's perception of professionalism was grounded in a cognitive (i.e., an attitude or a mind-set) as opposed to an empirical (i.e., practical and measurable) perspective.

Airport managers. As summarized in Table 4.9, the top five perceptions—which are those with the lowest means—reported by the Airport Managers subgroup with respect to their belief about what professionalism is based on or related to were: (1) being ethical, M = 3.19; (2) being qualified and reliable, M = 3.31; (3) being competent, M = 3.33; (4) demonstrated excellence, M = 3.71; and (5) being compliant with procedures M = 4.43. Similar to the AMT subgroup, the means of the remaining perceptions were in clear contrast relative to the top five perceptions and ranged from the perception that professionalism is based on the total years of experience (M = 6.20), which was ranked sixth, to earning number of ratings (M = 8.19), which was ranked 10th. Thus, the Airport Manager subgroup's perception of professionalism was grounded in a cognitive (i.e., an attitude or a mind-set) as opposed to an empirical (i.e., practical and measurable) perspective.

Air traffic controllers (ATCs). As summarized in Table 4.10, the top five perceptions—which are those with the lowest means—reported by the ATC

Table 4.9

Ranking of Airport Managers' Perceptions of Professionalism

	Rank[a]										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	$M^{b}_{weighted}$
I believe professionalism is based on or related to …											
1. being compliant w/proc.	11	5	11	11	19	4	6	3	1	4	4.43 (5)
2. being ethical	19	15	14	12	3	3	5	4	0	0	3.19 (1)
3. being competent	11	19	13	13	12	3	2	0	2	0	3.33 (3)
4. being qualified & reliable	10	16	21	12	9	4	0	1	2	0	3.31 (2)
5. demonstrated excellence	18	11	6	12	16	3	3	3	1	2	3.71 (4)
6. number of certificates	0	3	0	3	1	6	14	19	20	9	7.72 (9)
7. number of ratings	0	0	0	3	3	6	7	18	22	16	8.19 (10)
8. total years of experience	4	5	3	6	4	20	9	8	9	7	6.20 (6)
9. level of formal edu.	2	0	6	2	4	15	15	7	10	14	7.05 (7)
10. earning prof. certificates	0	4	1	1	4	11	14	12	5	23	7.60 (8)

Note. $N = 76$. All participants except one ranked each factor. In the first choice, "w/proc." = with procedures, and in the last choice, "prof." = professional.

[a]Ranked in order of importance (1 = most important, 10 = least important. [b]Weighted mean was derived by multiplying the number of responses by the corresponding rank to get a weighted sum and then dividing the weighted sum by *N*. For example, in the first perception, "being compliant w/procedures," the weighted mean was (11 × 1) + (5 × 2) + (11 × 3) + (11 × 4) + (19 × 5) + (4 × 6) + (6 × 7) + (3 × 8) + (1 × 9) + (4 × 10) = 332 and 332 / 75 = 4.43 (rounded to two decimal places).

subgroup with respect to their belief about what professionalism is based on or related to were: (1) being competent, $M = 3.75$; (2) demonstrated excellence, $M = 4.11$; (3) being qualified and reliable, $M = 4.14$; (4) being compliant with procedures, $M = 4.16$; and (5) being ethical, $M = 4.75$. It is noteworthy to point out that among the five subgroups, the ATC subgroup did not rank being ethical as one of the top two perceptions. Nevertheless, and similar to the other subgroups, the means of the remaining five perceptions were in contrast relative to the top five perceptions and ranged from the perception that professionalism is based on the total years of experience ($M = 6.0$), which was ranked sixth, to earning professional

Table 4.10

Ranking of Air Traffic Controllers' Perceptions of Professionalism

	Rank[a]										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	M^{b}_{weighted}
I believe professionalism is based on or related to …											
1. being compliant w/proc.	9	3	7	11	6	0	0	2	3	3	4.16 (4)
2. being ethical	3	4	12	3	8	3	4	2	2	3	4.75 (5)
3. being competent	10	10	3	7	3	2	4	3	1	1	3.75 (1)
4. being qualified & reliable	8	7	8	7	1	5	2	0	1	5	4.14 (3)
5. demonstrated excellence	11	8	3	1	7	1	8	3	0	2	4.11 (2)
6. number of certificates	0	4	2	5	5	5	8	11	2	2	6.16 (7)
7. number of ratings	0	1	1	5	3	6	6	11	5	6	7.07 (9)
8. total years of experience	0	1	6	3	3	15	4	9	3	0	6.0 (6)
9. level of formal edu.	3	4	2	1	6	5	4	1	11	7	6.50 (8)
10. earning prof. certificates	0	3	0	1	2	2	4	2	15	15	8.20 (10)

Note. $N = 44$. All participants ranked each factor. In the first choice, "w/proc." = with procedures, and in the last choice, "prof." = professional.

[a]Ranked in order of importance (1 = most important, 10 = least important. [b]Weighted mean was derived by multiplying the number of responses by the corresponding rank to get a weighted sum and then dividing the weighted sum by *N*. For example, in the first perception, "being compliant w/procedures," the weighted mean was $(9 \times 1) + (3 \times 2) + (7 \times 3) + (11 \times 4) + (6 \times 5) + (0 \times 6) + (0 \times 7) + (2 \times 8) + (3 \times 9) + (3 \times 10) = 183$ and $183 / 44 = 4.16$ (rounded to two decimal places).

certificates ($M = 8.20$), which was ranked 10th. Thus, the Air Traffic Controller subgroup's perception of professionalism was grounded in a cognitive (i.e., an attitude or a mind-set) as opposed to an empirical (i.e., practical and measurable) perspective.

Non-pilot aviation employees (NPAE). As summarized in Table 4.11, the top five perceptions—which are those with the lowest means—reported by the NPAE subgroup with respect to their belief about what professionalism is based on or related to were: (1) being competent, $M = 2.98$; (2) being ethical, $M = 3.50$; (3) being qualified and reliable, $M = 3.84$; (4) being compliant with procedures, $M =$

Table 4.11

Ranking of Non-Pilot Aviation Employees' Perceptions of Professionalism

	Rank[a]										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	$M^{b}_{weighted}$
I believe professionalism is based on or related to …											
1. being compliant w/proc.	28	30	31	41	30	13	11	3	7	5	3.95 (4)
2. being ethical	40	48	37	25	15	7	9	4	3	11	3.50 (2)
3. being competent	54	41	40	32	16	2	4	3	4	3	2.98 (1)
4. being qualified & reliable	23	34	39	44	23	14	4	10	6	2	3.84 (3)
5. demonstrated excellence	36	18	21	21	52	13	20	6	4	8	4.33 (5)
6. number of certificates	2	3	7	5	14	36	50	47	22	13	6.98 (7)
7. number of ratings	2	2	2	8	8	13	36	44	46	38	7.84 (10)
8. total years of experience	4	9	7	9	20	49	25	34	22	20	6.62 (6)
9. level of formal edu.	3	10	10	5	16	34	22	22	52	25	7.06 (8)
10. earning prof. certificates	7	7	5	8	6	16	19	24	30	77	7.83 (9)

Note. $N = 199$. All participants ranked each factor. In the first choice, "w/proc." = with procedures, and in the last choice, "prof." = professional.

[a]Ranked in order of importance (1 = most important, 10 = least important. [b]Weighted mean was derived by multiplying the number of responses by the corresponding rank to get a weighted sum and then dividing the weighted sum by *N*. For example, in the first perception, "being compliant w/procedures," the weighted mean was $(28 \times 1) + (30 \times 2) + (31 \times 3) + (41 \times 4) + (30 \times 5) + (13 \times 6) + (11 \times 7) + (3 \times 8) + (7 \times 9) + (5 \times 10) = 787$ and $787 / 199 = 3.95$.

3.95; and (5) demonstrated excellence, $M = 4.33$. Similar to the other subgroups, the means of the remaining five perceptions were in sharp contrast relative to the top five perceptions and ranged from the perception that professionalism is based on the total years of experience ($M = 6.62$), which was ranked sixth, to number of ratings ($M = 7.84$), which was ranked 10th. Thus, the NPAE subgroup's perception of professionalism was grounded in a cognitive (i.e., an attitude or a mind-set) as opposed to an empirical (i.e., practical and measurable) perspective.

Pilots. As summarized in Table 4.12, the top five perceptions—which are those with the lowest means—reported by the Pilot subgroup with respect to their

Table 4.12

Ranking of Pilots' Perceptions of Professionalism

	Rank[a]										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	M_{weighted}[b]
I believe professionalism is based on or related to …											
1. being compliant w/proc.	53	45	59	54	55	8	3	1	2	5	3.35 (3)
2. being ethical	72	73	43	45	34	5	7	2	1	3	2.92 (2)
3. being competent	64	65	83	42	24	2	3	1	1	0	2.74 (1)
4. being qualified & reliable	29	49	55	79	53	9	3	6	1	1	3.56 (4)
5. demonstrated excellence	57	34	32	42	79	23	6	5	4	3	3.75 (5)
6. number of certificates	0	2	2	4	7	61	86	71	37	15	7.30 (7)
7. number of ratings	0	2	2	4	6	13	63	93	70	32	7.96 (8)
8. total years of experience	3	9	4	5	14	90	36	63	37	24	6.99 (6)
9. level of formal edu.	5	2	5	5	9	37	46	15	89	72	7.98 (9)
10. earning prof. certificates	2	7	0	5	4	36	32	29	40	130	8.38 (10)

Note. $N = 287$. All participants except two ranked each factor. In the first choice, "w/proc." = with procedures, and in the last choice, "prof." = professional.

[a]Ranked in order of importance (1 = most important, 10 = least important. [b]Weighted mean was derived by multiplying the number of responses by the corresponding rank to get a weighted sum and then dividing the weighted sum by *N*. For example, in the first perception, "being compliant w/procedures," the weighted mean was $(53 \times 1) + (45 \times 2) + (59 \times 3) + (54 \times 4) + (55 \times 5) + (8 \times 6) + (3 \times 7) + (1 \times 8) + (2 \times 9) + (5 \times 10) = 956$ and $956 / 285 = 3.35$ (rounded to two decimal places).

belief about what professionalism is based on or related to were: (1) being competent, $M = 2.74$; (2) being ethical, $M = 2.92$; (3) being compliant with procedures, $M = 3.35$; (4) being qualified and reliable, $M = 3.56$; and (5) demonstrated excellence, $M = 3.75$. Similar to the other subgroups, the means of the remaining five perceptions were in clear contrast relative to the top five perceptions and ranged from the perception that professionalism is based on total years of experience ($M = 6.99$), which was ranked sixth, to earning professional certificates ($M = 8.38$), which was ranked 10th. Thus, the Pilot subgroup's

perception of professionalism was grounded in a cognitive (i.e., an attitude or a mind-set) as opposed to empirical (i.e., practical and measurable) perspective.

The reader will recall that Research Question 3 of the current study was "In what way do the subgroups differ in their perceptions of professionalism?" The answer to this research question is illustrated in Table 4.13, which shows that all five subgroups perceived professionalism as a mind-set rather than something that is practical and measurable. Furthermore, the reader will note that "being ethical" was ranked either first or second among all subgroups except the ATC subgroup, and "being competent" was ranked first or second among all subgroups except for the Airport Managers subgroup. For the ATC subgroup, "being ethical" ranked lowest among the five cognitive perspectives of professionalism, which is

Table 4.13

Overall Rankings of Perceptions of Professionalism by Subgroup

		Subgroup[a]				
		AMT	***AM***	***ATC***	***NPAE***	***Pilots***
	I believe professionalism is based on or related to …					
Attitudinal or Cognitive (A Mindset)	1. being compliant w/procedures	3	5	4	4	3
	2. being ethical	1	1	5	2	2
	3. being competent	2	3	1	1	1
	4. being qualified & reliable	5	2	3	3	4
	5. demonstrated excellence	4	4	2	5	5
Empirical (Practical and Measurable)	6. number of certificates	7	9	7	7	7
	7. number of ratings	9	10	9	10	8
	8. total years of experience	6	6	6	6	6
	9. level of formal education	8	7	8	8	9
	10. earning prof. certificates	10	8	10	9	10

Note. [a]AMT = Aircraft Maintenance Technicians, AM = Airport Managers, ATC = Air Traffic Controllers, and NPAE = Non-Pilot Aviation Employees.

noteworthy considering that the ATC profession directly affects human lives along with the AMT and Pilots subgroups. Furthermore, "total years of experience" was the leading perception among the empirical (practical and measurable) perspective, ranking sixth across all five subgroups. Lastly, three of the five subgroups—AMT, ATC, and Pilots—ranked "earning professional certificates" last as their perception of professionalism.

Section C: Aviation background. This section of the APS is what Alhallaf (2016) prepared to determine: (a) which field or position within the aviation profession participants worked (e.g., airport managers, ATCs, pilots, etc.), (b) whether they worked full- or part-time, (c) the aviation segment associated with their employment (e.g., commercial airlines, general aviation, education, etc.), (d) the number of years they have been working in the aviation industry, (e) flight hours (for pilots), and (f) other work-related information. The data acquired from this section of the APS were used as one of the three factors for guiding the formation of the five subgroups for the current study.

Section D: Professional activities and involvement. To measure participants' professional activity and involvement, Alhallaf (2016) used Kramer's (1974) Index of Professionalism (IOP), which is a Likert-type response scale with nine items that varies among the items. As noted by Kramer (p. 56), the IOP consists of "the sum of weighted scores, from 0 to a maximum of 5, on each of…nine indicators." The overall scores could range from 0 to 29, with higher scores

signifying a higher level of professional involvement or activity. The reader is reminded that a detailed description of IOP items was presented in Chapter 3. Tables 4.14–4.18 contain a summary of the item analysis of the IOP based on the current study's data for each subgroup with each of the nine indicators underscored, and a discussion relative to each subgroup follows.

Aircraft maintenance technicians (AMTs). As summarized in Table 4.1, the AMT subgroup had an overall mean score on the IOP of $M = 14.9$ ($SD = 5.1$), which reflects a medium level of professional involvement or activity. Furthermore, as reported in Table 4.14, when each of the nine items of Kramer's (1974) IOP is examined independently several items had noteworthy level of professional involvement or activity. For example, the respective means for Items D1 ($M = 3.64$, $SD = 0.84$), D2 ($M = 1.93$, $SD = 0.91$), D3 ($M = 2.03$, $SD = 1.01$), and D4 ($M = 2.04$, $SD = 1.16$) indicate that AMT participants were fairly active or involved with respect to: (a) the number of professional courses they took, (b) the number of professional journals they subscribed to, (c) the number of professional books they purchased, and (d) the number of hours per week they spent engaged in professional reading. On the other hand, the lowest scored items for the AMT subgroup were D8 ($M = 0.68$, $SD = 0.89$) and D9 ($M = 0.78$, $SD = 0.71$). This indicates that AMT participants were neither actively involved in holding offices or leadership roles within professional organizations nor actively engaged in any professional activities within their employing organization.

Table 4.14

Item Analysis of Kramer's Index of Professionalism (IOP) for Aircraft Maintenance Technicians

Item[a]	Statement[b]	Possible Range[a]	*M*	*SD*
D1	Please enter the number of professional courses you have taken that are related to your profession.	0 to 4	3.64	0.84
D2	Please enter the number of professional journals you subscribe to that are related to your profession.	0 to 3	1.93	0.91
D3	Please enter the number of professional books you have purchased that are related to your profession.	0 to 3	2.03	1.01
D4	Please enter the approximate number of hours you spend per week engaged in professional reading related to your profession.	0 to 4	2.04	1.16
D5	Please describe the level of activity and membership in professional organizations related to your profession.	0 to 5	1.80	1.45
D6	Please enter the number of publications related to your profession that were published in the professional literature (e.g., research article, books, etc.).	0 to 2	1.03	0.96
D7	Please enter the number of professional speeches you have given related to your profession.	0 to 3	1.00	1.09
D8	Please identify your role with respect to offices held or leadership roles within professional organizations related to your profession.	0 to 3	0.68	0.89
D9	Please enter the extent of your professional activity within your employing organization.	0 to 2	0.78	0.71

Notes. $N = 68$. Kramer's (1974) Index of Professionalism (IOP) consists of nine items that measure professional behaviors (see below). The overall scores could range from 0 to 29, with higher scores signifying a higher level of professional involvement or activity. The overall mean was 14.9, which reflects a medium level of professional involvement or activity.

[a]D1 was scored as None = 0, One = 1, Two = 2, Three = 3, and Four or more = 4. D2 was scored as None = 0, One = 1, Two to three = 2, and Four or more = 3. D3 was scored as None = 0, One to two = 1, Three to five = 2, and Six or more = 3. D4 was scored as None = 0, One to two = 1, Three to four = 2, Five to seven = 3, and Eight or more = 4. D5 was scored as None = 0, Member only = 1, Some activity once per year = 2, Two to five activities per year = 3, Six to 11 activities per year = 4, and Monthly or more = 5. D6 was scored as None = 0, One = 1, and Two or more = 2. D7 was scored as None = 0, One to two = 1, Three to four = 2, Five or more = 3. D8 was scored as None = 0, Member of committee = 1, Chairperson of committee = 2, and Officer in district or regional organization = 3. D9 was scored as None = 0, Member of at least one committee = 1, and Chairperson of a committee = 2.

Airport managers. As summarized in Table 4.1, the Airport Managers subgroup had an overall mean score on the IOP of $M = 14.9$ ($SD = 6.3$), which

Table 4.15

Item Analysis of Kramer's Index of Professionalism (IOP) for Airport Managers

Item[a]	Statement[b]	Possible Range[a]	*M*	*SD*
D1	Please enter the number of professional courses you have taken that are related to your profession.	0 to 4	3.23	1.37
D2	Please enter the number of professional journals you subscribe to that are related to your profession.	0 to 3	1.68	0.95
D3	Please enter the number of professional books you have purchased that are related to your profession.	0 to 3	1.74	1.11
D4	Please enter the approximate number of hours you spend per week engaged in professional reading related to your profession.	0 to 4	1.68	0.91
D5	Please describe the level of activity and membership in professional organizations related to your profession.	0 to 5	2.38	1.66
D6	Please enter the number of publications related to your profession that were published in the professional literature (e.g., research article, books, etc.).	0 to 2	0.75	0.90
D7	Please enter the number of professional speeches you have given related to your profession.	0 to 3	1.43	1.29
D8	Please identify your role with respect to offices held or leadership roles within professional organizations related to your profession.	0 to 3	1.05	1.11
D9	Please enter the extent of your professional activity within your employing organization.	0 to 2	0.92	0.78

Notes. N = 76. Kramer's (1974) Index of Professionalism (IOP) consists of nine items that measure professional behaviors (see below). The overall scores could range from 0 to 29, with higher scores signifying a higher level of professional involvement or activity. The overall mean was 14.9, which reflects a medium level of professional involvement or activity.

[a]D1 was scored as None = 0, One = 1, Two = 2, Three = 3, and Four or more = 4. D2 was scored as None = 0, One = 1, Two to three = 2, and Four or more = 3. D3 was scored as None = 0, One to two = 1, Three to five = 2, and Six or more = 3. D4 was scored as None = 0, One to two = 1, Three to four = 2, Five to seven = 3, and Eight or more = 4. D5 was scored as None = 0, Member only = 1, Some activity once per year = 2, Two to five activities per year = 3, Six to 11 activities per year = 4, and Monthly or more = 5. D6 was scored as None = 0, One = 1, and Two or more = 2. D7 was scored as None = 0, One to two = 1, Three to four = 2, Five or more = 3. D8 was scored as None = 0, Member of committee = 1, Chairperson of committee = 2, and Officer in district or regional organization = 3. D9 was scored as None = 0, Member of at least one committee = 1, and Chairperson of a committee = 2.

reflects a medium level of professional involvement or activity. Furthermore, as reported in Table 4.15, when each of the nine items of Kramer's (1974) IOP is examined independently only two items had noteworthy level of professional

involvement or activity: D1 (M = 3.23, SD = 1.37) and D5 (M = 2.38, SD = 1.66). These findings indicate that airport managers were fairly active or involved with respect to (a) the number of professional courses they took and (b) their level of activity/membership in professional organizations. On the other hand, the lowest scored items for Airport Managers were D6 (M = 0.75, SD = 0.90) and D9 (M = 0.92, SD = 0.78). This indicates that airport managers had little activity in publishing research articles, books, etc. in the professional literature, and were not actively engaged in any professional activities within their employing organization.

Air traffic controllers (ATCs). As summarized in Table 4.1, the ATC subgroup had an overall mean score on the IOP of M = 12.8 (SD = 6.0), which reflects a low level of professional involvement or activity. Furthermore, as reported in Table 4.16, when each of the nine items of Kramer's (1974) IOP is examined independently only one item had a noteworthy level of professional involvement or activity: D1 (M = 2.86, SD = 1.36), which indicates that air traffic controllers were fairly active or involved with respect to the number of professional courses they took. On the other hand, the lowest scored items for the ATC subgroup were D8 (M = 0.86, SD = 0.88) and D9 (M = 0.86, SD = 0.73). Thus, similar to the AMT subgroup, air traffic controllers were neither actively involved in holding offices or leadership roles within professional organizations nor actively engaged in any professional activities within their employing organization.

Table 4.16

Item Analysis of Kramer's Index of Professionalism (IOP) for Air Traffic Controllers

Item[a]	Statement[b]	Possible Range[a]	*M*	*SD*
D1	Please enter the number of professional courses you have taken that are related to your profession.	0 to 4	2.86	1.36
D2	Please enter the number of professional journals you subscribe to that are related to your profession.	0 to 3	1.34	0.94
D3	Please enter the number of professional books you have purchased that are related to your profession.	0 to 3	1.55	1.09
D4	Please enter the approximate number of hours you spend per week engaged in professional reading related to your profession.	0 to 4	1.55	1.21
D5	Please describe the level of activity and membership in professional organizations related to your profession.	0 to 5	1.61	1.35
D6	Please enter the number of publications related to your profession that were published in the professional literature (e.g., research article, books, etc.).	0 to 2	1.09	0.88
D7	Please enter the number of professional speeches you have given related to your profession.	0 to 3	1.11	0.97
D8	Please identify your role with respect to offices held or leadership roles within professional organizations related to your profession.	0 to 3	0.86	0.88
D9	Please enter the extent of your professional activity within your employing organization.	0 to 2	0.86	0.73

Notes. $N = 44$. Kramer's (1974) Index of Professionalism (IOP) consists of nine items that measure professional behaviors (see below). The overall scores could range from 0 to 29, with higher scores signifying a higher level of professional involvement or activity. The overall mean was 12.8, which reflects a low level of professional involvement or activity.

[a]D1 was scored as None = 0, One = 1, Two = 2, Three = 3, and Four or more = 4. D2 was scored as None = 0, One = 1, Two to three = 2, and Four or more = 3. D3 was scored as None = 0, One to two = 1, Three to five = 2, and Six or more = 3. D4 was scored as None = 0, One to two = 1, Three to four = 2, Five to seven = 3, and Eight or more = 4. D5 was scored as None = 0, Member only = 1, Some activity once per year = 2, Two to five activities per year = 3, Six to 11 activities per year = 4, and Monthly or more = 5. D6 was scored as None = 0, One = 1, and Two or more = 2. D7 was scored as None = 0, One to two = 1, Three to four = 2, Five or more = 3. D8 was scored as None = 0, Member of committee = 1, Chairperson of committee = 2, and Officer in district or regional organization = 3. D9 was scored as None = 0, Member of at least one committee = 1, and Chairperson of a committee = 2.

Non-Pilot aviation employees (NPAE). As summarized in Table 4.1, the NPAE subgroup had an overall mean score on the IOP of $M = 14.6$ ($SD = 6.5$), which reflects a medium level of professional involvement or activity. As reported in Table 4.17, when each of the nine items of Kramer's (1974) IOP is examined

Table 4.17

Item Analysis of Kramer's Index of Professionalism (IOP) for Non-Pilot Aviation Employees

Item[a]	Statement[b]	Possible Range[a]	*M*	*SD*
D1	Please enter the number of professional courses you have taken that are related to your profession.	0 to 4	3.18	1.30
D2	Please enter the number of professional journals you subscribe to that are related to your profession.	0 to 3	1.52	1.09
D3	Please enter the number of professional books you have purchased that are related to your profession.	0 to 3	1.90	1.11
D4	Please enter the approximate number of hours you spend per week engaged in professional reading related to your profession.	0 to 4	1.89	1.19
D5	Please describe the level of activity and membership in professional organizations related to your profession.	0 to 5	1.99	1.44
D6	Please enter the number of publications related to your profession that were published in the professional literature (e.g., research article, books, etc.).	0 to 2	1.00	0.89
D7	Please enter the number of professional speeches you have given related to your profession.	0 to 3	1.34	1.19
D8	Please identify your role with respect to offices held or leadership roles within professional organizations related to your profession.	0 to 3	0.95	0.95
D9	Please enter the extent of your professional activity within your employing organization.	0 to 2	0.88	0.76

Notes. N = 199. Kramer's (1974) Index of Professionalism (IOP) consists of nine items that measure professional behaviors. The overall scores could range from 0 to 29, with higher scores signifying a higher level of professional involvement. The overall mean was 14.7, which reflects a medium level of professional involvement or activity.

[a]D1 was scored as None = 0, One = 1, Two = 2, Three = 3, and Four or more = 4. D2 was scored as None = 0, One = 1, Two to three = 2, and Four or more = 3. D3 was scored as None = 0, One to two = 1, Three to five = 2, and Six or more = 3. D4 was scored as None = 0, One to two = 1, Three to four = 2, Five to seven = 3, and Eight or more = 4. D5 was scored as None = 0, Member only = 1, Some activity once per year = 2, Two to five activities per year = 3, Six to 11 activities per year = 4, and Monthly or more = 5. D6 was scored as None = 0, One = 1, and Two or more = 2. D7 was scored as None = 0, One to two = 1, Three to four = 2, Five or more = 3. D8 was scored as None = 0, Member of committee = 1, Chairperson of committee = 2, and Officer in district or regional organization = 3. D9 was scored as None = 0, Member of at least one committee = 1, and Chairperson of a committee = 2.

independently, only two items had noteworthy level of professional involvement or activity: D1 (*M* = 3.18, *SD* = 1.30) and D5 (*M* = 1.99, *SD* = 1.44). These findings indicate that the NPAE subgroup participants were fairly active or involved with

respect to (a) the number of professional courses they took and (b) their level of activity/membership in professional organizations. On the other hand, the lowest scored items for the NPAE subgroup were D8 (M = 0.95, SD = 0.95) and D9 (M = 0.88, SD = 0.76). Thus, similar to both the AMT and ATC subgroups, non-pilot aviation employees were neither actively involved in holding offices or leadership roles within professional organizations nor actively engaged in any professional activities within their employing organization.

Pilots. As summarized in Table 4.1, the Pilots subgroup had an overall mean score on the IOP of M = 16.1 (SD = 5.9), which reflects a medium level of professional involvement or activity. The reader should note that the Pilots subgroup had the highest mean among the five subgroups with respect to IOP scores. Furthermore, as reported in Table 4.18, when each of the nine items of Kramer's (1974) IOP is examined independently several items had noteworthy level of professional involvement or activity. These included Items D1 (M = 3.47, SD = 1.18), D3 (M = 2.44, SD = 0.87), D4 (M = 2.07, SD = 1.14), and D5 (M = 2.45, SD = 1.54). As a result, pilots were fairly active or involved relative to: (a) the number of professional courses they took, (b) the number of professional books they purchased, (c) the number of hours per week they spent engaged in professional reading, and (d) their activity/membership in professional organizations. On the other hand, the lowest scored items for the Pilots subgroup were D8 (M = 0.81, SD = 0.96) and D9 (M = 0.72, SD = 0.74). Thus, similar

Table 4.18

Item Analysis of Kramer's Index of Professionalism (IOP) for Pilots

Item[a]	Statement[b]	Possible Range[a]	*M*	*SD*
D1	Please enter the number of professional courses you have taken that are related to your profession.	0 to 4	3.47	1.18
D2	Please enter the number of professional journals you subscribe to that are related to your profession.	0 to 3	1.81	1.04
D3	Please enter the number of professional books you have purchased that are related to your profession.	0 to 3	2.44	0.87
D4	Please enter the approximate number of hours you spend per week engaged in professional reading related to your profession.	0 to 4	2.07	1.14
D5	Please describe the level of activity and membership in professional organizations related to your profession.	0 to 5	2.45	1.54
D6	Please enter the number of publications related to your profession that were published in the professional literature (e.g., research article, books, etc.).	0 to 2	0.95	0.93
D7	Please enter the number of professional speeches you have given related to your profession.	0 to 3	1.38	1.2
D8	Please identify your role with respect to offices held or leadership roles within professional organizations related to your profession.	0 to 3	0.81	0.96
D9	Please enter the extent of your professional activity within your employing organization.	0 to 2	0.72	0.74

Notes. N = 287. Kramer's (1974) Index of Professionalism (IOP) consists of nine items that measure professional behaviors. The overall scores could range from 0 to 29, with higher scores signifying a higher level of professional involvement. The overall mean was 16.1, which reflects a medium level of professional involvement or activity.

[a]D1 was scored as None = 0, One = 1, Two = 2, Three = 3, and Four or more = 4. D2 was scored as None = 0, One = 1, Two to three = 2, and Four or more = 3. D3 was scored as None = 0, One to two = 1, Three to five = 2, and Six or more = 3. D4 was scored as None = 0, One to two = 1, Three to four = 2, Five to seven = 3, and Eight or more = 4. D5 was scored as None = 0, Member only = 1, Some activity once per year = 2, Two to five activities per year = 3, Six to 11 activities per year = 4, and Monthly or more = 5. D6 was scored as None = 0, One = 1, and Two or more = 2. D7 was scored as None = 0, One to two = 1, Three to four = 2, Five or more = 3. D8 was scored as None = 0, Member of committee = 1, Chairperson of committee = 2, and Officer in district or regional organization = 3. D8 was scored as None = 0, Member of at least one committee = 1, and Chairperson of a committee = 2.

to the AMT, ATC, and NPAE subgroups, pilots were neither actively involved in holding offices or leadership roles within professional organizations nor actively engaged in any professional activities within their employing organization.

In summary:

- The highest scored item for all five subgroups was Item D1, which was related to the number of professional courses taken. The AMT subgroup reported having taken the most number of professional courses, which was at least three but closer to four.
- The AMT and Pilots subgroups scored highest on Items D2 and D3, which focused on the number of professional journal subscriptions and book purchases. Both subgroups subscribed to two to three journals and purchased three to five books related to their respective professions.
- The Airport Managers and Pilots subgroups scored highest on Item D5, which was related to activity/membership in professional organizations. Both subgroups had between two and five activities/memberships in professional organizations related to their respective professions.
- The lowest scored item for all five subgroups was Item D9, which measured participants' level of professional activity within their employing organization. Furthermore, except for Airport Managers, the other four subgroups also scored lowest on D8, which involved activity with respect to offices held or leadership roles within professional organizations. The Airport Managers subgroup, however, scored lowest on D6, which involved the number of publications published in the professional literature. More concretely, all subgroups' participants'

professional activity within their employing organization did not extend further than one committee membership, and none of the subgroups' participants held any offices or leadership roles within their professional organization other than being a member of a committee.

- Among the five subgroups, AMTs, Airport Managers, and Pilots were most closely aligned with each other's mean responses to all nine items, and scored the highest in HPI scores as well as IOP scores.
- Among the five subgroups, Pilots (N = 287) had the highest overall mean IOP score (M = 16.1, SD = 5.9), and Air Traffic Controllers (N = 44) had the lowest mean IOP score (M = 12.8, SD = 6.0).

Inferential Statistics

Overview. The purpose of the current study was to conduct a secondary analysis of Alhallaf's (2016) data. Unlike Alhallaf who identified specific factors that were related to the concept of professionalism across the aviation profession from an aggregate perspective, the current study disaggregated Alhallaf's data and examined factors associated with the concept of professionalism across five subgroups within the aviation profession: Aircraft Maintenance Technicians (AMTs), Airport Managers, Air Traffic Controllers (ATCs), Non-Pilot Aviation Employees (NPAEs), and Pilots. The reader is reminded that the NPAE subgroup included the business segment of aviation (sales, finance, and management), flight operations (safety, security, flight attendants, dispatchers, and IT personnel), and

college/university faculty participants. As a result, this subgroup was relatively less homogeneous than the other subgroups.

The analyses were conducted from both within- and between-groups perspectives. I also examined the same research factors that Alhallaf targeted and partitioned these factors into three functional sets: (a) demographics, (b) aviation experience, and (c) professional activity/involvement. A summary of these sets of variables was provided in Chapter 3, Table 3.10. The reader is reminded that independent of these sets the current study also assessed participants' perceived understanding of the concept of professionalism relative to each subgroup, and that this discussion was presented in the descriptive statistics section of this chapter.

The current study involved two different statistical procedures: hierarchical multiple regression and analysis of variance (ANOVA). The purpose of the former was to determine the corresponding aggregate R^2 and incremental R^2 (i.e., sR^2) values to identify the amount of variance in the degree of professionalism scores that was being explained by the targeted variables. This information also was used to predict participants' degree of professionalism relative to the targeted variables. The purpose of the latter was to make pairwise comparisons between subgroups with respect to HPI scores in order to determine the difference in level of professionalism across the five subgroups. In summary, hierarchical multiple regression was employed to answer the Research Question 1, and ANOVA was employed to answer Research Question 2.

Preliminary analyses. Prior to primary analyses and examining the hypothesized relationships, I performed several preliminary data screening activities to prepare the data set for primary analysis. These activities included (a) modifying Alhallaf's (2016) initial archival data set so that it was in a form conducive for analysis to be conducted on a per subgroup basis rather than an aggregate basis independent of subgroups, (b) conducting a missing data analysis, (c) performing an outlier analysis, (d) checking for multicollinearity, and (e) confirming that the data set was compliant with the assumptions of ordinary least squares regression. Following is a summary of these activities.

Data set modifications. Alhallaf (2016) initially made several modifications to the raw data set. These included changing the variables to be of the correct data type, coding nominal variables, and deleting various unneeded data, which included participants' response IDs, IP addresses, timestamps, device data, sequence numbers, external references, and email addresses. The modifications I made to Alhallaf's data set mostly focused on disaggregating the data relative to the five subgroups listed above and preparing variables based on the data that were available. A discussion about how the subgroups were formed and how the variables were coded and organized is presented in Chapter 2 and Chapter 3, respectively, and the reader is directed to these chapters for specific details. For the convenience of the reader, though, a short summary is provided here.

Subgroup formation. The formation of the five subgroups was guided by three key factors. The first factor was data-driven and consisted of participants' responses to the background section of Alhallaf's (2016) questionnaire. As part of this section Alhallaf asked participants to self-report their employment status, field or position of employment, the aviation segment they worked in, and their work setting or employer. These data were examined from a content analysis perspective, which led to the emergence of 12 major factions within the aviation industry. The second factor was theory-driven and was based on Edwards' (1981) SHELL model. Edwards' initial model represented the interactions among four different components of human factors: Software, Hardware, Environment, and Liveware. Hawkins (1987) modified this conceptual model by including a second Liveware component to represent the person as a central entity. As noted in Chapter 2, this second Liveware component introduced a Liveware-Liveware interaction, which involves the interrelationships among individuals within and between groups, including the flight crew (pilots), airport managers, air traffic controllers, maintenance personnel, operations personnel, instructors/students, ground crew, engineers/designers, and managers/supervisors. Thus, safe and successful operations in aviation require harmony among these interrelationships, which infers similar or complementing levels of professionalism among these subgroups. The last factor was personal experience-driven. I applied my 2 decades of personal industrial

experience within the aviation profession to the results from the first two factors to determine the final five subgroups.

Variable preparations. Because the purpose of the current study focused on subgroups, the following changes were made to Alhallaf's (2016) variables relative to this focus:

- I formed the Aviation Experience set that comprised Alhallaf's (2016) Years of Experience (Item E5), Number of FAA ratings (Item E7 and applicable to the Pilots subgroup), and Total Flight Hours (Item E7 and applicable to the Pilots subgroup).
- I reduced Alhallaf's (2016) initial five levels of marital status to a dichotomous variable that compared married vs. not married, where the latter group included single, divorced, separated, and widowed.
- I reduced Alhallaf's (2016) initial six levels of race/ethnicity to a dichotomous variable that compared White Caucasian vs. non-White Caucasian, where the latter group included African American, Hispanic, Asian American, and Other.
- I incorporated "Years of Experience" into the "Aviation Experience" set, where Alhallaf (2016) included it as a demographic variable.
- I reduced Alhallaf's (2016) initial nine income levels to four: (a) less than $50K, (b) $50K to less than $100K, (c) $100K to $150K, and (d) more than $150K.

- I reduced Alhallaf's (2016) initial five levels of education to three: (a) less than a 4-year degree, which included high school and 2-year degree holders; (b) 4-year degree; and (c) graduate degree, which included master's and doctoral degrees.

As a result of forming the five subgroups with complete cases, the final overall data set of the current study was reduced to $N = 674$ cases from Alhallaf's (2016) initial set of N=1,100. I acknowledged these modifications as delimitations and recommendations for future research in Chapter 5. By comparison, the reader should note that Alhallaf's reduced data set consisted of $N = 661$ cases.

Missing data. The absence of data can occur when participants forget or choose not to respond to an item. Working with the modified data set of $N = 674$ cases, I followed Cohen et al.'s (2003) guidelines to treat missing data as information. This involved: (a) creating a data-missing variable for each IV that had missing data, (b) coding this new variable 1 if data were absent on the initial IV and 0 if data were present, and (c) running a bivariate regression analysis to determine if the data-missing variable was significant. If the result was not significant, then the data were deemed as missing randomly; otherwise, the data were missing systematically. All independent variables with missing data per subgroup had data missing randomly and not systematically. Furthermore, across the subgroups the percentage of missing data varied between 4% and 21%, which were within Cohen et al.'s (2003) guidelines. As a result, I plugged the missing

data with the corresponding means. A summary of the missing data resolution for each subgroup is provided in Tables 4.19–4.23.

Table 4.19

Summary of Missing Data Resolution (Aircraft Maintenance Technicians)

IV[a]	Variable Type	*N* Missing (%)	Resolution
X_1 = Gender	Nominal	4 (5.8%)	Plugged with means
X_2 = Marital status	Nominal	4 (5.8%)	Plugged with means
X_3 = Age	Continuous	6 (8.8%)	Plugged with mean (M = 46.0)
X_4 = Race/Ethnicity	Nominal	6 (8.8%)	Plugged with means
X_{5a}, X_{5b}, X_{5c} = Annual income	Nominal	6 (8.8%)	Plugged with means
X_{6a}, X_{6b} = Educationl level	Nominal	8 (11.8%)	Plugged with means
X_7 = Years of experience	Continuous	11 (16.2%)	Plugged with mean (M = 23.7)

Note. N = 68.

Table 4.20

Summary of Missing Data Resolution (Airport Managers)

IV[a]	Variable Type	*N* Missing (%)	Resolution
X_1 = Gender	Nominal	2 (2.6%)	Plugged with means
X_2 = Marital status	Nominal	2 (2.6%)	Plugged with means
X_3 = Age	Continuous	3 (4.0%)	Plugged with mean (M = 40.2)
X_{5a}, X_{5b}, X_{5c} = Annual income	Nominal	4 (5.2%)	Plugged with means
X_{6a}, X_{6b} = Educationl level	Nominal	3 (4.0%)	Plugged with means
X_7 = Years of experience	Continuous	10 (13.0%)	Plugged with mean (M = 15.1)

Note. N = 76.

Table 4.21

Summary of Missing Data Resolution (Air Traffic Controllers)

IV[a]	Variable Type	*N* Missing (%)	Resolution
X_4 = Race/Ethnicity	Nominal	4 (9.1%)	Plugged with means
X_{6a}, X_{6b} = Educationl level	Nominal	8 (18.2%)	Plugged with means
X_7 = Years of experience	Continuous	1 (2.2%)	Plugged with mean (M = 21.9)

Note. N = 44.

Table 4.22

Summary of Missing Data Resolution (Non-Pilot Aviation Employees)

IV[a]	Variable Type	*N* Missing (%)	Resolution
X_1 = Gender	Nominal	2 (1.0%)	Plugged with means
X_2 = Marital status	Nominal	2 (1.0%)	Plugged with means
X_3 = Age	Continuous	9 (4.5%)	Plugged with mean (M = 42.0)
X_4 = Race/Ethnicity	Nominal	14 (7.0%)	Plugged with means
X_{5a}, X_{5b}, X_{5c} = Annual income	Nominal	10 (5.0%)	Plugged with means
X_{6a}, X_{6b} = Educationl level	Nominal	11 (5.5%)	Plugged with means
X_7 = Years of experience	Continuous	22 (11.0%)	Plugged with mean (M = 17.6)

Note. N = 199.

Table 4.23

Summary of Missing Data Resolution (Pilots)

IV[a]	Variable Type	*N* Missing (%)	Resolution
X_1 = Gender	Nominal	11 (3.8%)	Plugged with means
X_2 = Marital status	Nominal	11 (3.8%)	Plugged with means
X_3 = Age	Continuous	18 (6.3%)	Plugged with mean (M = 43.5)
X_4 = Race/Ethnicity	Nominal	16 (5.6%)	Plugged with means
X_{5a}, X_{5b}, X_{5c} = Annual income	Nominal	23 (8.0%)	Plugged with means
X_{6a}, X_{6b} = Educationl level	Nominal	21 (7.3%)	Plugged with means
X_7 = Years of experience	Continuous	41 (14.3%)	Plugged with mean (M = 22.2)
X_9 = Total flight hours	Continuous	60 (20.9%)	Plugged with mean (M = 7578.0)

Note. N = 287.

Outlier analysis. Outliers are extreme observations that lie at an unusual distance with respect to the data points in a sample. They can be a function of either rare cases or contaminants. For example, a rare case would be a Part 121 pilot with 45,000 hours as pilot-in-command, and a contaminant would be a participant who reported his age as 25 but listed 23.7 years as experience in the aviation profession. Outliers may affect the results of a study and lead to false interpretations of the results. Therefore, it is prudent to conduct an outlier analysis. The contaminated and

rare cases should carefully be analyzed to avoid unrealistic reflection of the results. With that in mind, I conducted an outlier analysis using Jackknife distances per each subgroup. Following is a summary of the results of these analyses.

Aircraft maintenance technicians (AMTs). I detected three outliers with the AMT subgroup. I examined each case independently to determine if it was a rare case or a contaminant. I determined that all three cases were rare, and the outliers were reflective of age and years of experience. For example, one participant was a 58-year-old female with 38 years of experience. I then ran two simultaneous regression analyses: one in the presence and one in the absence of these outliers, and there was little difference in the results. Because it yielded a stronger model to delete the outliers, I continued with outliers absent in the model. For the ANOVA omnibus (Research Question 2), three different outliers were detected and removed.

Airport managers. I detected five outliers with the Airport Managers subgroup. I examined each case independently to determine if it was a rare case or a contaminant. I determined that all five cases were rare, and the outliers were reflective of age and years of experience. For example, one participant was a 68-year-old male with 2 years of experience as an airport manager. I then ran two simultaneous regression analyses: one in the presence and absence of these outliers, and there was little difference in the results. Because it yielded a stronger model to delete the outliers, I continued with outliers absent in the model. For the ANOVA omnibus (Research Question 2), one different outlier was detected and removed.

Air traffic controllers (ATCs). I detected zero outliers with the ATC subgroup. Therefore, no action was required. For the ANOVA omnibus (Research Question 2), two outliers were detected and removed.

Non-pilot aviation employees (NPAE). I detected 16 outliers with the NPAE subgroup. I examined each case independently to determine if it was a rare case or a contaminant. Of the 16 cases flagged, most were rare case, but there also were a few contaminants. For example, with respect to a rare case, one participant was a 68-year-old male with 50 years of experience in the aviation profession. Another rare case was a participant who had a high HPI score. With respect to contaminants, one case consisted of a 3-year-old female with 9 years of experience in the aviation profession. I then ran two simultaneous regression analyses: one in the presence and one in the absence of these outliers. Because the regression analyses in the absence of outliers yielded a stronger model, I deleted the outliers and continued with outliers absent in the model. For the ANOVA omnibus (Research Question 2), seven new outliers were detected and removed.

Pilots. I detected 13 outliers with the Pilots subgroup, and all 13 outliers were determined to be rare cases related to flight time and years of experience. For example, one participant had 750 flight hours with 23 years of experience whereas someone with 22 years of experience had 30,000 flight hours. Another rare case was an 82-year-old male pilot with 60 years of experience and 26,000 flight hours. Because the regression analyses in the absence of outliers yielded no difference in

results, I kept the outliers and continued with the outliers present in the model. For the ANOVA omnibus (Research Question 2), five new outliers were detected and removed.

Multicollinearity. To check for the presence of multicollinearity I examined the variance inflation factors (*VIFs*) for each of the IVs per subgroup. *VIFs* provide an index of the amount that the variance of each regression coefficient is increased relative to a situation in which all the IVs are uncorrelated. For example, a $VIF = 9$ means standard error would be three times that compared to the standard error if the variables were not correlated. Thus, such high *VIF*s indicate that the IVs have strong relationships with each other and the results can be difficult to interpret or are even useless. Furthermore, the stronger the correlation, the less unique contribution an IV can make in explaining the variance in the DV. With that in mind, I carefully analyzed the data set per each subgroup. The results of my analysis indicated high multicollinearity ($VIF \approx 6$) between X_3 = Age and X_7 = Years of Experience for the AMT, ATC, and Pilots subgroups. As a result, I eliminated X_3 = Age from all aforementioned subgroups and continued with the analysis in the absence of this variable in the data set. I opted to eliminate age because the focus of the study was investigating factors that affect professionalism and years of experience is a better reflection of professionalism in aviation than age. Furthermore, "total years of experience" was ranked the highest perception of the empirical perspective of professionalism for the five subgroups (see Table 4.13).

Regression assumptions. According to Cohen et al. (2003), there are six underlying assumptions that must be met to ensure proper evaluation of the relationship involving the independent variables and the dependent measure when using a multiple regression strategy. If any of the six regression assumptions are violated, all of the statistical estimates might be incorrect. Further discussion of these assumptions and the techniques used to confirm their compliance follows.

Linearity. This assumption examines the linear relationship between the DV and IVs, because it is necessary to determine whether the form of the relationship between the variables is correct. It must be linear and the linearity assumption must be met from a multivariate perspective. Otherwise, there would be violations to this assumption resulting in biased estimates of the regression coefficients and standard errors. This can lead to incorrect significance tests and incorrect confidence intervals. For this purpose, I conducted a residual analysis for each subgroup in which the residuals were plotted against the predicted values. This plot yielded no discernable pattern for each of the five subgroups. I then confirmed this by examining the Kernel smoother line against the linear fit (i.e., zero line). A problematic situation was not observed with respect to any subgroup because the Kernel smoother line followed the trend of the zero line to the point where the two lines were nearly coincidental. As a result, the data sets were compliant with the multivariate linearity assumption for each subgroup.

Correct specification of the IVs. This assumption refers to whether or not the independent variables included in the model truly belong in the model. This second regression assumption examines the relevance and appropriateness of the IVs so there would not be any misinterpretation of the results. Given the nature of the current study, I relied on theory, past literature including Alhallaf's (2016) study, and my personal industrial experience of 2 decades coupled with my major advisor's knowledge and experience to help guide which variables to target. Nevertheless, it is still possible that (a) not all the appropriate factors were targeted or (b) of those factors that were targeted, some might not have been appropriate. Because due diligence was performed for the former, the focus was now on the latter. If some of the targeted factors did not belong in the model, then their presence could lead to incorrect estimates of the regression coefficients, significance tests, and confidence intervals. With this in mind, I attempted to determine the correct specification of the IVs per each subgroup by examining the respective leverage plots of the targeted factors. With the help of these plots, I examined the relationship between the residuals of the dependent variable (i.e., what remains after all of the IVs' collective contribution to the DV has been accounted for except for the IV under discussion) and the residuals of the targeted IV (i.e., what remains after all of the other factors' collective relationship with the IV under discussion has been accounted for).

Although the leverage plots revealed different results for each subgroup, there also was some consistency across the subgroups. A brief summary follows:

- X_1 = Gender (Female vs. Male) was incorrectly specified for all the subgroups except for the Pilot subgroup.
- X_2 = Marital status (Married vs. Not Married) was incorrectly specified for all five subgroups.
- X_3 = Age was incorrectly specified for only the NPAE subgroup.
- X_4 = Race/Ethnicity (White Caucasian vs. nonWhite Caucasian) was incorrectly specified for the AMT, ATC, and Pilot subgroups.
- X_5 = Annual income was incorrectly specified across all five subgroups, but the level of comparisons was different. For example: (a) In the AMT subgroup the comparisons of X_{5a} = less than \$50K vs. (\$50K to less than \$100K) and X_{5c} = more than \$150K vs. (\$50K to less than \$100K were incorrectly specified. (b) In the Airport Managers subgroup, the comparisons of X_{5b} = \$100K–\$150K vs. (\$50K to less than \$100K) and X_{5c} = more than \$150K vs. (\$50K to less than \$100K) were incorrectly specified. (c) In the ATC subgroup, all annual income comparisons were incorrectly specified. (d) In the NPAE subgroup the comparisons of X_{5a} = less than \$50K vs. (\$50K to less than \$100K) and X_{5b} = \$100K–\$150K vs. (\$50K to less than \$100K) were incorrectly specified. (e) In the Pilot subgroup, the comparisons of X_{5b} = \$100K–\$150K vs. (\$50K to less than

$100K) and X_{5c} = more than $150K vs. ($50K to less than $100K were incorrectly specified.

- X_6 = Education level was incorrectly specified for the AMT, Airport Managers, and Pilot subgroups, and the comparison of X_{6a} = less than a 4-year degree vs. 4-year degree was incorrectly specified for NPAE.
- X_7 = Years of experience was incorrectly specified for the AMT, Airport Managers, ATC, and Pilot subgroups.
- X_8 = Number of FAA ratings, which was applicable only to the Pilots subgroup, was incorrectly specified.

In each case, the respective leverage plots showed that these variables had a zero or near-zero relationship with the dependent measure of level of professionalism. As a result, I eliminated these variables from the respective subgroup data sets and did not include them in the primary analyses.

Perfect reliability. This assumption, also known as the measurement error specification, focuses on the reliability of the instruments used to measure each of the IVs. Furthermore, it is also related to the first assumption, which states that each IV in the regression equation is measured without error. Measurement error can easily be detected with a measure of reliability. If undetected then the measurement error commonly leads to bias in the estimate of the regression coefficients and their standard errors as well as incorrect significance tests and confidence intervals. According Cohen et al. (2003), in cross-sectional studies the

most commonly used measure of reliability (internal consistency) is coefficient alpha (Cronbach, 1951). Furthermore, Cohen et al. (2003) posited that a reliability coefficient greater than .70 is acceptable in practice. As the reader might recall, the only IV that involved a measuring instrument was Kramer's (1974) Index of Professionalism Inventory (IOP), which was related to X_{10} = IOP scores. (*Note.* Snizek's (1972) Hall's Professionalism Inventory (HPI) was used for the DV.) As discussed in Chapter 3 and summarized in Table 3.9 of the current study, the IOP per subgroup had the following Cronbach alpha's: $\alpha = .72$ (AMT), $\alpha = .79$ (Airport Managers), $\alpha = .81$ (ATC), $\alpha = .83$ (NPAE), and $\alpha = .76$ (Pilots). Based on these results, the reliability coefficients of the IOP were higher than Cohen et al.'s threshold of .70. Therefore, the data sets were compliant with the perfect reliability assumption.

Homoscedasticity of residuals. This assumption states that the variance of the dependent measure is the same for any specific observation of an independent variable. In other words, for any value of the independent variable *X*, the variance of the residuals around the regression line in the population is assumed to be constant. In the multiple IV case, the variance of the residuals should not be related to any of the IVs or to the predicted values. A problematic situation would occur if the variance changes as the value of *X* changes, then this would be a condition known as heteroscedasticity, which would be a violation of this assumption. In the multiple IV case, the variance of the residuals should not be related to any of the IVs or to the

predicted values. If this assumption is violated, the statistics from the regression analysis will be incorrect. I examined this assumption by using the same residual analysis (i.e., the residual vs. predicted plot) I applied to the linearity assumption for each subgroup and did not observe a problematic situation. Each plot showed no detection of a systematic trend per subgroup. This was confirmed by Kernel smoother line as discussed earlier. As a result, the homoscedasticity of the residuals assumption was met per each subgroup. Compliance with this assumption also satisfied the equal variances assumption of ANOVA, which was the statistical strategy relative to Research Question 2.

Independence of residuals. In addition to the constant variance of residuals, the residuals must also be independent of one another. This occurs when there is no relationship between the residuals for any subset of the cases in an analysis. This assumption is met if a sample is randomly selected from a population. If the residuals are not independent of each other, which can occur when data are clustered, then the significance tests and standard errors in the regression analysis will be incorrect. Independence of the residuals can be confirmed by examining a plot of the residuals versus the case numbers. In order to detect whether there was a problem with this assumption, the residuals were plotted against the case numbers per subgroup, and no distinct pattern was observed in these plots. This was further confirmed when I applied the Kernel density smoothing to both the linear fit and mean lines, respectively. Therefore, the respective data sets of each subgroup were compliant

with this assumption. Compliance with this assumption also satisfies the independence of samples assumption of ANOVA, which was the statistical strategy relative to Research Question 2.

Normality of residuals. The last regression assumption tested was normality of the residuals. This assumption states that for any value of the IV, the residuals around the regression line are assumed to have a normal distribution. This assumption makes it possible to evaluate the statistical significance of the relationship between *X* and *Y* as reflected by the regression line. Violations of this assumption might affect significance tests and confidence intervals. The normality assumption may be confirmed in one of two ways: (a) by plotting a histogram of the residuals and then superimposing a normal curve on the histogram or (b) by examining a normal *q-q* plot of the residuals at a 95% confidence interval. A visual inspection of both of these plots showed an approximately normal distribution for each subgroup, with the majority of the residuals "hugging" the normal line and falling within the 95% confidence band associated with each *q-q* plot. Nearly all of the data coincided with the line, and all of the data were enclosed within the confidence band. As a result, the normality assumption was satisfied for each subgroup. Compliance with this assumption also satisfies the normality assumption of ANOVA, which was the statistical strategy relative to Research Question 2. This assumption in ANOVA states that the populations from which the samples are selected must be normal (Gravetter & Wallnau, 2013).

Summary of preliminary analyses. As the reader might recall, after forming the five subgroups with complete cases, the final overall data set of the current study was reduced to $N = 674$ cases, which were extracted from Alhallaf's (2016) initial data set of N=1,100. As a result of the preliminary data screening presented in this section, each subgroup's initial data set was modified relative to sample size and number of variables per subgroup. Following is a summary of the results of these analyses. The reader also is directed to Table 4.24.

Aircraft maintenance technicians (AMTs). The initial sample size for the AMT subgroup was $N = 68$, but this was reduced to $N = 65$ after removing three rare case outliers. With respect to the number of variables for the AMT subgroup,

Table 4.24

Summary of Remaining IVs After Preliminary Analyses by Subgroup

	Remaining IVs[b]												
	Set A[c]									Set B[c]			Set C[c]
Subgroup[a]	X_1	X_2	X_3	X_4	X_{5a}	X_{5b}	X_{5c}	X_{6a}	X_{6b}	X_7	X_8	X_9	X_{10}
AMT						x					na	na	x
Airport			x	x	x						na	na	x
ATC								x	x		na	na	x
NPAE				x			x		x	x	na	na	x
Pilot	x				x							x	x

Note. All cells marked with "x" indicate the corresponding variables were correctly specified, which were confirmed by leverage plots. All empty cells reflect those IVs that were incorrectly specified via leverage plots and therefore were not included in primary analyses. Cells marked with "na" indicate that the corresponding IVs were not applicable to the respective sugbroups.

[a]AMT = Aircraft Maintenance Technicians ($N = 65$). Airport = Airport Managers ($N = 71$). ATC = Air Traffic Controllers ($N = 44$). NPAE = Non-Pilot Aviation Employees ($N = 183$). Pilot ($N = 287$). [b]X_1 = Gender (Female vs. Male). X_2 = Marital status (Not Married vs. Married). X_3 = Age. X_4 = Race/Ethnicity (nonWhite Caucasian vs. White/Caucasian). X_{5a} = Under \$50K vs. \$50K to less than \$100K annual income. X_{5b} = \$100K to \$150K vs. \$50K to less than \$100K annual income. X_{5c} = More than \$150K vs. \$50K to less than \$100K annual income. X_{6a} = Less than 4-year degree vs. 4-year degree education level. X_{6b} = Graduate degree vs. 4-year degree education level. X_7 = Years of experience. X_8 = Number of FAA ratings (Pilot subgroup only). X_9 = Total flight hours (Pilot subgroup only). X_{10} = IOP scores. [c]Set A = Demographics, Set B = Aviation Experience, and Set C = Professional Activitiy/Involvement.

of the 11 independent variables that comprised the initial data set (see Table 3.10), when modifications to the data set and the elimination of variables based on the preliminary data screening were applied, the data set was reduced to two IVs as indicated in Table 4.24. Thus, the sample size of the final data set that was used for the AMT subgroup to test the study's hypotheses consisted of $N = 65$ and involved only X_{5a} = less than \$50K vs. (\$50K to less than \$100K) and X_{10} = IOP scores.

Airport managers. The initial sample size for the Airport Managers subgroup was $N = 76$, but this was reduced to $N = 71$ after removing five rare case outliers. With respect to the number of variables for this subgroup, of the 11 independent variables that comprised the initial data set (see Table 3.10), when the modifications to the data set and the elimination of variables based on the preliminary data screening were applied, the data set was reduced to four IVs as indicated in Table 4.24. Thus, the sample size of the final data set that was used for the Airport Managers subgroup to test the study's hypotheses consisted of $N = 71$ and involved four IVs: X_3 = Age, X_4 = Race/Ethnicity, X_{5a} = less than \$50K vs. (\$50K to less than \$100K), and X_{10} = IOP scores.

Air traffic controllers (ATCs). The initial sample size for the ATC subgroup was $N = 44$ and no cases were detected as a result of the outlier analysis. With respect to the number of variables for this subgroup, of the 11 independent variables that comprised the initial data set (see Table 3.10), when the modifications to the data set and the elimination of variables based on the preliminary data screening

were applied, the data set was reduced to three IVs as indicated in Table 4.24. Thus, the sample size of the final data set that was used for the ATC subgroup to test the study's hypotheses consisted of $N = 44$ and involved three IVs: X_{6a} = less than 4-year degree vs. 4-year degree, X_{6b} = graduate degree vs. 4-year degree, and X_{10} = IOP scores.

Non-pilot aviation employees (NPAE). The initial sample size for the NPAE subgroup was $N = 199$, but this was reduced to the $N = 183$ after detecting 16 cases that were either rare case outliers or contaminants. With respect to the number of variables per this subgroup, of the 11 independent variables that comprised the initial data set (see Table 3.10), when the modifications to the data set and the elimination of variables based on the preliminary data screening were applied, the data set was reduced to five IVs as indicated in Table 4.24. Thus, the sample size of the final data set that was used for the NPAE subgroup to test the study's hypotheses consisted of $N = 183$ and involved five IVs: X_4 = Race/Ethnicity, X_{5c} = more than \$150K vs. (\$50K to less than \$100K), X_{6b} = graduate degree vs. 4-year degree, X_7 = Years of experience, and X_{10} = IOP scores.

Pilots. The initial sample size of the Pilots subgroup was $N = 287$. Although there were 13 rare case outliers, I retained the outliers because they had no impact on the results. With respect to the number of variables for this subgroup, of the 13 independent variables that comprised the initial data set (see Table 3.10), when the modifications to the data set and the elimination of variables based on the

preliminary data screening were applied, the data set was reduced to four IVs as indicated in Table 4.24. Thus, the sample size of the final data set that was used for the Pilots subgroup to test the study's hypotheses consisted of $N = 287$ and involved four IVs: X_1 = Gender, X_{5a} = less than \$50K vs. (\$50K to less than \$100K), X_9 = Total flight hours, and X_{10} = IOP scores.

Primary analysis 1: Hierarchical multiple regression. Following Cohen et al.'s (2003) guidelines, a hierarchical regression analysis was performed in which the dependent variable, participants' level of professionalism (defined by their HPI scores) per subgroup was regressed on the targeted sets of independent variables using the set entry order A-B-C, where Set A = Demographics, Set B = Aviation Experience, and Set C = Professional Activity and Involvement. Tables 4.25–4.29 contain a summary of the results of this analysis for each subgroup. A discussion of the unique contribution each set made in the presence of the other sets and the results of any corresponding follow-up analyses with respect to each subgroup is provided next.

Aircraft maintenance technicians (AMT). As reported in Table 4.25, one variable represented Set A = Demographics (X_{5b}), no variables represented Set B = Aviation Experience, and one variable represented Set C = Professional Activity and Involvement (X_{10}). A brief explanation of the results follows.

Set A = Demographics. When HPI scores were regressed on X_{5b} = the comparison in annual income between (\$100K to less than \$150K) vs. (\$50K to

Table 4.25

Summary of Results from Hierarchical Regression for the Aircraft Maintenance Technicians (AMT) Subgroup

	Participants' Demographics and Professional Activity/Involvement		
		Model 2[c]	
Factor[a]	**Model 1 *B*[b]**	***B***	**95% CI**
Constant	82.80***	72.33***	[66.1, 78.56]
X_{5b}	5.30	6.57*	[0.87, 12.27]
X_{10}		0.68***	[0.30, 1.06]
Statistical Results			
R^2	.04	.21	
F	2.95	8.13***	
ΔR^2		.17	
ΔF		14.00***	

Note. $N = 65$. Set entry order was A-C.
[a]X_{5b} = \$100K to \$150K vs. \$50K to \$100K annual income and X_{10} = IOP scores.
[b]Model 1 corresponds to Y = HPI scores regressed on Set A = Demographics.
[c]Model 2 corresponds to Y = HPI scores regressed on Set C = Professional Activity/Involvement in the presence of Set A.
*$p < .05$. **$p < .01$. ***$p < .001$.

less than \$100K), the contribution this factor made in explaining the variance in professionalism scores was not significant, $R^2 = .04$, $F(1, 63) = 2.95$, $p = .0906$. Although AMT participants whose annual income was between \$100K but less than \$150K averaged 5.3 point higher on the HPI than AMT participants whose annual incomes was between \$50K and less than \$100K, this 5.3-point difference was not statistically significant. Thus, annual income had no significant effect on level of professionalism for the AMT subgroup.

Set C = Professional Activity/Involvement. When HPI scores were regressed on X_{10} = IOP scores in the presence of X_{5b}, the overall contribution both factors made in explaining the variance in HPI scores was significant, $R^2 = .21$, $F(2, 62) =$

8.13, $p = .0007$. Therefore, annual income and IOP scores collectively explained 21% of the variance in HPI scores for the AMT subgroup, and the corresponding regression equation was $y' = 6.57X_{5b} + 0.68X_{10} + 72.33$. Given a significant overall model, I examined the significance of each factor and found that both factors were significant: $B_{5b} = 6.57$, $p = .0246$; $B_{10} = 0.68$, $p = .0007$. Thus, holding all other variables constant: (a) AMT participants whose annual income was between $100K but less than $150K averaged 6.57 points higher on the HPI than AMT participants whose annual income was between $50K less than $100K; and (b) for every 1-unit increase in IOP scores, AMT participants' HPI scores increased on average by 0.68 points. In other words, as aircraft maintenance technicians increased their level of professional activity/involvement as defined by Kramer's (1974) IOP scale, their overall level of professionalism, which is a measure of the affective domain, also increased.

Independent of the overall model and relative to Hypothesis 1a, I then examined the increment IOP scores made in explaining the variance in HPI scores when IOP scores entered the analysis in the presence of annual income. As reported in Table 4.25, the increment was 0.17, which was significant, $F(1, 62) = 14.00$, $p < .001$. Thus, in the presence of the annual income comparison, IOP scores made a significant increase in explaining HPI score variance for the AMT subgroup.

Airport managers. As reported in Table 4.26, three variables represented Set A = Demographics (X_3, X_4, X_{5a}), no variables represented Set B = Aviation

Table 4.26

Summary of Results from Hierarchical Regression for the Airport Managers Subgroup

	Participants' Demographics and Professional Activity/Involvement		
		Model 2[c]	
Factor[a]	**Model 1 *B*[b]**	***B***	**95% CI**
Constant	77.52***	74.31***	[66.28, 82.34]
X_3	0.15	0.08	[-0.10, 0.26]
X_4	-3.79	-4.22[d]	[-8.65, 0.21]
X_{5a}	2.31	3.82	[-1.67, 9.32]
X_{10}		0.38*	[0.06, 0.71]
Statistical Results			
R^2	.07	.15	
F	1.78	2.13*	
ΔR^2		.08	
ΔF		6.68*	

Note. $N = 71$. Set entry order was A-C.
X_3 = Age. X_4 = Race/Ethnicity (nonWhite Caucasian vs. White/Caucasian). X_{5a} = Under \$50K vs. \$50K to \$100K annual income. X_{10} = IOP scores. [b]Model 1 corresponds to Y = HPI scores regressed on Set A = Demographics. [c]Model 2 corresponds to Y = HPI scores regressed on Set C = Professional Activity/Involvement in the presence of Set A. [d]X_4 = Race/Ethnicity was significant for $p = .0610$.
*$p < .05$. **$p < .01$. ***$p < .001$.

Experience, and one variable represented Set C = Professional Activity and Involvement (X_{10}). A brief explanation of the results follows.

Set A = Demographics. When HPI scores were regressed on X_3 = Age, X_4 = Race/Ethnicity, and X_{5a} = the comparison in annual income between (less than \$50K) vs. (\$50K to less than \$100K), the collective contribution these variables made in explaining the variance in professionalism scores was not significant, $R^2 = .07$, $F(3, 67) = 1.78$, $p = .1578$. Thus, the targeted demographic factors had no significant effect on level of professionalism for the Airport Managers subgroup.

Set C = Professional Activity/Involvement. When HPI scores were regressed on X_{10} = IOP scores in the presence of the three demographic factors, the overall contribution both sets made in explaining the variance in professionalism scores was significant, $R^2 = .15$, $F(4, 66) = 2.87$, $p = .0294$. Therefore, age, race/ethnicity, annual income, and IOP scores collectively explained 15% of the variance in HPI scores for the Airport Managers subgroup, and the corresponding regression equation was $y' = 0.08X_3 - 4.22X_4 + 3.82X_{5a} + 0.39X_{10} + 74.31$. Given a significant overall model, I examined the significance of each factor within this model and found that the only significant factor at the preset alpha level of $\alpha = .05$ was $B_{10} = 0.39$, $p = .0193$. Thus, holding all other variables constant, for every 1-unit increase in IOP scores, airport managers' HPI scores increased on average by 0.38 points. In other words, as airport managers increased their level of professional activity and involvement as defined by Kramer's (1974) IOP scale, then their overall level of professionalism, which is a measure of the affective domain, also increased. Furthermore, if the reader is willing to accept a slightly higher alpha level of $\alpha = .065$, then race/ethnicity also was significant, $B_4 = -4.22$, $p = .0610$, which indicates that non-White Caucasian airport managers averaged 4.22 points lower on the HPI than White Caucasian airport managers.

Independent of the overall model and relative to Hypothesis 1b, I then examined the increment IOP scores made in explaining the variance in HPI scores when IOP scores entered the analysis in the presence of the three demographic

factors. As reported in Table 4.26, the increment was 0.08, which was significant, $F(1, 66) = 6.68$, $p < .05$. Thus, in the presence of the age, race/ethnicity, and annual income, IOP scores made a significant increase in explaining HPI score variance for the Airport Managers subgroup.

Air traffic controllers (ATC). As reported in Table 4.27, two variables represented Set A = Demographics (X_{6a}, X_{6b}), no variables represented Set B = Aviation Experience, and one variable represented Set C = Professional Activity and Involvement (X_{10}). A brief explanation of the results follows.

Table 4.27
Summary of Results from Hierarchical Regression for the Air Traffic Controllers (ATC) Subgroup

	Participants' Demographics and Professional Activity/Involvement		
		Model 2[c]	
Factor[a]	**Model 1 *B*[b]**	***B***	**95% CI**
Constant	82.10***	78.34***	[73.06, 83.61]
X_{6a}	-3.28	-4.78	[-10.36, 0.79]
X_{6b}	-2.89	-3.57	[-10.34, 3.20]
X_{10}		0.34	[-0.04, 0.72]
Statistical Results			
R^2	.04	.11	
F	0.85	1.70	
ΔR^2		.07	
ΔF		3.15	

Note. $N = 44$. Set entry order was A-C.
[a]X_{6a} = Less than 4-year degree vs. 4-year degree education level. X_{6b} = Graduate degree vs. 4-year degree education level. X_{10} = IOP scores. [b]Model 1 corresponds to Y = HPI scores regressed on Set A = Demographics. [c]Model 2 corresponds to Y = HPI scores regressed on Set C = Professional Activity/Involvement in the presence of Set A.
*$p < .05$. **$p < .01$. ***$p < .001$.

Set A = Demographics. When HPI scores were regressed on X_{6a} = the comparison between participants who had less than a 4-year degree vs. 4-year degree education level, and X_{6b} = the comparison between participants who had a graduate degree vs. a 4-year degree education level, the collective contribution these variables made in explaining the variance in HPI scores was not significant, $R^2 = .04$, $F(2, 41) = 0.85$, $p = .4331$. Thus, the targeted demographic factors had no significant effect on the level of professionalism for the ATC subgroup.

Set C = Professional activity/involvement. When HPI scores were regressed on X_{10} = IOP scores in the presence of the two demographic factors, the overall contribution both sets made in explaining the variance in professionalism scores also was not significant, $R^2 = .11$, $F(3, 40) = 1.70$, $p = .1820$. Thus, the targeted demographic factors and IOP scores collectively had no significant effect on the level of professionalism for the ATC subgroup.

Independent of the overall model and relative to Hypothesis 1c, I then examined the increment IOP scores made in explaining the variance in HPI scores when IOP scores entered the analysis in the presence of the two demographic factors. As reported in Table 4.27, the increment was .07, which was not significant, $F(1, 40) = 3.15$, $p > .05$. Thus, in the presence of education level, IOP scores did not make a significant increase in explaining HPI score variance for the ATC subgroup.

Table 4.28

Summary of Results from Hierarchical Regression for the Non-Pilot Aviation Employees (NPAE) Subgroup

	Participants' Demographics, Aviation Experience, and Professional Activity/Involvement			
			Model 3[d]	
Factor[a]	**Model 1 *B*[b]**	**Model 2 *B*[c]**	***B***	**95% CI**
Constant	82.98***	79.42***	74.07***	[70.55, 77.58]
X_4	-5.62***	-4.39**	-4.11**	[-6.66, -1.55]
X_{5c}	11.56[e]	9.15	7.55	[-3.66, 18. 76]
X_{6b}	3.35*	3.79**	2.55*	[0.11, 4.99]
X_7		0.17**	0.06	[-0.05, 0.16]
X_{10}			0.54***	[0.34, 0.73]
Statistical Results				
R^2	.14	.18	.30***	
F	9.75***	10.02	15.37	
ΔR^2		.04	.12	
ΔF		8.44**	30.34***	

Note. $N = 183$. Set entry order was A-B-C.

[a]X_4 = Race/Ethnicity (nonWhite Caucasian vs. White Caucasian). X_{5c} = More than \$150K vs. \$50K to \$100K annual income. X_{6b} = Graduate degree vs. 4-year degree education level. X_7 = Years of experience. X_{10} = IOP scores.[b]Model 1 corresponds to Y = HPI scores regressed on Set A = Demographics (X_4, X_{5c}, and X_{6b}). [c]Model 2 corresponds to Y = HPI scores regressed on Set B = Aviation Experience in the presence of Set A. [d]Model 3 corresponds to Y = HPI scores regressed on Set C = Aviation Activity/Involvement in the presence of Sets A and B. [e]X_{5c} was significant in Model 1 for p = .06.

*p < .05. **p < .01. ***p < .001.

Non-pilot aviation employees (NPAE). As reported in Table 4.28, three variables represented Set A = Demographics (X_4, $X_{5c,}$ X_{6b}), one variable represented Set B = Aviation Experience (X_7), and one variable represented Set C = Professional Activity and Involvement (X_{10}). A brief explanation of the results follows.

Set A = Demographics. When HPI scores were regressed on X_4 = Race/Ethnicity, X_{5c} = the comparison of participants whose annual income was

(more than $150K) vs. ($50K to less than $100K), and X_{6b} = the comparison between participants with a graduate degree vs. 4-year degree education level, the collective contribution they made in explaining the variance in HPI scores was significant, $R^2 = .14$, $F(3, 179) = 9.75$, $p < .0001$. Therefore, race/ethnicity, annual income, and education level collectively explained 14% of the variance in HPI scores for the NPAE subgroup, and the corresponding regression equation was $y' = -5.62X_4 + 11.56X_{5c} + 3.35X_{6b} + 82.98$. Given a significant overall model, I examined the significance of each factor within this model and found that only two factors were significant at the preset alpha level of $\alpha = .05$: $B_4 = -5.62$, $p < .0001$, and $B_{6b} = 3.35$, $p = .0130$. Thus, holding all other variables constant: (a) non-White Caucasian NPAEs averaged 5.62 points lower on the HPI than White Caucasian participants, and (b) NPAEs whose highest level of education was a graduate degree averaged 3.35 points higher on the HPI than NPAEs with a 4-year degree. Furthermore, if the reader is willing to accept a slightly higher alpha level of $\alpha = .065$, then annual income also was significant, $B_{5c} = 11.57$, $p = .0643$, which indicates that NPAEs whose annual income was more than $150K averaged 11.57 points higher on the HPI than those whose annual income was between $50K and less than $100K.

Set B = Aviation experience. When HPI scores were regressed on X_7 = Years of experience in the presence of the three demographic factors, the overall contribution both sets made in explaining the variance in HPI scores was

significant, $R^2 = .18$, $F(4, 178) = 10.02$, $p < .0001$. Therefore, race/ethnicity, annual income, education level, and years of experience collectively explained 18% of the variance in HPI scores for the NPAE subgroup, and the corresponding regression equation was $y' = -4.39X_4 + 9.15X_{5c} + 3.79X_{6b} + 0.17X_7 + 79.42$. Given a significant overall model, I examined the significance of each factor within this model and found that three factors were significant: $B_4 = -4.39$, $p = .0020$, $B_{6b} = 3.79$, $p = .0044$, and $B_7 = 0.17$, $p = .0025$. The corresponding interpretations of the first two significant factors are similar to what was presented earlier. With respect to $B_7 = 0.17$, holding all other variables constant, for every 1 year increase in years of experience, NPAEs' HPI scores increased on average by 0.17 points.

Set C = Professional activity/involvement. When HPI scores were regressed on X_{10} = IOP scores in the presence of the three demographic factors and years of experience, the overall contribution all three sets made in explaining the variance in HPI scores was significant, $R^2 = .30$, $F(5, 177) = 15.37$, $p < .0001$. Therefore, race/ethnicity, annual income, education level, years of experience, and IOP scores collectively explained 30% of the variance in HPI scores for the NPAE subgroup, and the corresponding regression equation was $y' = -4.11X_4 + 7.55X_{5c} + 2.56X_{6b} + 0.06X_7 + 0.54X_7 + 74.07$. Given a significant overall model, I examined the significance of each factor within this model and found that three factors were significant: $B_4 = -4.11$, $p = .0018$, $B_{6b} = 2.56$, $p = .0402$, and $B_{10} = 0.54$, $p < .0001$. The corresponding interpretations of the first two significant factors are similar to

what was presented earlier. With respect to $B_{10} = 0.54$: holding all other variables constant, for every 1-unit increase in IOP scores, NPAEs' HPI scores increased on average by 0.54 points. In other words, as NPAEs increased their level of professional activity and involvement as defined by Kramer's (1974) IOP scale, then their overall level of professionalism, which is a measure of the affective domain, also increased.

What is noteworthy about this final model for the NPAE subgroup is that in all three stages of the hierarchical regression, race/ethnicity and education level (a) maintained significance regardless of what other variables were present and (b) their respective influence on HPI scores as indicated by their regression coefficients were nearly constant. Thus, these results provide strong evidence relative to the NPAE subgroup that (a) nonWhite Caucasians had a significantly lower level of professionalism than White Caucasians, and (b) employees with a graduate degree had significantly higher level of professionalism than those with a 4-year degree.

Independent of these overall models and relative to Hypothesis 1d, I then examined (a) the increment X_7 = Years of experience made in explaining the variance in HPI scores when X_7 entered the analysis in the presence of the three demographic factors, and (b) the increment IOP scores made in explaining the variance in HPI scores when IOP scores entered the analysis in the presence of the three demographic factors and years of experience. As reported in Table 4.28, the increment for (a) was .04, which was significant, $F(1, 178) = 8.44$, $p < .05$, and the

increment for (b) was .12, which was significant, $F(1, 177) = 30.34$, $p < .001$. Thus: (a) in the presence of the race/ethnicity, annual income, and education level, years of experience made a significant increase in explaining HPI score variance for the NPAE subgroup; and (b) in the presence of the race/ethnicity, annual income, educational level, and years of experience, IOP scores made a significant increase in explaining HPI score variance for the NPAE subgroup.

Pilots. As reported in Table 4.29, two variables represented Set A = Demographics (X_1, X_{5a}), one variable represented Set B = Aviation Experience (X_9), and one variable represented Set C = Professional Activity/Involvement (X_{10}). A brief explanation of the results follows.

Set A = Demographics. When HPI scores were regressed on X_1 = Gender and X_{5a} = the comparison in annual income between (less than $50K) vs. ($50K to less than $100K), the collective contribution these two factors made in explaining the variance in HPI scores was significant, $R^2 = .03$, $F(2, 284) = 4.23$, $p = .0154$. Therefore, gender and annual income collectively explained 3% of the variance in HPI scores for the Pilots subgroup, and the corresponding regression equation was $y' = 2.61X_1 - 3.14X_{5a} + 85.39$. Given a significant overall model, I examined the significance of each factor and found only one significant factor: $B_{5a} = -3.14$, $p = .0113$. Thus, holding all other variables constant, pilots whose annual income was less than $50K averaged 3.14 points lower on their HPI scores than pilots whose annual income was between $50K and less than $100K.

Table 4.29

Summary of Results from Hierarchical Regression for the Pilots Subgroup

	Participants' Demographics, Aviation Experience, and Professional Activity/Involvement			
			Model 3[d]	
Factor[a]	**Model 1 *B*[b]**	**Model 2 *B*[c]**	***B***	**95% CI**
Constant	85.39***	82.75***	74.25***	[70.76, 77.73]
X_1	2.61	3.16**	2.21	[-0.76, 5.18]
X_{5a}	-3.14*	-1.35	1.63	[-1.02, 4. 29]
X_9		0.00028**	0.00023**	[0.00008, 0.00038]
X_{10}			0.51***	[0.33, 0.69]
Statistical Results				
R^2	.03	.07	.16***	
F	4.23*	7.19	13.81	
ΔR^2		.04	.09	
ΔF		12.17***	30.21***	

Note. $N = 287$. Set entry order was A-B-C.
[a]X_1 = Gender (Female vs. Male). X_{5a} = Under $50K vs. $50K to $100K annual income. X_9 = Total flight hours. X_{10} = IOP scores. [b]Model 1 corresponds to Y = HPI scores regressed on Set A = Demographics (X_1 and X_{5a}). [c]Model 2 corresponds to Y = HPI scores regressed on Set B = Aviation Experience in the presence of Set A. [d]Model 3 corresponds to Y = HPI scores regressed on Set C = Aviation Activity/Involvement in the presence of Sets A and B.
*$p < .05$. **$p < .01$. ***$p < .001$.

Set B = Aviation experience. When HPI scores were regressed on X_9 = Total flight hours in the presence of the two demographic factors, the overall contribution both sets made in explaining the variance in HPI scores was significant, $R^2 = .07$, $F(3, 283) = 7.19$, $p < .0001$. Therefore, gender, annual income, and total flight hours collectively explained 7% of the variance in HPI scores for the Pilots subgroup, and the corresponding regression equation at this stage of the hierarchical analysis was $y' = 3.16X_1 - 1.35X_{5a} + 0.00028X_9 + 82.75$. Given a significant overall model, I examined the significance of each factor and found only

two significant factors: $B_1 = 3.16$, $p = .0464$, and $B_9 = 0.00028$, $p = .0004$. Thus, holding all other variables constant: (a) Female pilots averaged 3.16 points higher on their HPI scores than male pilots, and (b) for every 10,000-hour increase in pilots' total flight hours, their HPI scores increased on average by 2.8 points.

Set C = Professional activity/involvement. When HPI scores were regressed on X_{10} = IOP scores in the presence of the three demographic factors and total flight hours, the overall contribution all three sets made in explaining the variance in HPI scores was significant, $R^2 = .16$, $F(4, 282) = 13.81$, $p < .0001$. Therefore, gender, annual income, total flight hours, and IOP scores collectively explained 16% of the variance in HPI scores for the Pilots subgroup, and the corresponding regression equation was $y' = 2.21X_1 + 1.63X_{5a} + 0.00023X_9 + 0.51\ X_{10} + 74.25$. Given a significant overall model, I examined the significance of each factor and found only two significant factors: $B_9 = 0.00023$, $p = .0021$, and $B_{10} = 0.51$, $p < .0001$. Thus, holding all other variables constant: (a) for every 10,000-hour increase in pilots' total flight hours, their HPI scores increased on average by 2.3 points; and (b) for every 1-unit increase in IOP scores, pilots' HPI scores increased on average by 0.51 points. In other words, as pilots increased their level of professional activity and involvement as defined by Kramer's (1974) IOP scale, then their overall level of professionalism, which is a measure of the affective domain, also increased.

Independent of these overall models and relative to Hypothesis 1e, I then examined (a) the increment X_9 = Total flight hours made in explaining the variance

in HPI scores when X_9 entered the analysis in the presence of the gender and annual income, and (b) the increment X_{10} = IOP scores made in explaining the variance in HPI scores when X_{10} entered the analysis in the presence of gender, annual income, and total flight hours. As reported in Table 4.29, the increment for (a) was .04, which was significant, $F(1, 283) = 12.17$, $p < .001$, and the increment for (b) was .09, which also was significant, $F(1, 282) = 30.21$, $p < .001$. Thus: (a) in the presence of gender and annual income, total flight hours made a significant increase in explaining HPI score variance for the Pilots subgroup; and (b) in the presence of gender, annual income, and total flight hours, IOP scores also made a significant increase in explaining HPI score variance for the Pilots subgroup.

Primary analysis 2: Single-factor ANOVA. The second statistical strategy used in the current study was a single-factor ANOVA. This strategy was used to test the hypotheses associated with Research Question 2, which examined the differences in HPI scores among the five subgroups. Consistent with one of the assumptions of ANOVA—no outliers—an outlier analysis was performed using Jackknife distances and 24 outliers were flagged and deleted from the final analysis, which resulted in a sample size of N =650. The results corresponding to the one-way ANOVA omnibus was $R^2 = .03$, $F(4, 645) = 4.72$, $p = .0009$.

Given a significant omnibus, I examined the pairwise comparisons between subgroups with respect to HPI scores using Tukey's HSD post hoc test. As reported in Table 4.30, which contains a summary of the results of these comparisons, two

Table 4.30
Summary of Pairwise Comparisons between Subgroups with Respect to HPI Scores

Comparison[a]	Mean Diff	*SE* Diff	Lower 95% CI	Upper 95% CI	*p*
Pilot vs. ATC	4.58	1.29	1.04	8.11	.0040*
Airport vs. ATC	2.81	1.51	-1.31	6.93	.3383
AMT vs. ATC	2.35	1.55	-1.88	6.59	.5498
NPAE vs. ATC	2.34	1.33	-1.31	5.99	.4002
Pilot vs. NPAE	2.23	0.74	0.22	4.25	.0213*
Pilot vs. AMT	2.22	1.08	-0.72	5.17	.2371
Pilot vs. Airport	1.77	1.02	-1.01	4.55	.4113
Airport vs. NPAE	0.47	1.07	-2.45	3.38	.9925
Airport vs. AMT	0.46	1.32	-3.17	4.08	.9970
AMT vs. NPAE	0.01	1.12	-3.07	3.09	1.0000

Note. $N = 650$. $R^2 = .03$, $F(4, 645) = 4.72$, $p = .0009$.
[a]AMT = Aircraft Maintenance Technicians ($N = 65$, $M = 82.7$). Airport = Airport Managers ($N = 75$, $M = 83.2$). ATC = Air Traffic Controllers ($N = 42$, $M = 80.4$). NPAE = Non-Pilot Aviation Employees ($N = 189$, $M = 82.7$). Pilots ($N = 279$, $M = 84.9$).

pairwise comparisons were statistically significant: The Pilots subgroup vs. (a) the ATC subgroup and (b) the NPAE subgroup, respectively. With respect to: (a) Pilots averaged 4.58 points higher on the HPI than air traffic controllers, 95% CI = [1.04, 8.11], $p = .0040$; and (b) Pilots averaged 2.23 points higher on the HPI than NPAEs, 95% CI = [0.22, 4.25], $p = .0213$. As a result, based on these post hoc pairwise comparisons pilots had significantly higher levels of professionalism than air traffic controllers and non-pilot aviation employees.

The reader will note from Table 4.30 that all of the other subgroups also had higher mean HPI scores than the ATC subgroup. For example, the AMT, Airport Managers, and NPAE subgroups averaged respectively 2.35, 2.81, and 2.34 points higher on the HPI than the ATC subgroup. These differences, however, were not

statistically significant, although they might have practical significance. This will be discussed further in Chapter 5. One plausible explanation for these differences, particularly the one with respect to the Pilots subgroup, is the disparate sample sizes. For example, $N_{Pilots} = 279$ and $N_{ATC} = 42$. To address this possible explanation, I randomly selected 42 cases three separate times from the Pilots subgroup and compared these reduced samples with the ATC subgroup. In each case, the difference was still significant, which confirms that sample size was not the issue.

The reader also is reminded of two points: (a) Table 4.1 provides a summary of participants' mean scores on both the HPI and the IOP, and (b) the HPI is a cognitive measure of professionalism (i.e., thinking) whereas the IOP is a behavioral measure of professionalism (i.e., doing). When examined from a ranking perspective, it is noteworthy to observe from Table 4.1 that the ATC subgroup ranked last in both the HPI and IOP measures among the five subgroups.

Results of Hypotheses Testing

The research questions and corresponding hypotheses of the current study were stated in Chapter 1. These research hypotheses are restated here in null form for testing purposes. The decision to reject or fail to reject a null hypothesis was based on the results of the respective primary analyses reported in this chapter. The null hypotheses and a discussion of the decisions made with respect to each are provided below.

Null hypothesis 1: When examined from a hierarchical regression perspective with set entry order A-B-C, there will be no significant predictive gain in the relationship with participants' level of professionalism per each subgroup at any stage of the analysis. Hypothesis 1 was tested on a per group basis and the results of testing each subgroup is presented separately.

Null hypothesis 1a: The AMT subgroup. As reported in Table 4.25, the hierarchical analysis involved Sets A and C. (The reader is reminded that Set B was eliminated from the final analysis as a result of preliminary data screening; see Table 4.24.) With respect to Set A = Demographics, there was no significant predictive gain in participants' level of professionalism, $R^2 = .04$, $F(1, 63) = 2.95$, $p = .0906$. When Set C = Professional Activity/Involvement entered the analysis in the presence of Set A, there was a significant predictive gain in participants' level of professionalism, $sR^2 = .17$, $F(1, 62) = 14.00$, $p < .001$. As a result, null Hypothesis 1a was rejected because there was a significant gain at one stage of the analysis.

Null hypothesis 1b: The airport managers subgroup. As reported in Table 4.26, the hierarchical analysis involved Sets A and C. (The reader is reminded that Set B was eliminated from the final analysis as a result of preliminary data screening; see Table 4.24.) With respect to Set A = Demographics, there was no significant predictive gain in participants' level of professionalism, $R^2 = .07$, $F(3, 67) = 1.79$, $p = .1578$. When Set C = Professional Activity/Involvement entered the

analysis in the presence of Set A, there was a significant predictive gain in participants' level of professionalism, $sR^2 = .08$, $F(1, 66) = 6.68$, $p < .001$. As a result, null Hypothesis 1b was rejected because there was a significant gain at one stage of the analysis.

Null hypothesis 1c: The ATC subgroup. As reported in Table 4.27, the hierarchical analysis involved Sets A and C. (The reader is reminded that Set B was eliminated from the final analysis as a result of preliminary data screening; see Table 4.24.) With respect to Set A = Demographics, there was no significant predictive gain in participants' level of professionalism, $R^2 = .04$, $F(2, 41) = 0.85$, $p = .1578$. When Set C = Professional Activity/Involvement entered the analysis in the presence of Set A, there was no significant predictive gain in participants' level of professionalism, $sR^2 = .07$, $F(1, 40) = 3.15$, $p > .05$. As a result, I failed to reject null Hypothesis 1c because there was no significant gain at any stage of the analysis.

Null hypothesis 1d: The NPAE subgroup. As reported in Table 4.28, the hierarchical analysis involved all three sets. With respect to Set A = Demographics, there was a significant predictive gain in participants' level of professionalism, $R^2 = .14$, $F(3, 179) = 9.76$, $p < .0001$. When Set B = Aviation Experience entered the analysis in the presence of Set A, there was a significant predictive gain in participants' level of professionalism, $sR^2 = .04$, $F(1, 178) = 8.44$, $p < .001$. When Set C = Professional Activity/Involvement entered the analysis in the presence of

Sets A and B, there was a significant predictive gain in participants' level of professionalism, $sR^2 = .12$, $F(1, 177) = 30.34$, $p < .001$. As a result, null Hypothesis 1d was rejected because there was a significant gain at every stage of the analysis.

Null hypothesis 1e: The pilots subgroup. As reported in Table 4.29, the hierarchical analysis involved all three sets. With respect to Set A = Demographics, there was a significant predictive gain in participants' level of professionalism, $R^2 = .03$, $F(2, 284) = 4.24$, $p < .0154$. When Set B = Aviation Experience entered the analysis in the presence of Set A, there was a significant predictive gain in participants' level of professionalism, $sR^2 = .04$, $F(1, 283) = 12.17$, $p < .001$. When Set C = Professional Activity/Involvement entered the analysis in the presence of Sets A and B, there was a significant predictive gain in participants' level of professionalism, $sR^2 = .09$, $F(1, 282) = 30.21$, $p < .001$. As a result, null Hypothesis 1e was rejected because there was a significant gain at every stage of the analysis.

Null hypothesis 2: There will be no significant difference in mean HPI scores across the targeted five subgroups ($\mu_{AMT} = \mu_{Airport\ Managers} = \mu_{ATC} = \mu_{NPAE} = \mu_{Pilots}$). As reported in Table 4.30, the one-way ANOVA omnibus was significant, $F(4, 645) = 4.72$, $p = .0009$. Furthermore, Tukey's HSD post hoc pairwise comparisons revealed that the Pilot subgroup had a significantly higher mean HPI score than the ATC (95% CI = [1.04, 8.11]) and NPAE (95% CI = [0.22, 4.25]) subgroups. As a result, null Hypothesis 2 was rejected.

Chapter 5

Conclusions, Implications, and Recommendations

Summary of Study

The purpose of this study was to conduct a secondary analysis of Alhallaf's (2016) data. Unlike Alhallaf who identified specific factors that were related to the concept of professionalism across the aviation profession from an aggregate perspective, the current study disaggregated Alhallaf's data and examined factors associated with the concept of professionalism across various subgroups within the aviation profession. These subgroups included Aircraft Maintenance Technicians (AMT), Airport Managers, Air Traffic Controllers (ATC), Non-Pilot Aviation Employees (NPAE), and Pilots. The NPAE subgroup included aviation personnel in business, flight operations, and college/university faculty. The analyses were conducted from both within- and between-groups perspectives. The current study also examined the same research factors Alhallaf targeted and partitioned these factors into three functional sets:

- Set A = Demographics consisted of traditional personological characteristics and included gender, age, marital status, race/ethnicity, education level, and annual income.
- Set B = Aviation Experience consisted of participants' years of experience working in the aviation profession, total number of FAA ratings (Pilot subgroup), and total flight hours (Pilot subgroup).

- Set C = Professional Activity/Involvement consisted of factors related to activities participants might be involved in to keep current in their profession. Examples included membership and participation in professional organizations, continuing education and training, and networking and mentorship. Alhallaf (2016) measured these activities using Kramer's (1974) Index of Professionalism (IOP) scale where higher scores reflected higher involvement in professional activities.

Independent of these sets the current study also assessed participants' perceived understanding of the concept of professionalism relative to each subgroup. This was measured using a series of ranked items that reflected a dichotomy between a belief grounded in cognition (an attitude or mind-set) and a belief grounded in empiricism (practical and measurable) and was described in the Instrumentation section of Chapter 3. The dependent variable was participants' level of professionalism, which Alhallaf measured using Snizek's (1972) Hall's Professionalism Inventory (HPI). The HPI also is described in the Instrumentation section of Chapter 3 of this study.

The current study incorporated two research methodologies. The first, which was relevant to Research Question 1, was explanatory and predictive correlational research. This methodology and design were appropriate because a correlational study examines relationships among variables. These relationships could then be used to make predictions. I endeavored to examine the relationship

between the targeted sets of variables and the level of professionalism within each targeted subgroup to determine the predictive influence these factors have on each subgroup's level of professionalism. The second methodology, which was relevant to Research Questions 2 and 3, was ex post facto. This methodology was appropriate because, with the exception of the NPAE subgroup, the composition of each subgroup was predetermined. For example, I could not assign a participant to the Pilots subgroup or another participant to the ATC subgroup. As a result, I examined the differences in the level of professionalism among the subgroups as well as what way(s) the subgroups differed in their levels of professionalism. Because the group membership variable was on the IV side, the corresponding design was effects type. More specifically, I examined the effect of group membership on (a) differences in level of professionalism (Research Question 2) and (b) differences in perceptions of professionalism (Research Question 3).

The target population for the current study was individuals who work or study in the aviation industry in the United States. The accessible population was delimited to the individuals who responded to Alhallaf's (2016) study. These included aviation mechanics, airport managers, air traffic controllers, aviation students and faculty, flight instructors, business aviation employees, and pilots. Alhallaf's participants were recruited via various aviation professional organizations that announced his study and invited their membership to complete his questionnaire. These organizations included the National Air Traffic Controllers Association

(NATCA), American Association of Airport Executives (AAAE), University Aviation Association (UAA), Society of Aviation and Flight Educators (SAFE), Curt Lewis & Associates, International Society of Air Safety Investigators (ISASI), National Association of Flight Instructors (NAFI), National Business Aviation Association (NBAA), Embry-Riddle Aeronautical University, Florida Institute of Technology, Aeronautical Repair Station Association (ARSA), and Aviation Technician Education Council (ATEC).

The sample for the current study was acquired from Alhallaf's (2016) initial sample ($N = 990$), which was comprised of individuals who volunteered to complete his questionnaire. After preliminary data screening in advance of conducting inferential statistics, the final sample sizes per subgroup used to test Hypothesis 1 were: AMTs, $N = 65$; Airport Managers, $N = 71$; ATC, $N = 44$; NPAE, $N = 183$; and Pilots, $N = 287$. The composition of these samples is reported in Tables 4.25 to 4.29 in Chapter 4. The final sample sizes per subgroup used to test Hypothesis 2 were: AMTs, $N = 65$; Airport Managers, $N = 75$; ATC, $N = 42$; NPAE, $N = 189$; and Pilots, $N = 279$. The composition of these samples is reported in Table 4.30.

The data used for the current study were collected from Alhallaf's (2016) Aviation Professionalism Survey (APS), which consisted of five sections: (a) Snizek's (1972) 25-item Hall's Professionalism Inventory (HPI), which served as the dependent variable; (b) Alhallaf's 10-item researcher-developed perceptions of

professionalism scale; (c) aviation background; (d) Kramer's (1974) 9-item Index of Professionalism (IOP) scale; and (e) demographics. Alhallaf prepared two copies of the questionnaire: (a) a paper copy, which was administered personally or sent via mail, and (b) an electronic version hosted by *QuestionPro*, which is now owned by *SurveyMonkey*. The corresponding link to the electronic version was sent to the targeted professional organizations. A brief description of each section of Alhallaf's questionnaire was discussed in Chapter 3 of this study, and a copy of the APS is provided in Appendix A.

Alhallaf (2016) reported overall reliability coefficients of $\alpha = .725$ for Snizek's (1972) Hall's Professionalism Inventory and $\alpha = .789$ for Kramer's (1974) Index of Professionalism. Because the current study disaggregated Alhallaf's data into subgroups, I gave attention to instrument reliability on a per subgroup basis and the respective reliability coefficients were as follows:

- Aircraft maintenance technicians (AMT). HPI: $\alpha = .40$, IOP: $\alpha = .72$
- Airport managers. HPI: $\alpha = .71$, IOP: $\alpha = .79$
- Air traffic Controllers (ATC). HPI: $\alpha = .50$, IOP: $\alpha = .81$
- Non-pilot aviation employees (NPAE). HPI: $\alpha = .77$, IOP: $\alpha = .83$
- Pilots. HPI: $\alpha = .70$, IOP: $\alpha = .76$

With the exception of the AMT subgroup for the HPI, the reliability coefficients were consistent with what was reported in the literature and are considered acceptable in practice (Cohen et al., 2003). For the AMT subgroup, however, 60% of

score variance on the HPI was attributed to measurement error. One plausible explanation for the high measurement error is that the AMT subgroup ($N = 65$) was relatively small and homogeneous, especially when compared to the other three subgroups. Nevertheless, this reliability was still unacceptable, especially when examined relative to Worthen, White, Fan, and Sudweeks' (1999) who reported "coefficients as low as .50 are acceptable if the tests are used to make decisions about groups" (p. 113). A complete summary of the reliability information for the HPI and IOP is provided in Tables 3.8 and 3.9 (Chapter 3), respectively.

Summary of Findings

Prior to conducting the primary analyses to test the study's hypotheses, I conducted several preliminary data screening activities to produce a "clean" data set. The analyses associated with this screening included modifying Alhallaf's (2016) initial archival data set, outlier and missing data analyses, checking for multicollinearity, and confirming that the data set was compliant with the assumptions of ordinary least squares regression as well as for ANOVA. Working with this "clean" data set, I then conducted two primary statistical analyses: hierarchical multiple regression, which was used to test the hypotheses associated with Research Question 1; and one-way between groups ANOVA, which was used to test the hypotheses associated with Research Question 2. Table 5.1 contains a summary of the results of these hypothesis tests. The reader is reminded that

Table 5.1
Summary of the Results of Hypothesis Testing

Null Hypothesis	Decision
H_1: When examined from a hierarchical regression perspective with set entry order A-B-C, there will be no significant predictive gain in the relationship with participants' level of professionalism per each subgroup at any stage of the analysis.	
H_{1a}: The Aircraft Maintenance Technicians Subgroup	Reject
H_{1b}: The Airport Managers Subgroup	Reject
H_{1c}: The Air Traffic Controllers Subgroup	Fail to Reject
H_{1d}: The Non-Pilot Aviation Employee Subgroup	Reject
H_{1e}: The Pilot Subgroup	Reject
H_2: There will be no significant difference in mean HPI scores across the targeted five subgroups: $\mu_{AMT} = \mu_{Airport\ Managers} = \mu_{ATC} = \mu_{NPAE} = \mu_{Pilots}$	Reject

Research Question 3 had no corresponding hypothesis and instead was answered directly via descriptive statistics.

Primary Analysis 1: Hierarchical multiple regression. A hierarchical multiple regression strategy was used to test the hypotheses associated with Research Question 1. This analysis examined the incremental contribution each set made in explaining the variance in aviation professionalism scores for each subgroup via the set entry order A-B-C, where Set A = Demographics, Set B = Aviation Experience, and Set C = Professional Activity/Involvement. As reported in Tables 4.25 to 4.29 (Chapter 4) separately per each subgroup, there were significant incremental gains in the relationship with participants' level of professionalism for each subgroup at some stage of the analysis with the exception of the Air Traffic Controller subgroup. A brief discussion of the incremental contribution each set

made in explaining the variance in aviation professionalism with respect to each subgroup is provided next.

Aircraft maintenance technicians (AMTs). As reported in Table 4.25, significant relationships at the preset alpha levels of .05 were found for annual income and Index of Professionalism (IOP) scores factors in the final stage of the analysis. Thus, in the final model two factors were significant: annual income, which was the comparison of AMTs whose annual income was $100K to $150K vs. $50K to $100K, and IOP scores. The reader should note that annual income was not significant in the first stage of the analysis but became significant in the presence of the IOP scores in the final stage.

***Airport managers*.** As reported in Table 4.26, a significant relationship at the preset alpha level of .05 was found for IOP scores in the final stage of the analysis. Thus, in the final model only IOP scores were significant. However, if the reader were willing to accept a slightly higher alpha level of .065, then race/ethnicity, which compared non-White Caucasian vs. White Caucasian airport managers, also had a significant relationship in explaining the variance in aviation professionalism in the final model.

Air traffic controllers (ATCs). As reported in Table 4.27, no significant relationship at the preset alpha level of .05 was found for the ATC subgroup.

Non-pilot aviation employees (NPAE). As reported in Table 4.28, significant relationships at the preset alpha level of .05 were found in each step of the analysis,

and in the final model three factors were significant: race/ethnicity, education level, and IOP scores. All three factors also were significant at the stage in which they entered the model. When examined at each stage, the following significant relationships were detected at the preset alpha level of .05: (a) When Set A entered the model, race/ethnicity (non-White Caucasian vs. White Caucasian) and education level (graduate degree vs. 4-year degree) were significant; (b) When Set B entered the model, race/ethnicity, education level, and years of experience were significant; (c) When Set C entered the model, race/ethnicity, education level, and IOP scores were significant.

Pilots. As reported in Table 4.29, significant relationships at the preset alpha level of .05 were found at each step of the analysis, and in the final model two factors were significant: total flight hours and IOP scores. Both factors also were significant at the stage they entered the model. When examined at each stage, the following significant relationships were detected at the preset alpha level of .05: (a) When Set A entered the model, annual income (under $50K vs. $50K to $100K) was significant; (b) When Set B entered the model, gender and number of flight hours were significant; (c) When Set C entered the model, number of flight hours and IOP scores were significant.

Primary analysis 2: Single-factor ANOVA. A single-factor between groups ANOVA was used to test the hypotheses associated with Research Question 2, which examined the differences in HPI scores among the targeted five subgroups. Given a

significant omnibus, I examined the pairwise comparisons between subgroups with respect to HPI scores using Tukey's HSD post hoc test. As reported in Table 4.30 (Chapter 4), two pairwise comparisons were statistically significant: the Pilot subgroup vs. the ATC and NPAE subgroups, respectively.

Descriptive statistics (for research question 3). The reader is reminded that descriptive statistics were used to answer Research Question 3, which examined in what way(s) the subgroups differed in their perceptions of professionalism. The results of this analysis, which was summarized in Table 4.13 (Chapter 4), showed that all five subgroups perceived professionalism from a cognitive (attitudinal or a mind-set) perspective rather than from an empirical (practical and measurable) perspective. Furthermore, the reader will note that participants ranked professionalism as "being ethical" either first or second among all subgroups except the ATC subgroup, and "being competent" either first or second among all subgroups except for the Airport Managers subgroup. For the ATC subgroup, "being ethical" ranked lowest among the five cognitive perspectives of professionalism. Furthermore, "total years of experience" was the leading perception among the empirical (practical and measurable) perspective, ranking sixth across all five subgroups. Lastly, three of the five subgroups—AMT, ATC, and Pilots—ranked "earning professional certificates" last in their perception of professionalism.

Conclusions and Inferences

This section contains a summary of the findings for the three research questions as presented in Chapter 1 and an interpretation of the results in the context of the research setting. Included with this discussion are plausible explanations for the results. The reader is reminded that Hypothesis 1, which corresponded to Research Question 1, was tested on a per subgroup basis and therefore the discussion and plausible explanations for the results of testing each subgroup are presented separately.

Research question 1: When examined from a hierarchical perspective with set entry order A-B-C, what is the predictive gain at each step of the analysis relative to each of the five-targeted subgroup's level of professionalism?

The reader will recall the targeted factors of the current study were partitioned into three functional sets: Set A = Demographics, Set B = Aviation Experience, and Set C = Professional Activity/Involvement. Furthermore, after preliminary data screening, not all factors and not all sets were applicable to each subgroup. This was summarized in Table 4.24 (Chapter 4) and the reader is directed to this table for guidance while reviewing this section.

Aircraft maintenance technicians (AMTs). With respect to the AMT subgroup, two factors were used in the final analysis: X_{5b} = the comparison in annual income between technicians who earned between $100K and $150K vs. those who

earned between $50K and $100K (Set A); and X_{10} = IOP scores, which measured technicians' level of professional activity/involvement (Set C). When X_{5b} entered the analysis the comparison in annual income was not significant. However, when X_{10} entered the analysis in the presence of annual income, both variables were significant. A brief discussion follows.

X_{5b} = annual income ($100K to $150K vs. $50K to $100K). Technicians who earned between $100K and $150K averaged approximately 6.5 points higher in their level of professionalism scores (HPI) compared to those technicians whose annual income was between $50K and $100K. This difference in level of professionalism was significant in the presence of IOP scores. A plausible explanation for this result is AMTs who earn between $100K and $150K are generally considered management level technicians who spend most of their time in the offices and outside of the maintenance hangars. Given this premise, it is possible that these individuals have more job/position responsibilities where they need to be more professional in order to maintain their positions. A second plausible explanation is that the AMTs who earn between $100K and $150K may aspire to advance in their careers more than the AMTs who earn between $50K and $100K. The individuals who earn between $50K to $100K generally are considered mid-level position employees and may be content and comfortable in their current employment, and are not concerned or motivated in advancing their careers. This latter point is partially supported by the AMT subgroup's demographics which

showed that the majority or near-majority of AMT participants were married, averaged 46 years old, and had less than a 4-year college degree (see Tables 3.1 and 3.4 in Chapter 3).

X_{10} = *IOP scores*. As discussed in the details provided in Chapter 4, the AMTs were fairly active or involved with respect to: (a) the number of professional courses they took, (b) the number of professional journals they subscribed to, (c) the number of professional books they purchased, and (d) the number of hours per week they spent engaged in professional reading. The final regression model revealed a direct relationship between AMTs' IOP scores and HPI scores. Thus, as their level of professional activity/involvement increased, their level of professionalism also increased. A plausible explanation for this result is that as AMTs pursued the various professional activities listed in (a) through (d) above, they became more cognizant of the concept and more immersed into the culture of professionalism. This is analogous to studying a second language. It is one thing to study the language via a textbook, but it is quite different to immerse yourself into the corresponding culture. By engaging in these professionally related activities, it is conceivable that AMTs' level of professionalism was enhanced because they immersed themselves into the culture of professionalism. This in turn impacted their attitudes toward what higher levels of professionalism means.

A second plausible explanation is that the knowledge and maturation acquired through professional activity and involvement could have a positive impact

on reducing the influence of unprofessional practices within participants' own work. A third plausible explanation for these results is grounded in Kern's (2011) model of professionalism for the aviation community, which was discussed in Chapter 2, particularly the third and fourth domains of Kern's model, namely, continuous improvement and professional engagement, respectively. According to Kern, these two domains could lead to higher states of growth and development, which in turn could result in higher levels of professionalism.

Airport managers. With respect to the Airport Managers subgroup, four factors were used in the final analysis: X_3 = age, X_4 = race/ethnicity, and X_{5a} = the comparison in annual income between airport managers who earned between under \$50K vs. those who earned between \$50K and \$100K (Set A); and X_{10} = IOP scores, which measured airport managers' level of professional activity/involvement (Set C). When X_3, X_4, and X_{5a} entered the analysis, none of the factors was significant. When X_{10} entered the analysis in the presence of age, race/ethnicity, and the comparison in annual income, only IOP scores was significant at the preset alpha level of $\alpha = .05$. However, X_4, which compared non-White Caucasian to White Caucasian, was significant for $\alpha = .065$. A brief discussion follows.

X_{10} = *IOP scores*. As discussed in the details in Chapter 4, airport managers were fairly active or involved with respect to (a) the number of professional courses they took and (b) their level of activity/membership in professional organizations. The final regression model revealed a direct relationship between airport manager's

IOP scores and HPI scores: As their level of professional activity/involvement increased, their level of professionalism also increased. A plausible explanation for this result is similar to that offered for the AMT subgroup. It is conceivable that airport managers' attitudes toward professionalism were enhanced because they immersed themselves into the culture of professionalism by taking professional courses and participating in professional organizations (e.g., AAAE).

A second plausible explanation for these results is grounded in Kern's (2011) model of professionalism for the aviation community similar to what was presented for the AMT subgroup. According to Kern's model, the third and fourth domains could lead to higher states of growth and development, which in turn could result in higher levels of professionalism. A third plausible explanation for these results is the formation of this subgroup, which was comprised mostly of managers or employees in a management track. It is conceivable that being in a management track or striving to be a manager requires having a mindset of continuous improvement and learning, which in turn could lead to achieving the highest level of professionalism. Given this premise, it is plausible that airport managers with this mindset combined with action would positively result in a higher level of professionalism.

X_4 = Race/ethnicity. As noted above, X_4, which compared non-White Caucasian to White Caucasian, was significant for $\alpha = .065$ with the former averaging 4 fewer points on the HPI than the latter. A plausible explanation for this

difference is disparate sample sizes. The sample size for the non-White Caucasian group was $N = 17$, which was 23% of the overall sample size ($N = 74$) for the Airport Managers subgroup. This means that nearly 80% of the Airport Managers subgroup was of a single race or ethnic group (White Caucasian), which effectively renders X_4 a constant and not a variable. As a result, the reader should neither interpret nor attribute this difference in level of professionalism to race/ethnicity.

Air traffic controllers. With respect to the ATC subgroup, three factors were used in the final analysis: X_{6a} = less than 4-year college degree vs. 4-year college degree, X_{6b} = graduate degree vs. 4-year college degree (Set A); and X_{10} = IOP scores, which measured ATCs' level of professional activity/involvement (Set C). When X_{6a} and X_{6b} entered the analysis, none of the factors was significant. When X_{10} entered the analysis in the presence of the comparisons in education level, the overall model and all three factors were not significant. A plausible explanation for this finding is sample size, which was $N = 44$. The ATC subgroup had the smallest sample size as well as the smallest overall effect size ($ES = .12$) of the five subgroups (see Table 3.7 in Chapter 3). A post-hoc power analysis revealed a sample size of $N = 95$, which is more than twice than $N = 44$, was needed to find this effect. Therefore, the current study did not have a sufficiently large sample size to make any statistical inferences or conclusions about the relationship these factors had with professionalism within the ATC subgroup, and with respect to Research Question 1.

Non-pilot aviation employees. With respect to the NPAE subgroup, five factors were used in the final analysis: X_4 = race/ethnicity, X_{5c} = the comparison in annual income between those who earned between more than $150K vs. those who earned between $50K and $100K, and X_6 = graduate degree vs. 4-year college degree (Set A); X_7 = years of experience (Set B); and X_{10} = IOP scores, which measured NPAEs' level of professional activity/involvement (Set C). When X_4, X_{5c}, and X_{6b} entered the analysis, X_4 and X_{6b} were significant. When X_7 entered the analysis in the presence of the three Set A factors, X_4, X_{6b}, and X_7 were significant. When X_{10} entered the analysis in the presence of the three Set A and single Set B factors, X_4, X_{6b}, and X_{10} were significant. A brief discussion follows.

X_4 = Race/ethnicity. The comparison between non-White Caucasian and White Caucasian remained significant across all three models. In each analysis non-White Caucasian NPAEs consistently averaged between approximately 4 and 6 points lower on their HPI scores than White Caucasian NPAEs, which implies a lower level of professionalism. A plausible explanation for this difference is the diverse nature of this subgroup: The formation of this subgroup was the least homogeneous among the five-targeted subgroups. As the reader will recall, this subgroup included business (sales/finance and management), flight operations (safety, security, flight attendants, dispatchers, and IT personnel), and college/university faculty participants. A second plausible explanation is the disparate sample sizes within the formation of the non-White Caucasian participants.

The sample size for the non-White Caucasian group was $N = 71$, which was 36% of the overall sample size ($N = 197$) for the NPAE subgroup. However, as illustrated in Table 3.2 in Chapter 3, non-White Caucasians included African American ($N = 9$), Asian American ($N = 24$), Hispanic ($N = 15$), and Other ($N = 21$). As a result, the reader should neither interpret nor attribute this difference in level of professionalism to race/ethnicity.

X_{6b} = *Graduate degree vs. 4-year college degree*. The comparison between NPAEs who had a graduate degree vs. those with a 4-year college degree remained significant across all three models. In each analysis, those with a graduate degree consistently averaged between approximately 2.5 and 3.5 points higher on their HPI scores than those with a 4-year college degree, which indicates a higher level of professionalism. One plausible explanation for this difference is related to the opportunities and interactions often afforded to graduate students such as getting involved in research activities and/or professional organizations. It is conceivable that NPAEs who had a graduate-level education were presented with a wider perspective of what professionalism entails from both behavioral as well as attitudinal contexts. Therefore, it is reasonable to conclude that the more educated an individual is the more knowledge he/she would have in terms of theoretical gains. This in turn could be applied to practice within the NPAEs' corresponding area of employment, which could result in a higher level of professionalism.

A second plausible explanation is grounded in the third domain of Kern's (2011) model of professionalism, which is continuous improvement. Implied within this domain is the concept of further self-investment, which entails returning to school for a graduate degree with the prospect of advancing within one's vocation. According to Kern's model, the domain of continuous improvement could lead to higher states of growth and development, which in turn could result in higher levels of professionalism.

A third plausible explanation is related to the general influence and contribution education has on humans, often called the learning process. The diligence, determination, and perseverance needed to earn a graduate degree often translate to a more self-disciplined and skilled individual. Thus, it is highly likely that NPAEs with graduate degrees view themselves as "professionals" and apply the same levels of diligence, determination, and perseverance that are needed to be recognized as a professional by their peers and employer than those without graduate degrees. Furthermore, in some positions graduate degrees may lead to even higher incomes and more promotion opportunities.

X_{10} = *IOP scores*. As discussed in detail in Chapter 4, the NPAE subgroup participants were fairly active or involved with respect to (a) the number of professional courses they took and (b) their level of activity/membership in professional organizations. These activities were same as the Airport Managers subgroup. The final regression model revealed a direct relationship between NPAEs'

IOP scores and HPI scores: As their level of professional activity/involvement increased, their level of professionalism also increased. Because the NPAE subgroup was active with respect to same activities as those of the Airport Managers subgroup, plausible explanations for this result are the same as those reported earlier for the Airport Managers subgroup. Therefore, the reader is directed to the Airport Managers subgroup section.

X_7 = *Years of experience*. The reader will note that NPAEs' years of experience was significant in the presence of the demographics factor. However, it lost its significance when IOP scores entered the analysis in the final model. A supplementary post-hoc examination that was not reported in Chapter 4 revealed that IOP scores mediated the relationship between years of experience and level of professionalism. This will be reflected as a recommendation for future research.

Pilots. With respect to the Pilot subgroup, four factors were used in the final analysis: X_1 = Gender, X_{5a} = the comparison in annual income between those who earned less $50K vs. those who earned between $50K and $100K (Set A); X_9 = total flight hours (Set B); and X_{10} = IOP scores, which measured pilots' level of professional activity/involvement (Set C). When X_1 and X_{5a} entered the analysis, only X_{5a}, the comparison in annual income, was significant. When X_9 entered the analysis in the presence of the two Set A factors, X_1 and X_9 were significant. When X_{10} entered the analysis in the presence of the two Set A and single Set B factors, X_9 and X_{10} were significant. A brief discussion follows.

X_{5a} = Annual income (under $50K vs. $50K to $100K). The comparison in annual income revealed that pilots earning under $50K in annual income averaged 3 points lower on the HPI than pilots whose annual income was between $50 and $100K, which indicates a lower level of professionalism. This difference in level of professionalism was only significant in the first model, and lost its significance in the presence of X_9 = total flight hours. A plausible explanation for this result is due to mediation. A supplementary post-hoc examination that was not reported in Chapter 4 confirmed that total flight hours did indeed mediate the relationship between annual income and HPI scores. This will be reflected as a recommendation for future research.

X_1 = Gender. The comparison between female and male pilots was only significant in the presence of flight hours in the second model with female pilots averaging 3 points higher on the HPI than male pilots, which indicates female pilots had a higher level of professionalism. This significant difference was not observed in the presence of IOP scores in the final model, and a plausible explanation for this is that its effect was mediated by pilots' level of professional activity/involvement. A supplementary post-hoc examination that was not reported in Chapter 4 confirmed that IOP scores did indeed mediate the relationship between gender and HPI scores. This will be reflected as a recommendation for future research.

A second plausible explanation for this difference is disparate sample sizes. The sample size for the females was $N = 33$, which was 12% of the overall sample size for the Pilots subgroup ($N = 276$). This means that nearly 90% of the Pilots subgroup was of a single gender (Male), which effectively renders X_1 a constant and not a variable. As a result, the reader should neither interpret nor attribute this difference in level of professionalism to gender.

X_9 = Total flight hours. When X_9 entered the analysis in the presence of the two demographic factors, a positive and significant relationship was found between total flight hours and HPI scores. This relationship also held when IOP scores entered the analysis in the final model: For every 10,000-hour increase in total flight time, HPI scores on average increased 2.3 points. Thus, as pilots' flight time increased, so too did their level of professionalism. A plausible explanation for this effect is the experiences pilots acquire and undergo as they accumulate more flight hours. For example, every flight, which corresponds to an increase in flight hours, pilots experience and must interact with different flight crewmembers, varying weather events, different ground crew, and different air traffic controllers. All of these situations require a certain level of professionalism. As a result, it is conceivable that as pilots' total flight hours increase so would their level of professionalism.

A second plausible explanation is related to pilot seniority, which is mostly measured as total flight hours and total years of employment within an airline. As

pilots gain experience as a result of increased flight time they move through ranks and tiers among their peers as well. Examples include being promoted from first officer to captain in a particular aircraft type, and being promoted to an instructor captain from a regular captain. Concomitant with such advancements is additional responsibilities as well as different levels of professionalism. Therefore, it is reasonable to conclude that the more flight hours a pilot accrues the more knowledge he/she would have in terms of practical gains. This in turn could enhance a pilot's level professionalism.

X_{10} = *IOP scores*. As discussed in detail in Chapter 4, pilots were fairly active or involved relative to: (a) the number of professional courses they took, (b) the number of professional books they purchased, (c) the number of hours per week they spent engaged in professional reading, and (d) their activity/membership in professional organizations. The final regression model revealed a direct relationship between pilots' IOP scores and HPI scores: As their level of professional activity/involvement increased, their level of professionalism also increased. A plausible explanation for this result is similar to what was presented earlier for the AMT subgroup. As pilots pursued the various professional activities listed in (a) through (d) above, they became more cognizant of the concept and more immersed into the culture of professionalism. Therefore, by engaging in these professionally related activities, it is conceivable that pilots' level of professionalism was enhanced

because of this immersion, and this in turn impacted their attitudes toward what higher levels of professionalism means.

A second plausible explanation is grounded in the fifth domain of Kern's (2011) model of professionalism, which is professional image. Implied within this domain is the concept of building credibility and maintaining authenticity, which entails projecting competence and professionalism across every endeavor. This is very much the case for pilots because they interact with so many different peers while performing their duties, which include pre-flight, flight, and post-flight activities. If pilots are not perceived as being credible and authentic at a high level, then they might be unable to perform their jobs safely. According to Kern (2011) "The bottom line is that your professional image communicates, interferes, attracts, and repels" (p. 226).

A third plausible explanation for these results is grounded in the sixth domain of Kern's (2011) model of professionalism, which is selflessness. According to Kern, this domain entails coaching and mentorship, and is the pinnacle of professionalism. This is very much likely the case for pilots because as they gain experience and mature they hold themselves to higher standards among their peers because their job also includes coaching and partial mentorship to less experienced pilots.

Research question 2: What is the difference in the level of professionalism across the targeted five subgroups?

The reader will recall this question was answered via a between groups ANOVA, which resulted in a significant omnibus. Tukey's HSD post-hoc test of the corresponding 10 pairwise comparisons revealed two significant comparisons: The Pilot subgroup vs. the ATC subgroup, and the Pilot subgroup vs. the NPAE subgroup. A discussion of each follows.

Pilot vs. ATC subgroups. The Pilot subgroup averaged 4.6 points higher in HPI scores than the ATC subgroup, which implies that pilots had a higher level of professionalism than air traffic controllers. The mean difference of 4.6 points was also the largest mean difference among all the comparisons. A plausible explanation for this finding is the disparate sample sizes between the Pilot subgroup ($N = 276$) and the ATC subgroup ($N = 42$). As discussed in Chapter 4, to address this plausibility, I randomly selected 42 cases three separate times from the Pilot subgroup and compared these reduced random samples to the ATC subgroup. In each case, the difference in mean HPI scores was still significant, which confirms that sample size was not the issue. It also is worth noting that both subgroups were very homogeneous as well.

A plausible explanation outside of sample size could be due to work environment. Air traffic controllers work in an isolated and high stress environment, especially during peak hours of certain days of the week where they need to be highly

focused. This may cause them not to dedicate any more time to improve their careers outside of their duty times. This plausible explanation is further supported by the fact that air traffic controllers also had the lowest mean score on Kramer's (1974) Index of Professionalism (IOP) among the five subgroups. As the reader might recall the IOP measured participants' professional activity/involvement where they self-reported the extent to which they were involved in various professional activities such as the number of professional courses taken, subscriptions to professional journals, and the number of hours spent reading professional literature.

A second plausible explanation for this result could be due to employment status. Air traffic controllers in the U.S. are predominantly federal employees who work for the U.S. government. The conventional consensus in the United States is that government, which represents the public sector, has less dynamism than the private sector, a lower sense of urgency, and provides "secure" jobs. Given this premise, air traffic controllers would be less likely to keep current in their profession through continuous improvement or by being actively engaged in the factors associated with the IOP than pilots. On the other hand, because pilots strive to advance to the rank of captain from being a first officer, or advance to the rank of instructor captain from captain, they must continually improve in their profession, maintain currency within their profession, and actively engage in many of the factors given in the IOP. If not, then they would not advance in their careers.

The reader will recall from Table 4.30 in Chapter 4 that all of the other subgroups also had higher mean HPI scores than the ATC subgroup. These differences, however, were not statistically significant, although they might have practical significance. This will be discussed later in this chapter. The reader also is reminded once again of two points: (a) Table 4.1 (Chapter 4) provides a summary of participants' mean scores on both the HPI and the IOP, and (b) the HPI is an attitudinal scale that measures a person's level of professional from a cognitive perspective (i.e., thinking) whereas the IOP is a behavioral scale that measures a person's level of professionalism from an activities/involvement perspective (i.e., doing). When examined from a ranking perspective, it is noteworthy to observe from Table 4.1 that the ATC subgroup ranked last in both the HPI and IOP measures among the five subgroups.

Pilot vs. NPAE subgroups. The Pilot subgroup averaged 2.2 points higher in HPI scores than the NPAE subgroup, which implies that pilots had a higher level of professionalism than non-pilot aviation employees. A plausible explanation for this significant mean difference in HPI scores is the nature of the composition of the two subgroups. The pilot subgroup was an extremely homogenous group whereas the NPAE subgroup was the least homogeneous among the five-targeted subgroups. As the reader will recall, the NPAE subgroup included business (sales/finance and management), flight operations (safety, security, flight

attendants, dispatchers, and IT personnel), and college/university faculty participants whereas the Pilot subgroup simply was comprised of pilots.

A second plausible explanation is the disparate sample sizes within the NPAE subgroup itself. Participants in this subgroup came from a wide spectrum of work settings within the aviation industry, including general aviation, flight schools, airports, colleges/universities, government, and cargo/packaging. Associated with these varied work settings are different cultures, which could place different emphasis on professionalism.

Research question 3: In what way(s) do the subgroups differ in their perceptions of professionalism?

The reader will recall this question was answered via descriptive statistics. As reported in Table 4.13 (Chapter 4), of the 10 possible responses to the statement "I believe professionalism is based on or related to …" the first five responses reflected a cognitive perspective—an attitude or mind-set—and the last five responses reflected a behavioral perspective—empirical and practical. Furthermore, the first five responses also were the top ranked items for all five subgroups. For example, all subgroups except the ATC subgroup ranked "being ethical" either first or second, and all subgroups except for the Airport Managers subgroup ranked "being competent" was first or second. The ATC subgroup ranked "being ethical" fifth, and the Airport Managers subgroup ranked "being competent" third. When considered from a behavioral perspective, all five subgroups ranked "number of certificates"

sixth, and three of the five subgroups—AMT, ATC, and Pilots—ranked "earning professional certificates" last. Thus, there was little difference in participants' perceptions of professionalism across all five subgroups.

A plausible explanation for this finding is related to the industry as a whole. Although Alhallaf's data were disaggregated into the five subgroups, these subgroups do not operate independently of each other. For example, pilots rely on aviation mechanics to keep their aircraft running safely, air traffic controllers to guide their aircraft safely, and airport managers to maintain a safe passenger environment. This explanation is supported in part by the SHELL model, which was presented in Chapter 2, and reflects an approach to safety through human factors in aviation. A key component of this model is the Liveware–Liveware interaction, which involves the interrelationships among individuals within and between subgroups, including the flight crew (pilots), airport managers, air traffic controllers, maintenance personnel, operations personnel, instructors/students, ground crew, engineers/designers, and managers/supervisors. Thus, safe and successful operations in aviation require harmony among these interrelationships, which infers similar or complementing levels of professionalism among these subgroups. Consequently, all subgroups in aviation must have a similar perception of professionalism, and this is exactly what the current study found.

A second plausible explanation for this finding has to do with the Kern's (2011) model of professionalism. With the exception of the ATC subgroup, the

participants in the other four subgroups were considered partial Level III professionals based on the significant relationship between their level of professional activity/involvement and their level of professionalism. One of the domains of a Level III professional is Professional Image (Domain 5), which refers to the concept of "looking and acting the part as you do the right thing" such as being respectful of others, promoting a positive perception, and maintaining a professional appearance. Although this domain was not measured directly, it is conceivable that participants in these subgroups endeavor to adopt a professional "culture" that is rooted in safety and recognize that to do so involves more of a mind-set than a skill set.

Implications

This section contains a discussion of the implications of the current study's results and is organized into three parts: implications relative to the theoretical foundation as presented in Chapter 2, implications relative to prior research as presented in Chapter 2, and implications for practice.

Implications relative to theory. The current study was grounded in Kern's (2011) model of professionalism for the aviation community. A summary of Kern's theory and a discussion of the implications of the study's findings relative to each subgroup are presented below.

Kern's model of professionalism. As presented in Chapter 2, Kern's (2011) model of professionalism for the aviation community consists of six stages, or

domains, of professionalism: Vocational Excellence, Professional Ethics, Continuous Improvement, Professional Engagement, Professional Image, and Selflessness). Kern partitioned these domains into three levels of professionals:

- Level I professionals are well qualified to earn a salary, but are not necessarily compliant with all the policies, procedures, and regulatory guidelines associated with their vocation. According to Kern (2011, p. 69), Level I professionals may be thought of as entry-level professionals who generally claim, "I'm a pro because I earn a pay check in the industry."
- Level II professionals include individuals who are as competent as Level I professionals, but are more adamant followers of ethical requirements. They are known as compliers to all the policies, procedures, and regulatory guidelines. However, they may never fully reach their potential due to lack of effort in personal development and investment, and hence tend to be status quo professionals. According to Kern (2011, p. 70), Level II professionals are those who stake their claim as, "I'm a pro because I meet and maintain the standards."
- Level III professionals include individuals who embrace and continually improve across the six domains of professionalism. According to Kern (2011, p. 72), a Level III professional is an elite performer who strives to meet the following definition of professionalism: "Meticulous adherence to

> undeviating courtesy, honesty, and responsibility in one's dealings with customers and associates, plus a level of excellence that goes over and above the commercial considerations and legal requirements." With respect to the six-domain model, a Level III professional who adheres to all domains within this level is an elite professional at the highest level.

The findings of the current study supported Kern's (2011) model of professionalism with respect to some, but not all, of the five targeted aviation subgroups. A discussion per subgroup with respect to Kern's model of professionalism follows.

Aircraft maintenance technicians (AMTs). As depicted in Figures 2.1 and 2.2 in Chapter 2 and described above, Kern's (2011) Levels I and II would apply to younger, entry- to mid-level employees. According to Kern, these individuals would be expected to have a lower level of professionalism than their more experienced and older counterparts. The findings of the current study with respect to the AMT subgroup supported this theoretical expectation from an annual income perspective. For example, the study found that AMTs who earned between $100K and $150K had a significantly higher level of professionalism than those who earned between $50K to less than $100K. This finding is consistent with Kern's model as follows: Those in the lower income bracket would generally be considered younger, entry- to mid-level employees who would have lower levels of professionalism whereas those in the higher income bracket generally would be

considered senior and more experienced management-level technicians who would have higher levels of professionalism.

The findings of the current study with respect to the AMT subgroup also supported Kern's (2011) theoretical expectation from an activity/involvement perspective. For example, the study found a direct and significant relationship between the number of activities AMTs were involved in, as measured by the IOP, and their level of professionalism, as measured by the HPI. This finding is consistent with Kern's Level III, which posits that individuals who are actively engaged in their profession will achieve a high level of professionalism. Thus, the technicians' professional development was linked to their level of professional involvement, and as reflected in Kern's theoretical model, this leads to higher levels of professionalism.

Airport managers. As reported earlier in the Summary of Findings section of this chapter, the only factor that had a significant relationship with professionalism at the preset alpha level of $\alpha = .05$ for the Airport Managers subgroup was IOP scores, which was a measure of professional activity. More specifically, airport managers were actively involved within their profession by taking professional courses and participating in their professional organizations. The reader will note that these two activities are directly related to the third (Continuous Improvement) and fourth (Professional Engagement) domains of Kern's (2011) theoretical model, and these two domains correspond to a Level III

professional. Thus, this direct and significant relationship between airport managers' professional involvement, as measured by their IOP scores, and their level of professionalism, as measured by the HPI, supports Kern's model, which posits that individuals who are actively engaged in their profession will achieve a high level of professionalism.

Air traffic controllers (ATC). As reported earlier in the Summary of Findings section of this chapter, none of the factors associated with the Air Traffic Controllers' subgroup had a significant relationship with their level of professionalism. Although there was some evidence of Professional Ethics (Domain 2 in Kern's model) with respect to the ATC subgroup's perception of professionalism, "being ethical" was ranked 5th of 10 possibilities, and was inconsistent with the other four subgroups, which ranked "being ethical" first or second. Similarly, although there was some evidence of Continuous Improvement (Domain 3) and Professional Engagement (Domain 4), the ATC subgroup's level of professional activity/involvement was the lowest among the five subgroups. As a result, the findings of the current study with respect to the Air Traffic Controllers subgroup did not support Kern's (2011) theoretical model.

Non-pilot aviation employees (NPAE). Two factors in the final regression model were significantly related to the NPAE subgroup's level of professionalism: education and level of professional activity/involvement. With respect to education, NPAEs with a graduate degree had a significantly higher level of professionalism

than those with a 4-year college degree. This finding is applicable to Kern's (2011) domain of Continuous Improvement as well as his domain of Professional Image. For example, implied within both these domains is the concept of self-investment through the avenue of increased education. Acquiring a graduate degree enhances the prospect of advancement within a vocation, makes one more marketable in both his/her current and related field(s) of employment, and projects a positive image that an individual is interested in growing professionally. With respect to their level of professional activity/involvement, NPAEs were actively involved in their profession relative to the number of professional courses they took and through their participation or membership in professional organizations. These findings correspond to Kern's Level III Professional and are exactly what one would expect based on Kern's model. Thus, the findings associated with the NPAE subgroup support Kern's theoretical model of professionalism.

Pilots. Independent of the other four groups, the Pilot subgroup included two factors that were only applicable to pilots: number of FAA ratings and total number of flight hours. Of these two factors, the latter had a direct and significant relationship with pilots' level of professionalism. This finding is consistent with Kern's (2011) first domain, namely, Vocational Excellence, which corresponds to a Level 1 professional. According to Kern, the domain of vocational excellence includes six broad subdomains: technical credibility, personal discipline and compliance, attention to detail, diligence, nontechnical excellence, and problem

solving. Within the context of the pilot profession, these characteristics are inherent in pilots' flight time. For example, to achieve a high degree of vocational excellence pilots must be technically credible, have a certain degree of personal discipline, pay attention to detail, be diligent when performing their job, be able to communicate with laypersons in a nontechnical manner, and be good problem solvers. One way in which to achieve these attributes is through increased flight time: By accruing more flight hours, pilots enhance their vocational excellence. Thus, in the absence of any of the other higher-level domains of the model, when applied to the Pilot subgroup this finding of increased flight time supports the notion implied by Kern's model that Vocational Excellence is foundation on which professionalism is built.

The findings of the Pilot subgroup also support Kern's (2011) model with respect to its domains of Continuous Improvement and Professional Engagement. As noted earlier, the Pilot subgroup had the highest level of professional activity. Pilots were actively involved within their profession with respect to the number of professional courses they took, the number of professional books they purchased, the number of hours per week they spent engaged in professional reading, and their activity/membership in professional organizations. The first two activities—taking professional courses and purchasing professional books—demonstrate continuous improvement, and the last two activities—weekly hours spent in professional reading and participation in professional organizations—demonstrate professional

engagement. These findings are what one would expect to find when examined from the perspective of the attributes associated with a Level III professional as reflected in Kern's model.

Implications relative to prior research. This section provides a comparison of the current study's findings as they relate to the findings of the prior research presented in Chapter 2. Given the primary focus of the current study—to perform a secondary analysis of Alhallaf (2016) by disaggregating his data and examining factors significantly related to professionalism within each of the disaggregated subgroups—this section will be weighted toward comparing the results of the current study to those of Alhallaf.

Professionalism in the aviation profession: A comparison to Alhallaf. The findings of the current study, to some degree, were consistent with those of Alhallaf (2016). Alhallaf identified specific factors that were related to the participants' level of professionalism across the aviation profession from an aggregate perspective. His findings included significant relationships involving marital status, race/ethnicity, annual income, education, and level of activity/involvement as measured by Kramer's (1974) IOP. A brief discussion of each follows.

Marital status. Alhallaf (2016) reported that "Divorced participants averaged 4.4 units higher on their HPI scores than married participants" (p. 144). In the current study, though, marital status was not a significant predictor of professionalism for any of the subgroups. One plausible explanation for this

inconsistency is the operational definition of marital status. In the current study, marital status was defined as a dichotomy between married and not married, where this latter group included single but never married, divorced, separated, and widowed. Furthermore, in all five subgroups "married" represented at least 60% of the participants, which resulted in small and disparate sample sizes among the various factions of the "not married" group. Alhallaf, however, defined marital status via three groups: single, married, and divorced, where single included single but never married, separated, and widowed. The implication here is that it makes a difference on how one defines marital status if this factor is to be examined as a correlate to professionalism.

Race/Ethnicity. Alhallaf (2016) treated race/ethnicity as a dichotomous variable that consisted of the comparison between Other vs. White/Caucasian where Other represented African American, Asian American, Hispanic, Middle Eastern, and Other, and reported "… (Other) had a significantly lower level of professionalism than White/Caucasian participants" (p. 146). This dichotomy also was used in the current study, and findings were consistent with Alhallaf's findings relative to the Airport Managers ($\alpha = .065$) and NPAE subgroups. In both subgroups, nonWhite Caucasians had significantly lower levels of professionalism than White Caucasians. However, as observed earlier in this chapter, this significant difference in the Airport Managers subgroup most likely was due to disparate sample sizes, and the significant difference in the NPAE subgroup most

likely was due to the diverse nature of the sample. Nevertheless, and independent of the plausible explanations given in the current study, the implication here is that race/ethnicity was a significant predictor from both aggregate and disaggregates perspectives and therefore is critical to understanding correlates to professionalism.

Annual income. Alhallaf (2016) reported three significant income categories: "Participants whose annual incomes were respectively between $40,000 and $49,999, $50,000 and $59,999, and $70,000 and $79,999 had significant lower professionalism scores than participants whose annual income was less than $40,000" (p. 147). The results of the current study were partially consistent with those of Alhallaf. Of the five subgroups, annual income was a significant predictor of professionalism for two subgroups: AMTs and Pilots. In the AMT subgroup, those earning $100K to $150K annually had a significantly higher level of professionalism than those earning between $50K to $100K. This significant relationship, though, was only present in the final stage of the hierarchical analysis. In the Pilots subgroup, pilots earning under $50K annually had a significantly lower level of professionalism than those earning $50K to $100K. This significant relationship, though, was only present in during the first stage of the hierarchical analysis. Once additional variables entered the model, they fully mediated this relationship.

There are two plausible explanations for these differences: (a) Alhallaf's (2016) annual income categories were different than those of the current study, and

(b) his results were based on an aggregate basis whereas those of the current study were based on a disaggregate basis. Nevertheless, annual income was a significant predictor independent of the categories used and was prominent from both aggregate and disaggregates perspectives. This implies that this factor is critical to understanding correlates to professionalism.

Education. Alhallaf (2016) defined education level as a dichotomy that compared graduate degree (master's and doctorate) vs. 4-year college degree or less. Based on this dichotomy, he reported "… participants who had a graduate degree had a significantly higher level of professionalism than participants who had a 4-year degree or less" (p. 148), but this significance level was at $\alpha = .06$ and not at the preset alpha level of $\alpha = .05$.

In the current study, a slightly different comparison of education level was used: (a) less than 4-year college degree vs. 4-year college degree, and (b) graduate degree vs. 4-year college degree. Based on these education level comparisons, the results of the current study were not consistent with those of Alhallaf. Of the five subgroups, education level was part of the analyses involving two subgroups: ATC and NPAE. In the ATC subgroup, air traffic controllers who had either less than a 4-year college degree or a graduate degree had a lower level of professionalism than those who had a 4-year college degree, but this difference in levels of professionalism was not significant. However, in the NPAE subgroup, those with a

graduate degree had significantly higher levels of professionalism than those with a 4-year college degree.

Two plausible explanations for these differences include the different categories used to define education level, and Alhallaf (2016) examined education level from an aggregate perspective whereas the current study examined it from a disaggregate perspective relative to the targeted subgroups. Nevertheless, education level was a significant predictor independent of the categories used and was relevant in both the aggregate and disaggregates analyses. This implies that this factor is critical to understanding correlates to professionalism.

Level of activity/involvement. Both Alhallaf (2016) and the current study used Kramer's (1974) Index of Professionalism (IOP) to measure participants' level of professional activities and involvement. Alhallaf reported, "IOP scores had a significant and direct relationship with professionalism" (p. 151). With the exception of the ATC subgroup, the results of the current study were consistent with those of Alhallaf across all of the other subgroups. In each case, there was a significant and direct relationship between participants' level of professional activity/involvement and their level of professionalism. This consistency in the findings between the two studies gives credibility to the influence professional activity/involvement has on a person's level of professionalism.

Alhallah (2016) also conducted an independent analysis between participants' level of professionalism as measured by Snizek's (1972) Hall's

Professionalism Inventory (HPI), and their scores on Kramer's (1974) IOP scale. Alhallaf reported a significant relationship between these two sets of scores, and the significant IOP factors were (a) number of professional journal subscriptions, (b) number of professional book purchases, (c) activity/membership in professional organizations, (d) number of professional speeches, and (e) activity within the employing organization. These findings were consistent with Kern's (2011) model of Level III professionalism, which includes domains of Continuous Improvement and Professional Engagement. Thus, to be a productive professional one is required to be actively involved within the profession.

Because I disaggregated Alhallaf's (2016) archival data and formed subgroups in parallel with the purpose of the current study, I did not deem it necessary to do an independent analysis. However, the results of my item analysis for the IOP scale on a subgroup basis yielded some different results than Alhallaf. For example, the highest scored item for all five subgroups was related to the number of professional courses participants took, which was not significant in Alhallaf's study. As another example, one of the least scored items in the current study was related to participant's activity within the employing organization, but Alhallaf's study found this activity to be significant.

Professionalism in other professions. A brief comparison of the results of the current study to those of studies in other non-aviation professions follows.

Healthcare and nursing. Wilkinson et al. (2009) reported that education level and level of professional activity/involvement had a direct and significant relationship to professionalism. Kim-Godwin et al. (2010) reported that a significant factor to professionalism among Korean American registered nurses was engagement in the profession. Wynd (2003) reported that among a sample of registered nurses, years of experience, education, and membership in professional organizations were significantly related to professionalism. The reader will note that the common factors among these studies are levels of education and professional engagement. As presented earlier, the current study also found that these factors were significantly related to professionalism with respect to certain subgroups. As a result, the findings of the current study provide further support and credibility for these factors' influence on professionalism.

Education. Ifanti and Fotopoulou (2011) reported that teachers in their study regarded professionalism and professional development as a multidimensional and complicated process. The findings of the current study, when examined from the perspective of Research Question 3, support Ifanti and Fotopoulou's conclusion. For example, participants in the current study, regardless of subgroup, consistently perceived professionalism from a cognitive perspective (e.g., an attitude or mind-set) as opposed to a behavioral perspective, which can be measured empirically. When considered from a cognitive perspective, this perception of professionalism implies a "multidimensional and complicated process."

Business and accounting. Araugo and Beal (2013) reported that a consistently discussed mark of professionalism in their focus groups was the maintenance of personal integrity and continuous learning, and Shafer et al. (2002) reported that participants' job, gender, years of experience, and education level had no significant effect on professionalism. The findings of the current study were mostly consistent with the findings of both of these previous studies. For example, continuous learning, which was equivalent to Kern's third domain (Continuous Improvement), was prevalent among all subgroups except for the ATC subgroup. Furthermore, the current study also found no significant relationship between the demographic factors of gender and years of experience, but education level was significant for the NPAE subgroup.

Legal and law enforcement. Carlan and Lewis (2009) reported no significant relationship between professionalism and the personal demographic variables of age, race, gender, and marital status. The results of the current study were partially consistent with these findings. For example, age, gender, and marital status were not significant factors across all five subgroups, but race/ethnicity was significant in the Airport Managers ($\alpha = .065$) and NPAE subgroups.

In summary, the results of the current study, for the most part, were similar to those of the healthcare/nursing, education, business/accounting, and legal/law enforcement professions. Alhallaf (2016) also reported mostly consistent findings with these professions. The reader will recall that Alhallaf's study was holistic in

nature and conducted across the aviation profession as a whole whereas the current study disaggregated Alhallaf's data into five subgroups that reflected a large proportion of the aviation industry. Because both Alhallaf's study and the current study reported similar significant factors with professionalism as these other studies, this provides further support for factors relate to professionalism.

Implications relative to practice. The main implications for practice of the current study's findings are important and discussed with respect to each of the five targeted aviation subgroups.

Aircraft maintenance technicians. The first implication of the study's findings relative to practice for the AMT subgroup is related to the effect income level had on professionalism scores. As reported earlier, AMTs whose annual income was between $100K and $150K had a significantly higher level of professionalism than those who earned between $50K to less than $100K. This finding implies that one way to increase the level of professionalism among aircraft maintenance technicians is to increase their annual salaries. However, the reader will note that this finding was between the salary brackets of what would be considered younger, entry- to mid-level technicians vs. experienced, management-level technicians. Therefore, a more appropriate implication is that, independent of salary, added experience coupled with management responsibilities appear to be strong indicators of professionalism among the AMT subgroup.

A second implication of the study's findings relative to practice for the AMT subgroup is related to professional activities and involvement as measured by the IOP. The reader might recall that AMTs were fairly active or involved in their profession relative to the number of professional courses they took, the number of professional journals they subscribed to, the number of professional books they purchased, and the number of hours per week they spent engaged in professional reading. The current study found that these activities had a significant and direct relationship with AMTs' level of professionalism. This finding implies that promoting continuous improvement in the form of these activities could increase professionalism within the AMT profession.

A third implication of the study's findings relative to practice for the AMT subgroup is related to the between groups analysis of Research Question 2. The study found no significant difference in the mean level of professionalism between the AMT subgroup and the other four subgroups. This implies that when it comes to professionalism within the aviation industry as a whole, the AMT profession does not need to be concerned about its status within the aviation industry because its level of professionalism appears to be on par with its counterparts across the aviation spectrum.

Airport managers. Similar to the AMT subgroup, one implication of the study's findings relative to practice for the Airport Managers subgroup is related to professional activities and involvement as measured by the IOP. The reader might

recall that airport managers were fairly active or involved in their profession relative to the number of professional courses they took and through their membership in professional organizations. These activities/involvements also were significantly related to professionalism. This finding implies that promoting continuous improvement in the form of these two activities could increase professionalism among airport managers.

A second implication of the study's findings relative to practice for the Airport Managers subgroup is related to demographic factors. The current study found no significant relationship between professionalism and airport managers' gender, marital status, age, race/ethnicity, annual income, and level of education. This implies that efforts to increase professionalism within the airport manager profession should be not directed at these factors. For example, based on the overall findings for the Airport Managers subgroup, it appears that taking professional courses related to the airport manager profession is more important to improving professionalism than earning a formal college degree.

A third implication of the study's findings relative to practice for the Airport Managers subgroup is related to the between groups analysis of Research Question 2. Although not significant, the study found that the Airport Managers subgroup had a higher mean level of professionalism than all the other subgroups except for the Pilots subgroup. This implies that when it comes to professionalism within the aviation industry as a whole, although airport managers are near the top of the

industry, they also might benefit from examining what pilots are doing to promote professionalism.

***Air traffic controllers*.** Similar to the Airport Managers subgroup, the first implication of the study's findings relative to practice for the ATC subgroup is the lack of significance found among the demographic factors of gender, marital status, age, race/ethnicity, annual income, and level of education. This implies that efforts to increase professionalism within the ATC profession should be not directed at these factors.

This implication also can be extended to professional activity/involvement as measured by the IOP. The reader might recall that none of the professional activities measured by the IOP was significantly related to professionalism within the ATC subgroup. This implies that increasing professionalism by promoting continuous improvement through activities such as taking professional courses, reading the professional literature, and being actively involved in professional ATC organizations is problematic for air traffic controllers.

A third implication of the study's findings relative to practice for the ATC subgroup is related to the between groups analysis of Research Question 2. The study found that the ATC subgroup had the lowest mean level of professionalism among the five subgroups, and that when compared to the Pilots subgroup, this difference also was statistically significant. This implies that when it comes to professionalism within the aviation industry as a whole, the ATC profession should be seriously

concerned about its status within the industry because its level of professionalism is below its counterparts across the aviation spectrum.

Non-pilot aviation employees. The first implication of the study's findings relative to practice for the NPAE subgroup is related to the effect race/ethnicity had on professionalism scores. As reported earlier, within the NPAE subgroup nonWhite Caucasian employees, which consisted participants who reported their race/ethnicity as African American, Asian American, Hispanic, and Other, had significantly lower levels of professionalism than White Caucasian employees. Although the NPAE subgroup was the most diverse of the targeted five subgroups—it consisted of the business side of aviation (sales, finance, and management), flight operations (safety, security, flight attendants, dispatchers, and IT personnel), and college/university faculty—this finding implies that cultural differences could be impacting professionalism.

A second implication of the study's findings relative to practice for the NPAE subgroup is related to level of education. The study found that NPAE participants with a graduate degree, which was approximately 50% of this subgroup, had a significantly higher level of professionalism than those with a 4-year college degree. This implies that among the various professions within the NPAE subgroup (business aviation, flight operations, and education) an advanced college degree beyond the post-baccalaureate level is beneficial to promoting a high level of professionalism. However, the reader is cautioned not to read too much into this implication because

many of these professions not only require an advanced degree but also are highly sensitive to the concept of professionalism. For example, recall that the NBAA established the Dr. Tony Kern Aviation Professionalism Award, and colleges and university/faculty generally promote the ethics and professionalism within their courses. Thus, professionalism simply might be ingrained within these professions and might not be related to education level.

A third implication of the study's findings relative to practice for the NPAE subgroup is related to professional activities and involvement as measured by the IOP. The reader might recall that NPAEs were fairly active or involved in their profession relative to the number of professional courses they took and through their membership in professional organizations. This activity/involvement also were significantly related to professionalism. This finding implies that promoting continuous improvement in the form of these two activities could increase professionalism among NPAE employees.

A fourth implication of the study's findings relative to practice for the NPAE subgroup is related to the between groups analysis of Research Question 2. The study found that three subgroups—AMTs, Airport Managers, and Pilots—had higher mean levels of professionalism then the NPAE subgroup, and the difference between Pilots and NPAEs was statistically significant. This implies that when it comes to professionalism within the aviation industry as a whole, the various professions that

comprised the NPAE subgroup should be concerned about their status within the aviation industry because it appears to be below their counterparts.

Pilots. The first implication of the study's findings relative to practice for the Pilots subgroup is related to total flight hours. As reported earlier, there was a positive and significant relationship between flight hours and professionalism. This finding implies that the various experiences associated with flight time, including personal interactions with air traffic controllers, cabin crew, ground personnel, and different aircraft, all make a positive contribution to professionalism.

A second implication of the study's findings relative to practice for the Pilots subgroup is related to professional activities and involvement as measured by the IOP. The reader might recall that pilots were fairly active or involved in their profession relative to the number of professional courses they took, the number of professional books they purchased, the number of hours per week they spent engaged in professional reading, and through their activity/membership in professional organizations. The current study found that these activities had a significant and direct relationship with pilots' level of professionalism. This finding implies that promoting continuous improvement in the form of these activities could increase professionalism within the Pilot profession.

A third implication of the study's findings relative to practice for the Pilots subgroup is related to the between groups analysis of Research Question 2. When compared to the other four subgroups, the Pilots subgroup had the highest mean level

of professionalism, and the differences between Pilots and the ATC and NPAE subgroups were statistically significant. This implies that when it comes to professionalism within the aviation industry as a whole, pilots are to be considered the benchmark against which professionalism in all the other segments of the aviation industry should be measured.

Generalizability, Limitations, and Delimitations

Generalizability. The generalizability of a study may be examined from both population and ecological perspectives. The former involves estimating the extent to which the findings of a study, based on sample data, may be generalized to the parent population, and the latter refers to the extent to which the findings of a study may be generalized to different settings or populations.

For the current study, population generalizability is problematic because I had no control over the sampling strategy as well as the integrity of the data. This is further exacerbated by the paucity of parent population demographics for each of the subgroups. For example, although the FAA provides demographic information about pilots, it does not maintain a similar demographic database for any other professions in aviation, including the current study's subgroups. Furthermore, the respective professional organizations do not publicly provide such information about their membership. To mitigate these limitations, I provided detailed demographic data for each subgroup in Tables 3.1 through 3.6 (Chapter 3). Therefore, the approach I chose to deal with population generalizability was to present a typical profile of each

subgroup's sample to better inform the reader about any decisions he/she makes relative to the generalizability of the study's findings to any subgroup population. A brief discussion for each subgroup follows.

Aircraft maintenance technicians. The majority of the AMT sample was comprised of White, middle aged (M = 46 years old), married males who had at most a 4-year college degree, had an average of approximately 24 years of experience, and earned between $50,000 to $99,999 annually. As a result, the study's findings for the AMT subgroup would be generalizable to this restricted population.

Airport managers. The majority of the Airport Managers sample was comprised of White, middle aged (M = 40 years old), married males who were highly educated with at least a 4-year college degree, had an average of approximately 15 years of experience, and earned between $50,000 to $99,999 annually. As a result, the study's findings for the Airport Managers subgroup would be generalizable to this restricted population.

Air traffic controllers. The majority of the ATC sample was comprised of an equally split between White Caucasian and nonwhite Caucasian, middle aged (M = 44 years old), married males who had a 4-year college degree, had an average of approximately 22 years of experience, and earned between $50,000 to $99,999 annually. As a result, the study's findings for the Air Traffic Controllers subgroup would be generalizable to this restricted population.

Non-pilot aviation employees. The NPAE subgroup consisted of (a) aviation personnel on the business side of aviation, including sales/finance and management; (b) flight operations, including safety, security, flight attendants, dispatchers, and IT personnel; and (c) college/university faculty teaching in an aviation program. Furthermore, these participants worked in either the public or private sector. The sheer diversity of this subgroup makes generalizability difficult. Nevertheless, based on the demographics of this subgroup, the sample was comprised of mostly White, middle aged (M = 42 years old), married males who had at least a 4-year college degree, had an average of approximately 18 years of experience, and earned less than $100,000 annually. As a result, the study's findings for the NPAE subgroup would be generalizable to this restricted population.

Pilots. The Pilots subgroup included anyone who listed his or her primary vocation as a pilot. This included airline transport pilots, commercial/corporate pilots, and air cargo pilots. Although the FAA maintains a public database that lists the attributes of various subgroups of pilots, including student, private, commercial, ATP, recreational, sport, rotorcraft, and glider, no distinction was made among the different pilot groups in the current study. As a result, generalization of the study's findings to the population of pilots is restricted to pilots who are employed full-time as a pilot with the following characteristics: 44 years old, male, married, White,

earning anywhere between less than $50,000 to more than $150,000 annually, have at least a 4-year college degree, and have 22 years of experience.

With respect to ecological generalizability, according to Alhallaf (2016, p. 71), the sample data were collected from "individuals who study or work in the aviation industry in the United States." Independent of any cultural differences across the world, there is very little difference in the aviation profession internationally. For example, countries that support aviation will have aircraft maintenance technicians, airport managers, air traffic controllers, business aviation personnel, flight attendants, dispatchers, and pilots. Furthermore, the rules and regulations governing international aviation are under the auspices of the International Civil Aviation Organization (ICAO), which is a United Nations specialized agency that manages the administration and governance of the Convention on International Civil Aviation. As a result, the findings of the current study most likely would be generalizable to the same subgroups in other countries.

Study limitations and delimitations. The last part of this chapter presents a discussion on the recommendations for future research relative to the study's limitations and delimitations. To make it easy for the reader to reflect on this discussion, the limitations and delimitations from Chapter 1 are restated here as a convenience to the reader.

Limitations. As noted in Chapter 1, the limitations of a study are circumstances, conditions, or events that are beyond the control of the researcher and

could limit the generalizability of the study's findings. A description of the limitations of the current study follows, and the reader is advised to take into consideration these limitations when interpreting the results of the current study.

1. Integrity of the archived data. The current study involved a secondary analysis of Alhallaf's (2016) data as discussed earlier. Therefore, I did not have any control over the integrity of the data, including the number of participants and the honesty of their responses. Furthermore, the data also were acquired via a questionnaire that participants accessed electronically at a remote survey website. Therefore, similar studies that involve a different number of participants and data collection procedures might get different results.

2. Sample representativeness. As noted earlier, the current study disaggregated Alhallaf's (2016) data into five targeted subgroups of Aircraft Maintenance Technicians (AMTs), Airport Managers, Air Traffic Controllers (ATC), Non-Pilot Aviation Employees (NPAE) and Pilots. The NPAE subgroup included business, flight operations, and college/university faculty. How representative these subgroups were to their respective target populations is unknown because Alhallaf focused on the aviation profession as a whole and not as independent subgroups. Furthermore, Alhallaf restricted his sample to the U.S. aviation industry. Therefore, subsequent studies that focus on different subgroups, or focus on the same subgroups but outside the U.S., might get different results.

3. Sample size. Because the current study was a secondary analysis of Alhallaf's (2016) data, the sample size was limited to the number of participants within each of the aviation subgroups who completed the questionnaire. Therefore, subsequent studies that employ larger or smaller sample sizes for each subgroup might get different results.

4. Type and source of study. The current study was a secondary analysis of Alhallaf's (2016) data and therefore was restricted to his archived data. As a result, if a similar study were to be conducted that collected data directly from participants in the five subgroups being targeted, the results might be different.

5. *Time factor.* The data collection period for the study was the consecutive 4-month period that ended August 2015. Therefore, similar studies that use a different data collection period might not get the same results. This is important to note because the awareness of the importance of professionalism has increased in aviation within the last few years.

6. Data collection instruments. The current study utilized Alhallaf's (2016) archival data, which were acquired from an instrument he prepared. This instrument may include unknown flaws with respect to validity and reliability. Therefore, similar studies that use a different data collection instrument to collect participants' perceptions of professionalism, aviation experience, and demographics, or use different standardized instruments to measure professionalism, might not get the same results.

7. Sampling sources. The current study was limited to Alhallaf's (2016) data. Participants who provided these data were members, employees, or subscribers of the following organizations: National Air Traffic Controllers Association, American Association of Airport Executives, University Aviation Associations, Society of Aviation and Flight Educators, Curt Lewis & Associates' mailing list, International Society of Air Safety Investigators, National Association of Flight Instructors, National Business Aviation Association, alumni from Embry-Riddle Aeronautical University and Florida Institute of Technology, Aeronautical Repair Station Association, and Aviation Technician Education Council. Therefore, similar studies that use different sampling sources within the aviation industry might not get the same results.

***Delimitations*.** As noted in Chapter 1, delimitations are researcher-imposed circumstances, conditions, or events that are necessary to make the study manageable and feasible to be implemented, but further limit the generalizability of a study's findings. A description of the delimitations of the current study follows, and the reader is advised to take into consideration these delimitations when interpreting the results of the current study.

1. Formation of subgroups. The formation of the five subgroups was guided by three key factors. The first factor was data-driven and consisted of participants' responses to the background section of Alhallaf's (2016) questionnaire. As part of this section Alhallaf asked participants to self-report their employment status, field

or position of employment, the aviation segment they worked in, and their work setting or employer. These data were examined from a content analysis perspective, which led to the emergence of 12 major factions within the aviation industry. The second factor was theory-driven and was based on Edwards' (1981) SHELL model. The last factor was personal experience-driven. I applied my 2 decades of personal industrial experience within the aviation profession to the results from the first two factors to determine the final five subgroups. As a result, subsequent studies that analyze Alhallaf's (2016) data by forming different subgroups might not get the same results.

2. Incomplete cases. According to Alhallaf (2016), his initial data set consisted of 1,100 cases, of which 439 cases (39%) were incomplete because of missing data. Although Alhallaf chose to delete these cases, I followed Cohen, Cohen, West, and Aiken's (2003) guidelines for missing data. Therefore, subsequent studies that disaggregate Alhallaf's data but treat his missing data differently might get different results.

3. Statistical strategies. The current study employed a hierarchical multiple regression strategy to test Hypothesis 1, a between groups ANOVA strategy to test Hypothesis 2, and descriptive statistics to answer Research Question 3. Therefore, subsequent studies that disaggregate Alhallaf's (2016) data but use different statistical strategies might get different results.

Recommendations for Future Research and Practice

The purpose of the current study was to conduct a secondary analysis of Alhallaf's (2016) data by disaggregating the data into five subgroups and examining within each subgroup factors that are strongly associated with professionalism, differences in the levels of professionalism, and differences in the perceptions of professionalism. The subgroups were aircraft maintenance technicians, airport managers, air traffic controllers, non-pilot business aviation employees, and pilots. In previous sections of this chapter, I presented inferences and implications relative to the study's findings, and I also replicated the study's limitations and delimitations from Chapter 1. In this section I present a set of recommendations for future research relative to the study's limitations, delimitations, and implications. I then conclude this section (as well as the chapter) with a set of recommendations for practice relative to the study's implications.

Recommendations for future research relative to study limitations. Following is a set of recommendations for future research based on the current study's limitations.

1. In the current study, I did not have any control over the integrity of the data, the veracity of the responses, and the manner in which the data were acquired. Hence, a recommendation for future research is to replicate Alhallaf's study by personally administering the data collection instrument.

2. The current study's sample was restricted to the U.S. aviation industry and participants self-reported the aviation segment in which they were employed. Therefore, a recommendation for future research is to replicate Alhallaf's (2016) study outside the U.S. and then conduct a secondary analysis of the corresponding data by disaggregating the data into the same five subgroups used in the current study.
3. The sample sizes associated with each subgroup were limited to what Alhallaf (2016) provided. For some subgroups they were sufficient, but in other subgroups the sample sizes were insufficient either overall or with respect to Set A = Demographics relative to power. Therefore, a recommendation for future research is to augment each subgroup's sample size to meet the minimum required from an a priori power analysis by administering the questionnaire directly to those subgroups.
4. The current study was a secondary analysis of Alhallaf's (2016) data, which were then disaggregated into the targeted five subgroups. Therefore, a recommendation for future research is to collect data directly from participants within a particular segment by enlisting the support of professional organizations associated with each segment. This could include the Professional Aviation Maintenance Association (PAMA), the American Association of Airport Executives (AAAE), the Professional Air Traffic Controllers Organization (PATCO), and the Professional Pilots Association (PPA).

5. The current study's data was cross-sectional and included a data collection period between May and August 2015. Therefore, a recommendation for future research is to (a) replicate Alhallaf's (2016) study using a different data collection period, and then (b) replicate the current study by disaggregating the data from this subsequent study into the same subgroups.
6. The data from the current study were collected from Alhallaf's (2016) researcher-prepared instrument, which included Snizek's (1972) Hall's Professionalism Inventory (HPI) and Kramer's (1974) Index of Professionalism (IOP). Therefore, a recommendation for future research is to (a) replicate Alhallaf's study using different data collection instruments to measure professionalism, and then (b) replicate the current study by disaggregating the data from this subsequent study into the same subgroups.
7. The data used in the current study were acquired from participants who were associated with various organizations listed earlier. Therefore, a recommendation for future research is to (a) replicate Alhallaf's (2016) study that targets different organizations, and then (b) replicate the current study by disaggregating the data from this subsequent study into the same subgroups.

Recommendations for future research relative to study delimitations.

Following is a set of recommendations for future research based on the current study's delimitations.

1. As noted earlier, the current study disaggregated Alhallaf's (2016) data into five subgroups, and the creation of these subgroups was guided by data, theory, and personal experience. Therefore, a recommendation for future research is to replicate the current study by disaggregating Alhallaf's data into subgroups that are formed using a different theory and different personal experiences to guide their creation.
2. For the current study, missing data were treated as information per Cohen et al.'s (2003) guideline and not deleted. As a result, a recommendation for future research is to employ a different missing data strategy or delete all cases with missing data to see if similar results are obtained.
3. The current study's research questions were answered using (a) hierarchical multiple regression, (b) single-factor between groups ANOVA, and (c) descriptive statistics. Therefore, a recommendation for future research is to employ a different statistical approach. For example, a hypothesized causal model could be presented and examined using structural equation modeling, and Kruskal–Wallis could be used to examine the ranked data associated with Research Question 3.

Recommendations for future research relative to implications. Following is a numbered list that contains a set of recommendations for future research that corresponds to the study's implications relative to theory and prior research.

1. With the exception of the ATC subgroup, all subgroups were considered partial Level III professionals relative to Kern's (2011) model of professionalism. This was demonstrated through the participants' professional activity/involvement as measured by Kramer's (1974) IOP. These activities were consistent with Kern's professional competencies related to Continuous Improvement, Professional Engagement, and Professional Image. Therefore, a recommendation for future research is to measure these competencies directly using a different instrument than the IOP.
2. Since Alhallaf's (2016) study, Kern's (2011) model of professionalism has been revised to include a seventh domain, Mentorship, which corresponds to a new Level IV professional. This new level represents the pinnacle of professionalism and was not examined in the current study. Therefore, a recommendation for future research is to apply Kern's revised model to studies involving professionalism within aviation.
3. Augmenting on the first and second recommendations, it is further recommended that future research be conducted with entirely homogeneous group comparisons different than the current study's researcher-formed NPAE subgroup. Examples include comparing (a) pilots vs. flight attendants, (b) business aviation pilots (Part 135 operations) vs. scheduled commercial airline pilots (Part 121 operations), (c) airline ground operations employees vs. airport ground operations, and (d) air traffic controllers in the U.S. vs. air traffic controllers in

the U.K. The findings from these future studies should then be examined relative to Kern's (2011) model of professionalism and compared to the findings of the current study.

4. Findings of the current study also were consistent with the findings of the healthcare/nursing, education, accounting/business, and legal professions. These findings imply there are similarities of the concept of professionalism with respect to these professions and the aviation profession. This is not surprising because interrelationships and interdependencies within these industries are in part similar to these industries. Moreover, teamwork is the essential core component for success in these professions similarly to aviation professions. Therefore, a recommendation for future research is to conduct similar studies to the current study with respect to subgroups in these other industries.
5. Consistent with the findings of studies conducted in the healthcare/nursing, education, accounting/business, and legal professions, the findings of the current study confirmed that education level, income level, and level of professional activity/involvement were all significantly related to professionalism. Therefore, a recommendation for future research is that studies involved in examining professionalism include these factors.
6. Consistent with the findings of studies conducted in the healthcare/nursing, education, accounting/business, and legal professions, the findings of the current

study confirmed that demographic factors such as gender, age, and marital status were not significantly related to professionalism. Therefore, a recommendation for future research is that studies involved in examining professionalism exclude these factors.

7. The current study found years of experience to be significantly related to professionalism for the NPAE subgroup in the presence of the demographics set. However, this factor lost its significance when IOP scores entered the analysis, which implies that IOP scores mediated the relationship between years of experience. The significance of years of experience is consistent with Kern's (2011) first domain, namely, Vocational Excellence, which corresponds to a Level I professional and includes technical credibility, personal discipline and compliance, attention to detail, diligence, nontechnical excellence, and problem solving. Within the context of the NPAE subgroup, these characteristics are inherent in their years of experience within their designated profession. Furthermore, professional activity/involvement as measured by Kramer's (1974) IOP is consistent with Kern's Level III professional. Given that Kern's Level III includes Level I, it is reasonable to presume that IOP scores mediated years of experience with respect professionalism. Therefore, a recommendation for future research is to specifically examine this suspected mediation.
8. The current study found annual income to be significantly related to professionalism in the Pilot subgroup, but this factor was not significant in the

presence of total flight hours. The study also found that gender, which is not applicable to Kern's (2011) model, was not a significant factor initially, but then became significant in the presence of total flight hours. However, in the final analysis only IOP scores and total flight hours were significant. When applied to Kern's (2011) model of professionalism, total flight hours falls within the Vocational Excellence domain and represents a Level I professional. As noted in the previous recommendation, professional activity/involvement as measured by Kramer's (1974) IOP is consistent with Kern's Level III professional. Given that Kern's Level III includes Level I, it is reasonable to presume that IOP scores mediated total flight hours with respect professionalism. Therefore, a recommendation for future research is to specifically examine this suspected mediation.

9. Another finding of the current study was race/ethnicity was a significant predictor of professionalism for both the Airport Managers ($\alpha = .065$) and NPAE subgroups. In both subgroups, nonWhite Caucasians had significantly lower levels of professionalism than White Caucasians. However, as discussed earlier in this chapter, this significant difference in the Airport Managers subgroup was most likely due to disparate sample sizes, and the significant difference in the NPAE subgroup was most likely due to the diverse nature of the sample. Although race/ethnicity is not applicable to Kern's (2011) model, nevertheless a

recommendation for future research is to conduct studies with larger and more homogeneous subgroups to investigate this finding further.

10. Similar to prior studies involving professionalism, the current study examined professionalism within the aviation profession on a subgroup basis from a quantitative approach. Given the complexity of the concept of professionalism, especially on comparing subgroups, combined with the multifaceted nature of the aviation profession, a recommendation for future research is to examine the concept from a purely qualitative approach.

Recommendations for practice relative to implications. Following is a numbered list that describes recommendations for practice that correspond to the study's implications.

1. The study's findings demonstrated that annual income was a significant predictor of professionalism for the AMT and Pilots subgroups. In both instances, higher income levels equated to higher levels of professionalism. Therefore, a recommendation for practice is that employers within other aviation subgroups such as ATC, Airport Managers, and business aviation, flight operations, schools/colleges of aviation should consider paying more attention to this relationship. For example, perhaps seniority and years of experience could be rewarded with higher increases in annual income to achieve higher levels of professionalism.

2. Augmenting the first recommendation, a recommendation for practice is that labor unions in the aviation profession across the board should support their members for higher annual income to reach higher levels of professionalism levels. In fact, they could use this argument as a part of their collective bargaining process during negotiations with management, because higher levels of professionalism would lead to maximizing safety standards and practices within the industry.
3. With exception of ATC subgroup, the current study's findings demonstrated that IOP scores, which measured participants' level of professional activity/involvement, had a direct relationship with professionalism. Thus, as participants were more actively involved in activities related to their profession, their level of professionalism increased. Therefore, a recommendation for practice is employers within all aviation subgroups should continue to promote active involvement among their employees in their respective professions.
4. Augmenting the IOP scores relationship with professionalism, the ATC subgroup should be encouraged, supported, and guided to participate in professional activities to achieve similar levels of professionalism as the other subgroups of the aviation industry. One suggestion is for ATC professional organizations such as the National Air Traffic Controllers Association (NATCA) and the Air Traffic Controllers Association (ATCA) to further promote professional involvement.
5. The study's findings demonstrated that specific activities relative to the IOP (see Tables 4.14–18 and items D_1, D_2, D_3, D_4, and D_5) were common to most subgroups

with the exception of ATC, and these activities enhanced participants' levels of professionalism. Therefore, a recommendation for practice is that all individuals working within the various subgroups of aviation do the following relative to their respective professions: (a) continue taking professional courses, (b) subscribe to professional journals, (c) obtain or gain access to professional books, (d) allot certain number of hours per week to professional reading, and (e) increase their level of activity/membership in professional organizations.

6. Augmenting the specific activities relative to the IOP, another recommendation for practice is that employers within the aviation profession offer incentives to their employees to pursue professionally related activities. Examples include (a) establishing promotional criteria that include incentives related to professional activities; and (b) offering bonuses, which could include additional income, for employees who meet certain professional benchmarks. In fact, labor unions might consider including incentives related to professional activities and engagements as part of their collective bargaining agreements (CBAs) similar to any other benefit such as employee salaries and other benefits that are part of a CBA.
7. Accenting the significance of professional activity/involvement, another recommendation for employers is to establish professional libraries (online or on company premises) for their organizations and allot their employees a few hours a week for professional reading. This recommendation also is extended to the respective federal agencies such as the FAA and NTSB.

8. The study's findings demonstrated that the ATC subgroup scored the lowest in both Snizek's (1972) 25-item Hall's Professionalism Inventory (HPI), which served as the dependent variable, as well as Kramer's (1974) nine-item Index of Professionalism (IOP) scale, which measured the professional activities and engagements. The reader also is reminded that the ATC subgroup scored even lower than the least homogeneous subgroup of the study, which was the NPAE subgroup, and ATC subgroup ranked "being ethical" lowest among the five cognitive perspectives of professionalism. Air traffic controllers' level of professionalism and their perception of professionalism not being on similar levels with the other aviation subgroups is a major concern, because safe aviation activities involve interrelationships and interdependencies among all subgroups. The reader might recall from Chapter 1 that air traffic controllers were contributing factors to the world's two most deadly accidents. As a result, a recommendation for practice is to consider the privatization of ATC entirely in the U.S. similar to countries that have privatized their ATC systems in the past such as U.K., Germany, Australia, Canada, New Zealand, and Switzerland.
9. The study's findings demonstrated that participants with a graduate degree had a significantly higher level of professionalism than those who had a 4-year college degree within the NPAE subgroup, which consisted of business aviation, flight operations, and schools/colleges of aviation. As a result, a recommendation for practice is that these non-pilot aviation employees strive to attain a graduate degree,

and that their respective employers support their employees' higher education endeavors. This employer support could also be used as an incentive for their employees' career advancement. This recommendation also could be extended to other subgroups.

10. One area of investigation in the current study asked participants about their perceived understanding of the concept of professionalism within their vocation. This was accomplished by asking them to rank a set of items to the lead phrase "I believe professionalism is based on or related to..." As reported in Table 4.13 (Chapter 4), the top five ranked items on a subgroup basis related to cognitive constructs (attitudinal/mindset) such as being competent and ethical whereas the bottom five ranked items related to behavioral constructs (empirical/practical) such as years of experience and education level. These perceptions partially contradicted the findings of the IOP, which showed that professional activities/involvement, which are empirical and practical in nature, had a direct relationship with professionalism. Therefore, a recommendation for practice is for employers within all subgroups to include the concept of professionalism as part of their organization's strategic planning and goals, and to promote specific professional activities that are positively related to professionalism. This recommendation is applied to regulatory agencies such as the FAA as well as to the aviation industry as a whole.

11. Given the current study's findings relative to the significant relationship between education and professionalism for the NPAE subgroup, which consisted of business aviation, flight operations, and schools/colleges of aviation, a recommendation for practice is for aviation education institutions to incorporate within their curricula the concept of professionalism. This also could include a course in aviation professionalism for aviation majors. Doing so will enable aviation students to become cognizant of what professionalism entails, help them become more aware of what will be expected of them within their careers, and instill the concept of professional identity.
12. The current study's findings demonstrated a significant difference in the level of professionalism between Pilots vs. ATC subgroups. Therefore, a recommendation for practice is for the ATC subgroup to follow and benchmark the professional activities of pilots' as well as their training protocols, because ATCs are the people whom pilots communicate with and depend on frequently when conducting their duties. Therefore, this issue is crucial to maintaining a safe aviation environment.
13. The current study's findings demonstrated that "total flight hours" was a significant predictor of professionalism for the Pilot subgroup. Relative to Part 121 pilots, this finding supports the FAA's latest regulation, which raised the minimum number of flight hours for first officers to fly for a commercial airline from 250 hours to 1,500 hours and requires them to have an ATP license (Baldwin, 2014). Therefore, a recommendation for practice is that the FAA maintains this regulation.

References

Airports Council International. (2018). *Global ACI-ICAO airport management professional accreditation program.* Retrieved from http://www.aci.aero/Global-Training/Programmes/Airport-Management-Professional-Accreditation-Programme-AMPAP

Airports Council International. (2015). *International traffic report 2015*. Retrieved from http://www.aci.aero/News/Releases/Most-Recent/2016/09/09/Airports-Council-International-releases-2015-World-Airport-Traffic-Report-The-busiest-become-busier-the-year-of-the-international-hub-airport

Airports Council International. (2018). *International traffic report 2018*. Retrieved from https://aci.aero/wp-content/uploads/2018/11/WATR_WATF_Infographic_Web.pdf

Alemu, A. (2013). Professionalism and professional development of teachers in English language teaching: University of Gondar in focus. *International Journal of Innovative Research and Development*, *2*(9).

Alhallaf, H. F. A. (2016). *Examining the relationship between factors affecting the aviation profession and the concept of aviation professionalism.* (Doctoral dissertation). Retrieved from http://search.proquest.com/openview/4986608f6380eadea370781248a92f1f/1?pq-origsite=gscholar&cbl=18750&diss=y

American Association of Airport Executives. (2018). *Professional development*. Retrieved from https://www.aaae.org/aaae/AAAEMBR/PD/AAAEMemberResponsive/PD/PD.aspx?hkey=f0e6f1a1-e838-46c3-94e5-cd4fd05daeb7

Araugo, J., Beal, R. (2013). Professionalism as reputational capital: The moral imperative in the global financial crisis. *Procedia-Social and Behavioral Sciences 99* (2013), 351-362.

Ary, D., Jacobs, L., & Sorenson, C. (2010). *Introduction to research in education* (8th ed.). Belmont, CA. Wadsworth.

ATAG. (2016). The economic and social benefits of air transport. *Air Transport Action Group, Geneva*. Retrieved from https://aviationbenefits.org/media/149668/abbb2016_full_a4_web.pdf

Babbitt, R. (2011). Above and beyond: Attitude determines your altitude. *Federal Aviation Administration Safety Briefing.* Retrieved from http://www.faa.gov/news/safety_briefing/2011/media/JulAug2011.pdf

Bacon, J., & Mutzabaugh, B. (2017, April 11). United Airlines says controversial flight was not overbooked; CEO apologizes again. *USA Today.* Retrieved from https://www.usatoday.com/story/news/nation/2017/04/11/united-ceo-employees-followed-procedures-flier-belligerent/100317166/#

Baldwin, H. (2014). Parsing Professionalism. *Flight Safety Foundation*. Retrieved from https://flightsafety.org/asw-article/parsing-professionalism/

Burton, W. C. (2011). *Burton's legal thesaurus* (5th ed.). New York, NY: Mc Graw-Hill Education.

Carlan, P. E., & Lewis, J. A. (2009). Professionalism in policing: Assessing the professionalization movement. *Professional Issues in Criminal Justice*, *4*(1), 39-58.

Clamann, M., & Kaber, D. B. (2004). Applicability of usability evaluation techniques to aviation systems. *The International Journal of Aviation Psychology*, *14*(4), 395–420.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Hillsdale, NJ: Lawrence Erblaum Associates.

FAA. (2018). Become a mechanic. *Federal Aviation Administration,* Oklahoma. Retrieved from https://www.faa.gov/mechanics/become/

FAA. (2019). Lessons learned. *Federal Aviation Administration,* Oklahoma. Retrieved from: https://lessonslearned.faa.gov/Japan123/JAL123_Acc_Report.pdf

Federal Aviation Administration (Producer). (2012). The history of CRM [MP4]. Retrieved from https://www.faa.gov/tv/?mediaId=447

Ghadirian, F., Salsali, M., & Cheraghi, M. A. (2014). Nursing professionalism: An evolutionary concept analysis. *Iranian Journal of Nursing and Midwifery Research*, *19*(1), 1–10.

Gravetter, F. J. & Wallnau, L.B. (2013). *Statistics for the behavioral sciences* (9 th ed.). Belmont, California.: Wadsworth Cengage Learning.

Hall, R. H. (1968). Professionalization and bureaucratization. *American Sociological Review*, *33*, 92–104.

Hawkins F. H. (1987). *Human factors in flight* (2nd ed.). Ashgate (Aldershot, UK). Retrieved from https://www.faa.gov/tv/?mediaId=447

Holtman, M. C. (2011). Paradoxes of professionalism and error in complex systems. *Journal of Biomedical Informatics, 44,* 395–401.

IAAE. 2018. *International Association of Airport Executives.* Retrieved from https://www.aaae.org/aaae/IAAE/About/IAAE/News/About.aspx?hkey=74763836-e696-46b2-8d36-ce1042d7010c

Ifanti, A. A., & Fotopoulou, V. S. (2011). Teachers' perceptions of professionalism and professional development: A case study in Greece. *World Journal of Education*, *1*(1), 40.

International Civil Aviation Organization (1993). *Human factors digest no 7: Investigation of human factors in accidents and incidents.* Montreal: Author. http://aviationknowledge.wikidot.com/aviation:shell-model

Kern, T. (2011). *Going pro: The deliberate practice of professionalism* (1st ed.). Colorado Springs, Colo.: Pygmy Books.

Kim-Godwin, Y. S., Baek, H. C., & Wynd, C. A. (2010). Factors influencing professionalism in nursing among Korean American registered nurses. *Journal of Professional Nursing*, *26*(4), 242–249.

Kramer, M. (1974). *Reality shock: Why nurses leave nursing.* St. Louis, MO: The C. V. Mosby Co.

Leddy, S., & Pepper, J.M. (1993). *Conceptual basis of professional nursing* (3rd ed.). Philadelphia, PA: Lippincott.

Maister, D. H. (1997). True professionalism: *The courage to care about your people, your clients, and your career*. New York, NY: Touchstone Publications.

Mat, N. H. N., & Zabidi, Z. N. (2010). Professionalism in practices: A preliminary study on Malaysian public universities. *International Journal of Business and Management*, *5*(8), 138.

Manion, M., & Evan, W. M. (2002). Technological catastrophes: Their causes and prevention. *Technology in Society, 24,* 207–224.

Moore, W. E. (1970) *The professions: Roles and rules.* New York, NY: Russell Sage Foundation.

National Air Traffic Control Association. (2018). *NATCA National Professionalism Award.* Retrieved from https://www.natca.org/index.php/media-center/other-natca-awards/natca-professionalism-award

National Business Aviation Association. (2015). *Professionalism in business aviation.* Retrieved from https://www.nbaa.org/ops/safety/professionalism/

National Business Aviation Association. (2018). *Professionalism in business aviation.* Retrieved from https://www.nbaa.org/ops/safety/professionalism/personal-professionalism.php

NTSB. (1979). Loss of control and asymmetric stall American Airlines flight 191, DC-10-10, N110 AA. Retrieved from http://libraryonline.erau.edu/online-full-text/ntsb/aircraft-accident-reports/AAR79-17.pdf

NTSB. (2007). Attempted takeoff from wrong runway Comair flight 5191. *NTSB Aircraft Accident Report*. Retrieved from http://www.ntsb.gov/doclib/reports/2007/AAR0705.pdf

NTSB. (2010). Loss of control on approach, Colgan Air, Inc., operating as Continental Connection flight 3407. *NTSB Aircraft Accident Report*. Retrieved from http://www.ntsb.gov/doclib/reports/2010/AAR1001.pdf

NTSB. (2012). 2011- 2012 Most wanted list page. *The National Transportation Safety Board.* Retrieved from http://www.ntsb.gov/safety/mwl-6.html

Pounds, J., & Ferrante, A. S. (2003). FAA Strategies for reducing operational error causal factors. *DOT/FAA/AM Office of Aerospace Medicine.* Retrieved from https://www.faa.gov/data_research/research/med_humanfacs/oamtechreports/2000s/media/0319.pdf

Richards, J. C., & Farrell, T. S. C. (Eds.). (2005). *Professional development for language teachers: Strategies for teacher learning*. Ernst Klett Sprachen.

Sabet, M. G., & Klingner, D. (1993). Exploring the impact of professionalism on administrative innovation. *Journal of Public Administration Research and Theory, 5*(2), 252–266.

Scarborough, A., Bailey, L., & Pounds, J. (2005). Examining ATC operational errors using the human factor analysis and classification system. *DOT/FAA/AM Office of Aerospace Medicine.* Retrieved from http://www.dtic.mil/get-tr-doc/pdf?AD=ADA460879

Shafer, W. E., Park, L. J., & Liao, W. M. (2002). Professionalism, organizational-professional conflict and work outcomes: a study of certified management accountants. *Accounting, Auditing & Accountability Journal*, *15*(1), 46–68.

Snizek, W. (1972). Hall's professionalism scale: An empirical assessment. *American Sociological Review*, *37*, 109–114.

Seyler, C. D. (2012). *Perceived importance of professionalism in athletic training education and practice* (Doctoral dissertation). Retrieved from https://etd.ohiolink.edu/!etd.send_file?accession=bgsu1333490919&disposition=inline

Tretheway, M. W., & Markhvida, K. (2014). The aviation value chain: Economic returns on policy issues. *Journal of Air Transport Management, 41*, 3–16.

Wilensky, H. L. (1964). The professionalization of everyone? *American Journal of Sociology. 70,* 137–158.

Wilkinson, T. J., Wade, W. B., & Knock, L. D. (2009). A blueprint to assess professionalism: Results of a systematic review. *Academic Medicine*, *84*(5), 551–558.

Worthen, B. R., White, K. R., Fan, X., & Sudweeks, R. R. (1999). *Measurement and assessment in schools* (2nd ed.). New York, NY: Addison Wesley Longman, Inc.

Wynd, C. A. (2003). Current factors contributing to professionalism in nursing. *Journal of Professional Nursing*, *19*, 251–261.

Wittmer, A., & Bieger, T. (2011). *Aviation systems management of the integrated aviation value chain*. Berlin, Heidelberg: Springer-Verlag Berlin Heidelberg.

Appendix A

Aviation Professionalism Survey

(From Alhallaf, 2016, Reprinted with Permission)

Aviation Professionalism Survey (APS)

INTRODUCTION

Hello. You are invited to participate in a research study involving individuals who work/study in the aviation industry, including pilots, aviation business professionals, aircraft maintenance personnel, ground service personnel, aviation students, airport personnel, air traffic controllers, corporate flight departments, safety and security personnel, aircraft parts and aircraft/simulator manufacturers, and training centers. As far as I know, and based on the literature this study is the first empirical research study to be conducted on aviation professionalism.

As part of this study, I am requesting that you complete this questionnaire, which consists of four sections followed by a set of demographic questions. It will take approximately 15 minutes to complete the questionnaire. Please note that this questionnaire is part of a doctoral dissertation study being conducted at Florida Institute of Technology's College of Aeronautics, and has been approved by the university's Institutional Review Board (IRB).

Before taking the survey, it is important for you to understand the following:

1. Your responses will be treated confidentially and will be accessible only by the research team.
2. Your responses will remain completely anonymous.
3. No reference will be made in oral or written reports connecting you in any way to this study.
4. Your participation is completely voluntary and you are not required to participate in the study.
5. If you begin taking the survey and opt not to continue, you may simply stop.
6. By taking the survey, you are indicating that you are at least 18 years old and have agreed to voluntarily participate in the study.

SECTION A: PROFESSIONALISM SCALE

The following statements are an attempt to measure certain aspects of what is commonly called professionalism. The statements are referring to your own profession. Each item then, should be answered in light of the way you yourself both feel and behave as a member of your particular profession. There are five possible responses to each item. Please read each item carefully, think about how you feel about each item, and then circle the most closely corresponds to how the statements best describe your own attitudes and/or behavior using the response scale of Strongly Disagree, Disagree, Neutral/Undecided, Agree, and Strongly Agree. The middle category Neutral/Undecided is designed to indicate an essentially neutral opinion about the item. Please answer ALL items.

	SD D N/U A SA
1. I systematically read the professional journals.	☐☐ ☐ ☐☐
2. Other professions are actually more vital to society than mine.	☐☐ ☐ ☐☐
3. I make my own decisions in regard to what is to be done in my work.	☐☐ ☐ ☐☐
4. I regularly attend professional meetings at the local level.	☐☐ ☐ ☐☐
5. I think that my profession, more than any other, is essential for society.	☐☐ ☐ ☐☐
6. My fellow professionals have a pretty good idea about each other's competence.	☐☐ ☐ ☐☐
7. People in this profession have a real "calling" for their work.	☐☐ ☐ ☐☐
8. The importance of my profession is sometimes over stressed.	☐☐ ☐ ☐☐
9. The dedication of people in this field is most gratifying.	☐☐ ☐ ☐☐
10. I don't have much opportunity to exercise my own judgment.	☐☐ ☐ ☐☐

	SD	D	N/U	A	SA
11. I believe that the professional organization(s) should be supported.	☐	☐	☐	☐	☐
12. Some other occupations are actually more important to society than is mine.	☐	☐	☐	☐	☐
13. A problem in this profession is that no one really knows what his colleagues are doing.	☐	☐	☐	☐	☐
14. It is encouraging to see the high level of idealism, which is maintained by people in this field.	☐	☐	☐	☐	☐
15. The professional organization doesn't really do too much for the average member.	☐	☐	☐	☐	☐
16. We really have no way of judging each other's competence.	☐	☐	☐	☐	☐
17. Although I would like to, I really don't read the journals too often.	☐	☐	☐	☐	☐
18. Most people would stay in the profession even if their incomes were reduced.	☐	☐	☐	☐	☐
19. My own decisions are subject to review.	☐	☐	☐	☐	☐
20. There is not much opportunity to judge how another person does his work.	☐	☐	☐	☐	☐
21. I am my own boss in almost every work-related situation.	☐	☐	☐	☐	☐
22. If ever an occupation is indispensable, it is this one.	☐	☐	☐	☐	☐
23. My colleagues pretty well know how well we all do in our work.	☐	☐	☐	☐	☐
24. There are very few people who don't really believe in their work.	☐	☐	☐	☐	☐
25. Most of my decisions are reviewed by other people.	☐	☐	☐	☐	☐

SECTION B. PERCEPTIONS OF PROFESSIONALISM

Following is a list of 10 items that consist of descriptions commonly associated with professionalism. Please rank each item (from 1–10) so the items appear in a ranked order based on your perception of what professionalism means to you.

I believe professionalism is based on or related to...

_____ being compliant with procedures (i.e., following rules and policies).

_____ being ethical (i.e., knowing what is right or wrong behavior relative to a specific context).

_____ being competent (i.e., having the required skills and knowledge).

_____ being qualified and reliable (i.e., trustworthy).

_____ demonstrating excellence as evidenced by your behavior, personal appearance, and quality of work.

_____ the number of certificates/licenses obtained.

_____ the number of ratings obtained.

_____ the number of years of experience.

_____ the level of formal education (high school, 2-year college, 4-year college, graduate school).

_____ earning professional certificates from professional aviation organizations (e.g., AAAE, NBAA, FAA, ICAO).

SECTION C: AVIATION BACKGROUND

C1. Please indicate your employment status.

Student Part-time Full-time Retired Unemployed

C2. Please indicate the field/position in which you are employed.

Airport Manager Flight Attendant Aircraft Maintenance Aviation Security Aviation Safety
ATC Pilot Faculty/Educator Engineer Other _____

C3. Please identify the aviation segment in which you are employed/involved.

Commercial Airlines General Aviation Business Aviation
Charter/For-Hire Aviation Cargo/Package Aviation Other _____

C4. Please indicate your current work setting/employer.

Airline Airport Government Private Firm
College/University Flight School/Center Independent Consultant Other _____

SECTION D: PROFESSIONAL ACTIVITY AND INVOLVEMENT

The following statements are an attempt to measure professional behaviors such as the number of professional books purchased, subscriptions to professional journals, hours spent in professional reading, and so forth. Please read each item carefully before responding and answer ALL items.

D1. Please enter the number of professional courses you have taken that related to your profession.

None One Two Three Four or more

D2. Please enter the number of professional journals you subscribe to that related to your profession.

None One Two to Three Four or more

D3. Please enter the number of professional books you have purchased that related to your profession.

None One to Two Three to Five Six or more

D4. Please enter the approximate number of hours you spend per week engaged in professional reading related to your profession.

None One to Two Three to Four Five to Seven Eight or more

D5. Please describe the level of activity and membership in professional organizations related to your profession using the following responses: A = No activity or membership; B = Member of at least one professional organization, but not active; C = Some activity once per year; D = Actively engaged in activities 2 to 5 times per year; E = Actively engaged in activities 6 to 11 times per year; F = Actively engaged in activities monthly or more.

A B C D E F

D6. Please enter the number of publications related to your profession that were published in the professional literature (e.g., research article, books, etc.).

None One Two or more

D7. Please enter the number of professional speeches you have given related to your profession.

None One to Two Three to Four Five or more

D8. Please identify your role with respect to offices held or leadership roles within professional organizations related to your profession using the following responses: A = None; B = Member of at least one committee; C = Chairperson of a committee; D = Officer in a district or regional organization: A B C D

D9. Please circle the extent of your professional activity within your employing organization using the following responses: A = None; B = Member of at least one committee; C = Chairperson ofa committee.

SECTION E: DEMOGRAPHICS

E1. Please indicate your gender and marital status.

	Single (Never Married)	Married	Divorced	Separated	Widowed
Male	❑	❑	❑	❑	❑
Female	❑	❑	❑	❑	❑

E2. Please indicate your age _____.

E3. Please indicate your race/ethnicity

Caucasian African-American Hispanic Asian-American Other _____

E4. Please indicate your approximate annual income in dollars_____.

E5. Please enter the total number of years of experience you have in the aviation profession_____.

E6. Please indicate your highest level of education.

1. High school degree or equivalent (e.g., GED)
2. 2-year/Associate degree (e.g., AA, AS)
3. 4-year/Bachelors degree (e.g., BA, AB, BS)
4. Masters degree (e.g., MA, MS, MBA)
5. Doctoral degree (e.g., PhD, MD, DDS, JD, EdD)

E7. If you are a pilot, please indicate what FAA ratings you currently have (check all that apply), and enter the approximate number of flight hours you have. If you are not a pilot, then please ignore this question and go to the next one.

Student Pilot Private Pilot Instrument Pilot Commercial Pilot

ATP CFI CFII MEI

Please enter your approximate total number of flight hours_____.

Thank you for participating in this study. If you have any questions please contact Mr. Hussain Alhallaf via e-mail (Mr.hfa@hotmail.com) or Cell phone (386-847-7671), or Dr. Michael Gallo via e-mail (gallo@fit.edu) or by telephone (321-674-7634). If you would like to know your score on any of the scales presented in this questionnaire, please enter your e-mail address here. You are advised, however, that by entering your e-mail address you effectively are forfeiting your right to anonymity because it will now be possible to link your responses to your e-mail address. Therefore, by entering your e-mail address you are acknowledging that (1) you are doing so voluntarily and that (2) you understand that this could result in a breach of anonymity.

Appendix B

Raw Data

Table B.1

Raw Data

#	*Y*	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	Perceptions	Group
1	87	M	N	31	N	A	C	2	3		15		P
2	78	M	N	30	N	A	B	3	4	350	10	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	P
3	86	M	N	26	N	A	B	7	1	257.5	6	4, 3, 5, 1, 6, 7, 8, 2, 9, 10	P
4	87	M	N	25	N	A	C	2	0		16	1, 4, 2, 3, 5, 7, 8, 6, 10, 9	A
5	84	M	M	59	W	B	C	37	1		15.9	2, 4, 1, 5, 3, 7, 8, 6, 10, 9	P
6	70	F	N	25	N	A	B	4	0		9	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	N
7	92	M	M	45	W	C	C	23	1		27	5, 1, 4, 3, 2, 10, 9, 6, 7, 8	P
8	80	F	N	30	W	D	C	7	2	300	1	4, 3, 1, 2, 5, 7, 9, 10, 8, 6	M
9	81	M	N	28	W	D	C	6	1		9	3, 1, 2, 5, 4, 9, 7, 6, 8, 10	M
10	79	F	N	28	W	D	C	7	1	300	8	5, 4, 1, 2, 3, 7, 8, 6, 9, 10	N
11	80	M	M	53	W	C	C	32	1	20000	15	2, 3, 4, 5, 1, 8, 9, 7, 6, 10	P
12	83	F	M	29	W	D	B	7	1	70	15	1, 3, 4, 5, 2, 6, 9, 7, 8, 10	M
13	76	F	N	26	W	D	B	3	1	340	14	4, 2, 1, 3, 5, 7, 8, 10, 6, 9	P
14	81	M	N	24	W	A	C	1	1	65	6	3, 4, 1, 2, 5, 6, 7, 8, 9, 10	N
15	79	M	M	51	W	D	C	33	1	250	8.3	4, 3, 1, 2, 10, 8, 9, 6, 5, 7	N
16	93	M	N	37	N	D	B	19	4	3700	18	4, 2, 3, 5, 1, 6, 7, 8, 9, 10	N
17	91	M	M	52	W	B	B		0		26	4, 5, 1, 2, 3, 7, 8, 9, 6, 10	N
18	70	M	M	32	W	B	B	9	2	500	15	3, 2, 1, 4, 5, 8, 9, 10, 6, 7	M
19	71	F	N	30	W	D	C	6	1	205	11	3, 8, 6, 1, 2, 7, 9, 4, 10, 5	M
20	87	M	M	46	W	B	C		1	16000	24	3, 2, 4, 5, 1, 8, 9, 7, 6, 10	N
21	80	M	N	31	N	D	A	7	3	3600	12	3, 2, 4, 5, 1, 7, 9, 8, 10, 6	P
22	90	F	N	30	W	D	B	8	0		18	7, 2, 3, 1, 4, 9, 10, 8, 5, 6	M
23	81	F	N	24	W	D	B	0.5	0		3	5, 3, 2, 4, 1, 8, 9, 6, 7, 10	N
24	75	M	N	30	W	D	C		1	5000	12	1, 5, 3, 4, 2, 6, 7, 8, 9, 10	P
25	92	M	N	30	W	A		7	5	3200	18	2, 5, 3, 1, 4, 8, 9, 7, 6, 10	P
26	86.2	F	N	36	N	A	B	17	1	5000	11	3, 4, 2, 9, 8, 6, 5, 7, 1, 10	P
27	95	F	M	59	W	D	B	7	0		16	4, 1, 5, 2, 3, 9, 10, 7, 8, 6	M
28	81	M	M	52	N	C	B	33	0		28	8, 6, 2, 5, 7, 9, 10, 1, 3, 4	M
29	94	M	M	26	W	D	B	7	3	256	17	5, 4, 2, 1, 3, 6, 7, 8, 9, 10	M
30	77.6	M	M	41	W	B	C	17	0		7	4, 2, 5, 3, 1, 6, 9, 7, 8, 10	N
31	81	M	M	34	W	C	B	12	0		15.9	5, 2, 4, 3, 1, 8, 9, 7, 10, 6	M
32	88.5	M	M	55	W	C	C	38	4	19500	19	6, 7, 3, 2, 5, 8, 9, 4, 1, 10	P
33	96	M	M	68	W	C	B	2	0		12	5, 3, 2, 4, 1, 7, 8, 9, 10, 6	M
34	100	M	M	33	W	D	B	11	1		25	3, 2, 4, 1, 5, 7, 9, 10, 6, 8	N
35	91	M	M	55	W	C	B	35	5	1500	22	5, 3, 1, 2, 4, 7, 8, 6, 10, 9	P
36	91	M	M	48	W	D	B	23	1		23	4, 2, 5, 3, 1, 9, 10, 6, 8, 7	M
37	93.8	F	M	44	W	B	B	22	0		23	5, 1, 3, 4, 2, 9, 10, 6, 7, 8	M
38	86	M	N	44	W	B	B	18	0		17	10, 3, 2, 4, 1, 8, 9, 6, 7, 5	M
39	116	M	M	33	W	D	B		1	200	22	3, 2, 4, 1, 5, 7, 8, 6, 10, 9	P
40	83	M	M	66	W	D	C	40	0		12	5, 2, 1, 3, 4, 6, 9, 8, 10, 7	M
41	92	M	M	60	W	A	B	27	1		26	5, 1, 2, 4, 3, 6, 7, 8, 9, 10	N
42	108	M	N	51	W	C	A	36	1	225	26	5, 4, 2, 3, 1, 7, 8, 6, 9, 10	N
43	86	F	M	36		D	B	8	0		12	3, 6, 1, 2, 4, 8, 9, 10, 7, 5	M
44	89	M	N	62	W	D	C	44	3	30000	18	2, 1, 4, 5, 3, 9, 6, 7, 8, 10	P
45	87	F	M	49	W	C	B	24	2	13000	16	2, 3, 4, 5, 1, 8, 9, 6, 10, 7	P
46	91	M	M	44	W	D	A	35	1	15000	14	3, 4, 2, 5, 1, 7, 8, 6, 10, 9	P
47	71	F	N	47		D	B	13	0		2	4, 1, 5, 3, 2, 7, 8, 6, 9, 10	N
48	75	M	N	26	W	A	B	2	1	250	11	5, 1, 4, 3, 2, 10, 9, 8, 6, 7	P
49	84	M	N	48	W	C	C	25	4	2800	5	4, 3, 1, 5, 2, 7, 8, 6, 9, 10	C
50	91	M	M	57	W	D	C	35	2	15000	11	3, 4, 1, 2, 6, 7, 8, 5, 10, 9	P

Note. Y = HPI scores, X_1 = Gender (M = Male, F = Female), X_2 = Marital Status (N = Not Married, M = Married), X_3 = Age, X_4 = Race/Ethnicity (N = non-White/Caucasian, W = White/Caucasian), X_5 = Annual Income (A = < $50K, B = $100K to < $150K, C = ≥ $150K, D = > $50K but < $100K), X_6 = Education Level (A = < 4-yr. college degree, B = Graduate degree, C = 4-yr. college degree), X_7 = Years of Experience, X_8 = Number of FAA Ratings (Pilot subgroup), X_9 = Total Flight Hours (Pilot subgroup), X_{10} = IOP scores. Perceptions = Ranked data of participants' perceptions of professionalism, Group = Aviation Subgroup (A = Aircraft Maintenance Technician, C = Air Traffic Controller, M = Airport Manager, N = Non-Pilot Aviation Employee, P = Pilot).

Table B.1

Raw Data (Continued)

#	Y	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	Perceptions	Group
51	90	M	M	43	W	B	B	15	0	5	14	3, 4, 2, 5, 1, 8, 10, 6, 7, 9	N
52	91	M	M	39	W	C	B	18	1	10000	13	1, 5, 2, 3, 4, 9, 7, 6, 10, 8	P
53	85	M	M	51	W	C	C	29	1	250	24	4, 1, 5, 2, 3, 9, 10, 8, 6, 7	M
54	85.6	F	N	58	W	C	B		0		15	6, 2, 1, 3, 7, 9, 10, 4, 5, 8	M
55	90	F	N	49	W	D	A	25	3	8500	18	5, 2, 1, 3, 4, 6, 10, 8, 9, 7	P
56	86	M	N	60	W	C	C	37	1		25	6, 1, 4, 3, 2, 8, 9, 5, 10, 7	M
57	93.6	M	M	64	W	B	C	35	1	15000	12	5, 3, 2, 1, 4, 6, 7, 8, 9, 10	P
58	73	M	M	64	N	B	B	45	1	15000	11	3, 5, 1, 4, 2, 8, 9, 6, 10, 7	P
59	91	F	N	26	N	D	B	5	0		13	6, 4, 1, 3, 5, 7, 8, 2, 10, 9	N
60	89	M	M	55	N	D	C	28	3	400	15	3, 7, 5, 4, 8, 6, 10, 9, 1, 2	C
61	87	M	M	45	W	C	C	24	3	10600	11	4, 3, 2, 5, 1, 8, 9, 6, 7, 10	P
62	92	F	M	48	W	B	A	29	0	4	26	5, 1, 2, 3, 4, 7, 8, 6, 10, 9	N
63	87	M	M	53	W	B	B	31	6	4000	25	5, 1, 3, 4, 2, 6, 7, 8, 9, 10	N
64	92	M	M	55	W	C	A	32	4	3000	27	4, 2, 3, 5, 1, 9, 10, 8, 7, 6	P
65	64	M	N	43	W	B	A	21	1		8	1, 2, 3, 4, 5, 7, 8, 6, 10, 9	P
66	79	M	N	40	W	D	C	17	2	5000	8	5, 4, 1, 3, 2, 8, 9, 6, 7, 10	P
67	80	M	M	39	N	B	A	18	1		16	1, 7, 3, 4, 9, 6, 8, 5, 10, 2	P
68	89	M	N	38	W	D	B	15	1		19	2, 1, 3, 4, 6, 8, 9, 5, 7, 10	N
69	101	F	M	50	W	C	A	17	0		16	5, 1, 3, 4, 2, 9, 8, 6, 7, 10	M
70	92	M	M	45	W	B	C	22	0		27	5, 2, 1, 3, 4, 6, 7, 9, 8, 10	M
71	78	M	M	30	W	D	B	2	1	158	5	6, 1, 3, 2, 7, 8, 9, 10, 4, 5	M
72	97	F	N	68	W	D	C		4		26	4, 1, 2, 3, 5, 7, 8, 6, 10, 9	P
73	78.6	M	M	67	W	D	C	4	1	800	15	5, 1, 3, 2, 6, 7, 8, 9, 4, 10	P
74	91	M	M	68		D	B	25	2		25	1, 5, 3, 2, 4, 7, 8, 6, 9, 10	P
75	106	M	N	61	W	C	B		3	6000	21	3, 1, 4, 5, 2, 8, 9, 6, 7, 10	P
76	78	M	M	58	W	C	C	45	4	25000	23	2, 4, 1, 5, 3, 7, 8, 6, 10, 9	P
77	80	M	M	45	N	C	B	22	1	8500	14	5, 2, 1, 3, 4, 7, 10, 9, 6, 8	N
78	72	M	M	47	W	C	A	30	1	9975	12	7, 8, 1, 2, 3, 9, 5, 4, 10, 6	P
79	91	M	M	44	W	C	B	21	0		23	7, 1, 2, 3, 4, 8, 9, 5, 6, 10	M
80	77	M	M	34		D	C	14.5	2	280	10	4, 1, 5, 3, 6, 7, 8, 9, 10, 2	P
81	87	F	N		W	D	B	4	1		25	2, 3, 6, 4, 1, 7, 8, 9, 5, 10	N
82	81	M	M	54	W	B	C	38	3	20000	16	5, 3, 1, 2, 4, 7, 8, 6, 9, 10	P
83	92	M	N	64	W	C	C	42	3	36000	22	3, 4, 1, 2, 5, 9, 7, 6, 10, 8	P
84	84	M	M	34	W	D	B	9	0		9	4, 1, 3, 5, 7, 8, 9, 10, 2, 6	N
85	72.3	F	M	41	W	A	B	2	0		12	6, 4, 3, 2, 1, 7, 8, 5, 9, 10	N
86	83	M	M	41	W	B	B	29	6	6000	27	4, 10, 1, 3, 5, 7, 8, 2, 9, 6	P
87	70	M	M	37	W	D	C	11	0		6	1, 3, 4, 5, 2, 8, 7, 9, 10, 6	M
88	79	F	N	24	N	A	B	6	0		16	1, 2, 4, 6, 3, 9, 10, 5, 7, 8	N
89	92	F	N	28	W	D	B	7	0		13	4, 1, 5, 2, 3, 6, 7, 8, 9, 10	N
90	89	M	N	32	W	B	B	10	1	400	12	2, 3, 4, 5, 1, 9, 10, 6, 7, 8	M
91	89	M	M	50	W	D	A	20	0		16	2, 3, 4, 5, 1, 6, 7, 8, 9, 10	N
92	80	M	M	58	W	D	C	29	0		2	5, 1, 3, 2, 4, 7, 8, 9, 6, 10	M
93	87	M	M	66	W	D	A		0	100	16	1, 3, 5, 2, 6, 7, 8, 4, 9, 10	M
94	80	F	M	3		D	B	9	0		19	4, 1, 2, 3, 5, 9, 10, 7, 8, 6	N
95	84	M	M	43	W	B	A	24	0		13	6, 2, 4, 3, 1, 7, 8, 5, 9, 10	A
96	80.2	M	N	27		A	B	1	0		7	4, 1, 2, 3, 6, 9, 10, 7, 5, 8	N
97	84	F	M	50	W	B	C	15	4	6000	17	5, 1, 3, 4, 2, 10, 7, 6, 8, 9	P
98	98	M	N	74	W	B	A	42	2	25000	15	2, 3, 1, 4, 5, 6, 7, 8, 9, 10	P
99	95	M	M	47	W	A	A	13	1	7000	15	3, 2, 1, 4, 5, 6, 7, 8, 10, 9	P
100	104	F	N	42	W	D	C	16	0		20	5, 1, 2, 3, 4, 7, 8, 9, 10, 6	N

Note. Y = HPI scores, X_1 = Gender (M = Male, F = Female), X_2 = Marital Status (N = Not Married, M = Married), X_3 = Age, X_4 = Race/Ethnicity (N = non-White/Caucasian, W = White/Caucasian), X_5 = Annual Income (A = < $50K, B = $100K to < $150K, C = ≥ $150K, D = > $50K but < $100K), X_6 = Education Level (A = < 4-yr. college degree, B = Graduate degree, C = 4-yr. college degree), X_7 = Years of Experience, X_8 = Number of FAA Ratings (Pilot subgroup), X_9 = Total Flight Hours (Pilot subgroup), X_{10} = IOP scores. Perceptions = Ranked data of participants' perceptions of professionalism, Group = Aviation Subgroup (A = Aircraft Maintenance Technician, C = Air Traffic Controller, M = Airport Manager, N = Non-Pilot Aviation Employee, P = Pilot).

Table B.1

Raw Data (Continued)

#	Y	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	Perceptions	Group
101	84	M	M	48	W	C	B	25	3	2000	21	1, 5, 4, 2, 3, 8, 6, 7, 9, 10	P
102	89	M	M	41	W	B	C	12	2	1500	18	5, 1, 2, 4, 3, 7, 8, 9, 10, 6	M
103	84	M	N	27	W	D	B	3	3	280	14	2, 3, 5, 8, 1, 4, 6, 9, 7, 10	P
104	84	M	M	45	W	B	C	19	5	9500	14	2, 1, 3, 5, 4, 7, 8, 9, 10, 6	N
105	79	M	N			D	C	36	0		21	7, 4, 1, 2, 5, 10, 8, 3, 6, 9	M
106	73	M	N	26	N	D	B	1	0		7	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	N
107	78	M	M	33	N	A	C		0		16	1, 2, 3, 4, 5, 10, 9, 7, 6, 8	N
108	108	M	M	35	W	D	B	10	1	300	20	1, 4, 2, 3, 7, 8, 9, 5, 6, 10	N
109	73	M	N	30	W	D	C	7	3		5	4, 3, 1, 2, 5, 6, 7, 8, 9, 10	N
110	77	M	N	28	N	B	A	7	5	3000	21	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	P
111	92	M	M			D	C	40	4	12000	28	5, 1, 3, 4, 2, 8, 9, 6, 10, 7	P
112	91	M	M	34	W	A	B	14	0		14	2, 1, 4, 7, 5, 8, 9, 3, 6, 10	N
113	70	M	N	34	N	C	A	10	3		12	2, 1, 3, 4, 5, 7, 8, 6, 9, 10	P
114	82	M	M	33	N	A	C	1	0		12	7, 6, 2, 1, 9, 8, 10, 4, 5, 3	N
115	101	M	M	40	N	B	B	20	4	5000	20	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	P
116	84	M	M	30	N	D	C	8	2		11	2, 5, 4, 6, 9, 8, 7, 3, 10, 1	P
117	88	M	M	34	W	A	A		0		6	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	A
118	77.4	M	M	25	W	A	C		0		4	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	A
119	90	M	N	54	W	D	B	37	4	4000	18.9	3, 4, 2, 5, 1, 8, 9, 10, 6, 7	P
120	79	M	M	61	W	C	B	40	3	4600	25	6, 2, 3, 1, 4, 8, 9, 10, 7, 5	P
121	87	M	M	70	W	C	C	45	1	13500	21	3, 2, 1, 4, 5, 7, 8, 10, 9, 6	N
122	83	M	N	50	W	B	B	29	2		14	4, 2, 3, 6, 1, 7, 8, 5, 9, 10	A
123	85	M	M	57	N	D	B	28	0		21	5, 2, 3, 1, 4, 8, 9, 6, 10, 7	M
124	86.2	M	M	70	W	D	B	53	1		26	3, 1, 4, 5, 2, 8, 9, 10, 7, 6	P
125	64	M	N	26	W	D	B	1	0		4	5, 9, 2, 1, 10, 7, 8, 3, 4, 6	C
126	80	M	N	53	W	A	B	27	6	12680	13	1, 2, 3, 4, 5, 9, 10, 6, 7, 8	P
127	77	F	N	23	N	A	C	8	0		12	6, 7, 2, 1, 3, 4, 8, 10, 9, 5	N
128	67	M	M	37	W	D	C	19	2	6000	19	3, 2, 4, 5, 1, 7, 8, 6, 9, 10	P
129	88	M	M	62	W	C	C	44	7	31000	18	3, 5, 1, 4, 2, 7, 8, 6, 9, 10	P
130	90	M	M	61	W	C	C	35	6	24000	19	5, 3, 1, 2, 4, 7, 8, 6, 10, 9	P
131	67	F	M	43	W	B	B		2	2000	19	2, 1, 4, 5, 3, 7, 8, 6, 10, 9	N
132	77	M	M	48	W	D	B	18	1		16	1, 2, 4, 5, 6, 7, 8, 9, 3, 10	N
133	84	M	M	35	N	D	B	25	3	3000	21	4, 5, 1, 2, 3, 8, 10, 6, 7, 9	P
134	58	M	N	27	W	A	B	12	2	360	7	4, 1, 5, 3, 2, 7, 8, 10, 6, 9	P
135	78	M	M	45	W	B	B	16	0		19	6, 2, 1, 3, 4, 9, 10, 7, 5, 8	N
136	83	F	N	45	N	A	B	15	0		11	1, 4, 2, 3, 5, 7, 8, 6, 9, 10	C
137	95	F	M	65	W	D	B	45	2	3500	26	8, 6, 7, 5, 2, 9, 10, 3, 1, 4	P
138	95	M	M	32	W	D	B	2	0		18	5, 1, 3, 2, 4, 7, 8, 10, 9, 6	A
139	100	M	M	55	N	C	C	32	3	15048	21	3, 4, 1, 2, 7, 8, 9, 5, 6, 10	P
140	76	M	N	38	W	D	B	16	1	7200	18	2, 1, 3, 4, 5, 8, 9, 10, 6, 7	P
141	78	M	M	51	W	D	A	30	0		11	5, 2, 1, 3, 4, 7, 8, 6, 9, 10	A
142	73.8	M	M	34	W	D	C	18	1	150	10	2, 1, 4, 5, 3, 8, 6, 10, 7, 9	A
143	88	M	M	25	N	A	B	2	2	167	12	3, 1, 5, 4, 2, 7, 8, 9, 6, 10	A
144	81	M	N	39	W	B	C		6	9000	16	2, 3, 1, 4, 5, 8, 9, 6, 7, 10	P
145	88	M	N	22	N	D	C		0		22	1, 2, 7, 6, 3, 8, 9, 5, 4, 10	N
146	80	M	N	25	W	A	B	1	0		8	5, 3, 4, 2, 1, 9, 6, 7, 10, 8	M
147	86	M	M	33	W	A	C	7	1	1300	16	3, 1, 4, 5, 2, 8, 9, 10, 6, 7	P
148	94	M	M	63	W	D	B	27	0		24	3, 5, 1, 2, 6, 7, 9, 10, 8, 4	N
149	71	M	M	47	W	D	A		0		16	2, 1, 3, 4, 5, 8, 9, 6, 7, 10	A
150	99	M	M	52	W	B	C	35	1		26	4, 10, 5, 7, 1, 8, 9, 6, 3, 2	N

Note. Y = HPI scores, X_1 = Gender (M = Male, F = Female), X_2 = Marital Status (N = Not Married, M = Married), X_3 = Age, X_4 = Race/Ethnicity (N = non-White/Caucasian, W = White/Caucasian), X_5 = Annual Income (A = < $50K, B = $100K to < $150K, C = ≥ $150K, D = > $50K but < $100K), X_6 = Education Level (A = < 4-yr. college degree, B = Graduate degree, C = 4-yr. college degree), X_7 = Years of Experience, X_8 = Number of FAA Ratings (Pilot subgroup), X_9 = Total Flight Hours (Pilot subgroup), X_{10} = IOP scores. Perceptions = Ranked data of participants' perceptions of professionalism, Group = Aviation Subgroup (A = Aircraft Maintenance Technician, C = Air Traffic Controller, M = Airport Manager, N = Non-Pilot Aviation Employee, P = Pilot).

Table B.1

Raw Data (Continued)

#	Y	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	Perceptions	Group
151	86	M	M	62	W	C	A	44	1	200	24	4, 1, 3, 2, 5, 6, 7, 9, 10, 8	A
152	87	F	M	58	W	C	B		0		24.1	5, 1, 2, 3, 4, 7, 8, 6, 9, 10	N
153	78	M	M	57	W	D	A	35	0		8	3, 2, 1, 4, 5, 6, 7, 8, 9, 10	A
154	95	M	M	66	W	D	A		1		20	1, 3, 4, 5, 2, 9, 6, 7, 8, 10	A
155	56	M	N	60	W	D	B	42	0		13	4, 2, 1, 3, 5, 7, 8, 10, 6, 9	N
156	87	M	M	61	W	B	C	30	1		17	2, 1, 4, 5, 3, 7, 8, 6, 9, 10	N
157	84	M	M	54	W	B	C	24	4	7000	12	3, 4, 6, 1, 2, 10, 9, 7, 5, 8	M
158	98	M	M	35	W	C	C	16	5	12000	14	5, 3, 1, 2, 4, 6, 7, 8, 9, 10	N
159	74	M	M	32	W	D	C	12	3	5200	7	4, 1, 5, 2, 3, 7, 8, 6, 9, 10	P
160	76.8	M	M	26	N	A	B	3	0		10	10, 3, 1, 2, 4, 5, 9, 6, 8, 7	N
161	75	F	N	26	W	D			0		11	4, 2, 5, 3, 1, 9, 10, 6, 7, 8	M
162	80	M	N	42	N	D	C	20	0		20	9, 10, 4, 1, 8, 6, 7, 3, 2, 5	C
163	84	M	M	57	W	C	C	30	5	5500	22	3, 1, 2, 5, 4, 7, 8, 6, 10, 9	P
164	78	M	N	25	N	D	B	6	0		18	4, 2, 3, 9, 10, 1, 5, 8, 6, 7	N
165	82	M	M	34	N	D	B		0		9	7, 1, 6, 2, 4, 9, 8, 3, 5, 10	M
166	88	M	N	33	W	D	B	11	0		15	3, 1, 2, 7, 4, 8, 9, 10, 5, 6	A
167	65.3	F	N	23	W	A	A	1	0		6	3, 5, 2, 4, 1, 7, 10, 8, 9, 6	N
168	89	M	M	60	W	C	C	39	1	12000	24	1, 5, 3, 2, 4, 7, 8, 6, 9, 10	P
169	79	M	N	25	W	A	A		0		6	1, 4, 2, 3, 8, 10, 5, 6, 9, 7	M
170	91	F	N	52	W	D	B	15	0		23	4, 7, 5, 1, 6, 8, 10, 3, 2, 9	N
171	74	M	M	63	W	B	C	43	0		15	6, 2, 3, 5, 1, 10, 9, 4, 8, 7	N
172	77	M	N	25		D	C	2	1	380	9	2, 1, 3, 4, 6, 7, 8, 5, 10, 9	P
173	79	M	M	63	W	C	B	39	6	4200	20	3, 2, 1, 4, 5, 9, 10, 8, 7, 6	P
174	79	M	M	54	W	D	C	32	0		16	5, 1, 4, 2, 3, 7, 10, 6, 8, 9	A
175	87	M	N	27	N	D	B	2	0		19	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	A
176	90	M	N	24	W	D	C	5	3	410	15	5, 3, 4, 2, 7, 9, 10, 6, 1, 8	P
177	93	M	M	66	W	B	C	44	2	10000	20	5, 1, 2, 3, 4, 7, 8, 9, 10, 6	P
178	76	M	M	52	N	B	A	29	1	3000	24	5, 9, 4, 1, 10, 8, 3, 2, 7, 6	P
179	82.9	M	N	55	W	B	C	42	0		25	5, 1, 2, 3, 4, 7, 8, 6, 10, 9	N
180	87	M	M	69	W	B	C	52	3	15000	22	4, 1, 2, 3, 6, 8, 9, 7, 5, 10	P
181	87	M	M	36	W	D	A	1	0	63	12	4, 1, 5, 2, 3, 6, 7, 8, 9, 10	N
182	79	M	N	29	W	D	C	3	0		8	4, 5, 1, 2, 3, 6, 7, 8, 9, 10	N
183	89	M	M	52	W	D	A	34	0		16	4, 5, 2, 1, 3, 7, 8, 6, 10, 9	A
184	76	M	M	41	N	B	A		1	8000	12	1, 6, 3, 2, 4, 10, 7, 5, 8, 9	P
185	86	M	M	26	N	D	B		5	370	19	1, 2, 3, 4, 5, 8, 9, 10, 6, 7	P
186	87	M	M	32	N	D	C	12	3	1200	9	5, 8, 9, 2, 3, 10, 6, 1, 4, 7	P
187	83	M	N	23	W	A	C	3	1		9	5, 1, 3, 2, 4, 9, 6, 7, 10, 8	P
188	80	M	M	49	W	D	B	10	0		13	4, 5, 2, 3, 1, 8, 10, 9, 6, 7	M
189	78	M	N	30	N	D	C	4	0		10	2, 1, 8, 3, 7, 5, 6, 9, 10, 4	N
190	65	M	M	33	W	D	C	7	1	150	11	5, 2, 3, 1, 4, 6, 7, 8, 9, 10	P
191	92	M	M	53	W	A	B		1		19	4, 2, 1, 6, 3, 8, 9, 5, 7, 10	N
192	69	M	M	30	W	A	B	5	0		13	1, 3, 7, 4, 5, 8, 9, 10, 6, 2	A
193	71	M	N	25	N	A	B	3	0	0	9	4, 7, 1, 6, 3, 8, 9, 2, 10, 5	N
194	90	M	N	27	N	A	B	10	0		22	2, 1, 4, 5, 3, 9, 8, 6, 10, 7	A
195	74	M	M	35	N	D	C	0	0		20	6, 2, 7, 8, 4, 9, 10, 5, 1, 3	A
196	81	M	M	48	W	D	A	15	5	1800	11	5, 1, 2, 4, 3, 9, 8, 7, 10, 6	P
197	83	M	M	64	N	A	B		0		23	2, 3, 1, 4, 7, 8, 9, 6, 10, 5	N
198	79	M	M	37	W	D	C	15	0	40	19	5, 2, 3, 1, 4, 9, 10, 6, 7, 8	M
199	92	M	M	54	W	D	C	31	1	135	20	3, 1, 4, 2, 5, 9, 10, 7, 6, 8	M
200	83	M	M	36	W	D	A	15	0		14	2, 1, 3, 4, 5, 8, 10, 6, 9, 7	A

Note. Y = HPI scores, X_1 = Gender (M = Male, F = Female), X_2 = Marital Status (N = Not Married, M = Married), X_3 = Age, X_4 = Race/Ethnicity (N = non-White/Caucasian, W = White/Caucasian), X_5 = Annual Income (A = < $50K, B = $100K to < $150K, C = ≥ $150K, D = > $50K but < $100K), X_6 = Education Level (A = < 4-yr. college degree, B = Graduate degree, C = 4-yr. college degree), X_7 = Years of Experience, X_8 = Number of FAA Ratings (Pilot subgroup), X_9 = Total Flight Hours (Pilot subgroup), X_{10} = IOP scores. Perceptions = Ranked data of participants' perceptions of professionalism, Group = Aviation Subgroup (A = Aircraft Maintenance Technician, C = Air Traffic Controller, M = Airport Manager, N = Non-Pilot Aviation Employee, P = Pilot).

Table B.1

Raw Data (Continued)

#	*Y*	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	Perceptions	Group
201	110	M	M	46	W	B	C	23	0		17	1, 4, 2, 3, 5, 10, 9, 6, 7, 8	M
202	77	M	M	45	W	B	B	22	3	8888	19	7, 1, 6, 3, 2, 10, 9, 5, 4, 8	N
203	88	M	M	34	W	D	C	13	0		27	3, 2, 1, 4, 5, 8, 7, 6, 9, 10	A
204	79	M	N	20	N	D	A		0		8	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	P
205	80	F	N	58	W	B	B	38	1	3500	14	3, 1, 4, 2, 5, 7, 10, 9, 6, 8	A
206	82	M	M	41	N	D	B	15	0		15	1, 7, 6, 4, 3, 2, 8, 5, 9, 10	C
207	88	F	N	30	W	D	B	8	1	2500	14	5, 4, 1, 2, 3, 6, 7, 10, 9, 8	P
208	91	M	M	58	W	C	C	50	3	12000	20	1, 4, 2, 8, 3, 5, 6, 7, 9, 10	P
209	96	M	N	64	W	C	C	40	4	35000	22	2, 3, 1, 4, 5, 8, 9, 6, 10, 7	P
210	88	M	M	59	W	D	A	40	1	1500	24	4, 3, 2, 5, 1, 8, 10, 9, 6, 7	N
211	80	M	M	50	W	C	B	28	0		17	8, 1, 2, 4, 5, 9, 6, 3, 10, 7	C
212	88	M	M	54	N	C	B	35	2	650	11	4, 1, 3, 2, 5, 7, 8, 6, 9, 10	M
213	86	M	N	23	N	D	C	3	3	180	19	3, 2, 4, 5, 1, 7, 8, 6, 9, 10	P
214	89	M	N	26	N	A	C	1	1	260	14	3, 4, 2, 1, 5, 8, 9, 7, 6, 10	P
215	84	M	M	47	N	C	C	23	4	10000	15	1, 3, 2, 4, 5, 7, 8, 10, 9, 6	P
216	85	M	M	45	N	C	A	23	4	11000	14.3	3, 4, 1, 2, 5, 9, 10, 6, 7, 8	P
217	72	M	N	40	W	D	B	15	3	4500	19	2, 3, 4, 1, 6, 9, 8, 5, 7, 10	P
218	79.3	M	M	55	N	C	A	32	1	60	20	3, 5, 2, 1, 10, 8, 4, 6, 9, 7	C
219	81	M	M	38	W	C	A	20	1	400	20	5, 1, 2, 4, 3, 7, 8, 6, 9, 10	A
220	99	M	N	66	W	B	C	44	2	24000	12	5, 1, 4, 2, 3, 8, 9, 6, 7, 10	P
221	83	F	M	44	W	B	B	15	0		24	1, 2, 3, 4, 9, 8, 7, 5, 6, 10	N
222	91	M	M	64	W	C	B	20	0		24	6, 3, 1, 2, 4, 7, 9, 5, 8, 10	N
223	88	M	N	51	W	C	A	20	2	1100	18	3, 2, 4, 5, 1, 8, 9, 6, 7, 10	A
224	86	M	M	57	W	B	B	30	0		15	9, 2, 4, 3, 1, 6, 8, 5, 7, 10	N
225	76	M	M	29	N	A			0		10	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	N
226	100	M	M	64	W	A	C	45	2	900	22	4, 1, 5, 3, 2, 8, 9, 7, 10, 6	N
227	90	M	M	60	W	D	A	30	0		21	5, 1, 3, 2, 4, 7, 8, 6, 9, 10	A
228	77	M	N	58	W	D	A	41	1	400	14	4, 3, 2, 1, 5, 6, 7, 8, 10, 9	A
229	91	M	M	70	W	D	B	45	4		25	2, 3, 1, 4, 5, 6, 7, 8, 9, 10	P
230	74	M	N		N	A	C		1		14	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	N
231	107	M	M	53	W	D	A	35	0		22	5, 1, 3, 4, 2, 9, 10, 6, 7, 8	A
232	84	M	M	68	W	C	B	44	0		15	5, 4, 2, 3, 1, 8, 9, 6, 10, 7	C
233	81	M	M	46	N	B	B	26	4	5000	19	4, 2, 3, 5, 1, 7, 6, 9, 8, 10	P
234	75	M	N	24		D	C	1	2	200	18	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	P
235	73	M	N	28	W	A	C	6	0		5	3, 6, 4, 5, 1, 7, 8, 9, 10, 2	M
236	81	M	N	66	W	D	B		0		13	4, 2, 3, 5, 1, 6, 7, 8, 9, 10	A
237	77	M	M	50	W	D	C		2		18	3, 5, 2, 4, 1, 8, 9, 6, 7, 10	P
238	83	F	M	27	W	A	B	4	1		11	1, 4, 2, 3, 5, 7, 9, 6, 10, 8	M
239	88.5	M	M		W	A	C		1	326	17.7	4, 1, 2, 3, 5, 7, 8, 9, 6, 10	P
240	84	F	N	23	N	A	A	2	1	200	7	3, 5, 1, 7, 4, 8, 9, 10, 6, 2	P
241	86	M	N	23	N	A	A	3	1	60	14	10, 1, 2, 3, 4, 5, 6, 7, 9, 8	P
242	82.1	M	N	23	W	A	A	2	0	75	14	1, 4, 3, 2, 5, 7, 8, 10, 9, 6	P
243	91	M	N	22	N	A	A	3	0		13	2, 4, 1, 3, 7, 6, 8, 9, 10, 5	P
244	81	M	M	68	N	A	B	36	0		16	4, 3, 2, 5, 1, 9, 10, 6, 7, 8	A
245	84	M	M	46	W	D	A	22	1		16	2, 3, 1, 4, 5, 6, 7, 9, 10, 8	P
246	94	M	M	50	W	D	C	28	2	10000	9	3, 1, 4, 2, 5, 8, 7, 6, 10, 9	A
247	95	F	M	37	W	D	A	18	3	280	10	5, 3, 2, 4, 1, 6, 10, 7, 9, 8	A
248	78	M	M	63	W	C	C	44	2	14000	19	4, 1, 2, 3, 10, 6, 8, 5, 9, 7	P
249	80	M	M	59	W	B	A	40	1	1200	11	5, 2, 3, 4, 1, 10, 8, 7, 9, 6	A
250	78	M	M	58	W	D	A	38	2	6500	12.7	1, 3, 4, 5, 2, 6, 7, 8, 9, 10	A

Note. Y = HPI scores, X_1 = Gender (M = Male, F = Female), X_2 = Marital Status (N = Not Married, M = Married), X_3 = Age, X_4 = Race/Ethnicity (N = non-White/Caucasian, W = White/Caucasian), X_5 = Annual Income (A = < $50K, B = $100K to < $150K, C = ≥ $150K, D = > $50K but < $100K), X_6 = Education Level (A = < 4-yr. college degree, B = Graduate degree, C = 4-yr. college degree), X_7 = Years of Experience, X_8 = Number of FAA Ratings (Pilot subgroup), X_9 = Total Flight Hours (Pilot subgroup), X_{10} = IOP scores. Perceptions = Ranked data of participants' perceptions of professionalism, Group = Aviation Subgroup (A = Aircraft Maintenance Technician, C = Air Traffic Controller, M = Airport Manager, N = Non-Pilot Aviation Employee, P = Pilot).

Table B.1

Raw Data (Continued)

#	*Y*	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	Perceptions	Group
251	90	M	N	28	W	D	B	3	0		4	1, 3, 2, 4, 5, 8, 9, 6, 7, 10	N
252	87	F	M		W	D	C	11	3	3000	23	5, 2, 3, 4, 1, 8, 9, 7, 10, 6	P
253	66	M	N	28	W	D	A	7	2	250	11	9, 8, 1, 3, 2, 4, 5, 6, 10, 7	N
254	91	F	N	24	W	A	B	6	4	1070	5	4, 5, 3, 1, 2, 6, 7, 8, 9, 10	P
255	84	M	N	24	W	A	C	9	2	420	4	3, 4, 2, 5, 1, 7, 8, 6, 9, 10	P
256	80	M	M	61	W	D	A	30	1	100	14	1, 3, 5, 4, 2, 9, 10, 8, 6, 7	A
257	79	M	N	19	N	A	A		0		11	4, 3, 1, 2, 5, 7, 10, 9, 6, 8	N
258	93	M	M	63	W	B	B	14	0		26	5, 1, 3, 6, 2, 10, 7, 4, 8, 9	N
259	83	M	M	65	W	B	C	40	1	16000	11	1, 4, 2, 3, 5, 8, 6, 7, 9, 10	P
260	53	M	N	31	W	D	C		4		14.9	3, 1, 5, 4, 6, 7, 8, 9, 2, 10	P
261	95	M	N	21	N	A	A		2	200	15	1, 2, 4, 3, 5, 8, 9, 6, 7, 10	P
262	64	M	N	25	N	A	A		2	430	12	4, 5, 2, 1, 3, 7, 8, 6, 9, 10	P
263	70	F	M	39	W	A	C	15	1	100	13	2, 1, 4, 3, 5, 8, 9, 10, 6, 7	N
264	84.6	M	N	22	N	A	C		1		18	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	P
265	77	M	M	40	N	A	C	10	3	375	14	5, 1, 7, 2, 3, 8, 9, 4, 10, 6	C
266	80	M	N	27	N	D	B	6	0	4	15	4, 1, 3, 2, 5, 9, 7, 8, 6, 10	N
267	80	M	M	33	N	B	C	14	1		24	1, 6, 2, 8, 7, 9, 10, 5, 3, 4	P
268	88	M	N	23	N	A	A	3	1	150	11		P
269	76	M	N	22	N	A	A		0		12.7	5, 4, 2, 1, 3, 8, 9, 7, 10, 6	P
270	80	M	N		N	D	A		1		11	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	P
271	83			23	W	A	C	1	1		5	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	P
272	84	M	M	55	W	D	A	38	0		17	4, 2, 1, 3, 5, 6, 8, 7, 9, 10	A
273	98	M	N	57	W	D	C	34	1		22	4, 1, 2, 3, 5, 8, 9, 10, 6, 7	M
274	82	M	N	22	N	A	A		1		10	4, 1, 3, 2, 5, 8, 9, 7, 10, 6	P
275	89	F	M	46	W	C	C	25	3	7000	15	4, 5, 1, 2, 3, 7, 9, 6, 10, 8	P
276	87	M	M	52	W	B	B	30	0		28	4, 5, 2, 3, 10, 6, 7, 8, 9, 1	N
277	88	F	N	30	W	A	A		0		14	7, 8, 1, 5, 6, 9, 10, 2, 4, 3	M
278	89	M	M	33	N	B	B	8	0		17	3, 10, 4, 2, 6, 7, 9, 5, 8, 1	N
279	78	M	M	36	W	D	B	14	4	500	18	2, 1, 5, 4, 3, 8, 9, 10, 7, 6	M
280	94.2	M	N	21	N	A	A		1	130	17	1, 2, 5, 3, 6, 8, 7, 9, 10, 4	P
281	67	M	N	25		D			4		15.1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	P
282	92	M	M	51	W	C	A	34	0		21	1, 3, 2, 4, 5, 7, 8, 6, 10, 9	C
283	90	F	N	22	W	A	C	2	0		11	5, 2, 4, 3, 1, 9, 8, 7, 6, 10	N
284	73	M	N	33	N	D	B	11	0	15	23	5, 4, 3, 1, 2, 10, 9, 7, 6, 8	M
285	87	M	M	26	N	B	A	5	4	1600	16	2, 6, 1, 3, 5, 7, 8, 4, 9, 10	P
286	89	M	M	68	W	C	C	45	6	23000	13	5, 1, 3, 4, 2, 8, 9, 7, 10, 6	P
287	84	F	N	33	W	D	C	15	7	8000	14	4, 1, 3, 2, 5, 7, 8, 9, 10, 6	P
288	73.5	M	M	55	N	B	B	33	0		23		M
289	77	M	M	45	W	D	B	24	1		23	5, 2, 3, 4, 1, 6, 7, 8, 9, 10	P
290	87	M	M	48	N	A	B	16	0		9	3, 5, 4, 6, 1, 7, 8, 9, 10, 2	N
291	97	M	M	64	W	D	B		1		19	7, 1, 4, 3, 2, 8, 9, 5, 10, 6	M
292	71	M	N	54	W	B	B	18	1	8100	27	2, 3, 4, 5, 1, 7, 10, 6, 9, 8	P
293	84	M	M	50	W	B	C	32	1		19	4, 2, 1, 3, 5, 8, 9, 10, 6, 7	P
294	88	M	M	60	W	B	C	40	0		12	3, 2, 5, 4, 1, 9, 8, 10, 7, 6	A
295	77	F	M	42	W	A	C	18	3	300	0	2, 3, 1, 4, 5, 7, 8, 6, 9, 10	C
296	88	F	M	50	N	C	C	23	1	750	23	4, 3, 1, 5, 2, 7, 8, 9, 6, 10	P
297	85.6	F	M	34	W	A	C	17	3	1500	14	3, 2, 1, 4, 5, 8, 9, 6, 7, 10	A
298	81	M	N	63	W	C	B	39	3	27000	10	4, 2, 3, 6, 1, 8, 9, 5, 7, 10	P
299	73	M	M	54	W	B	C		4	12000	15	3, 1, 2, 5, 4, 6, 7, 8, 9, 10	P
300	93	M	N		W	B	C	43	4	12000	21	1, 2, 4, 5, 6, 7, 8, 3, 10, 9	P

Note. Y = HPI scores, X_1 = Gender (M = Male, F = Female), X_2 = Marital Status (N = Not Married, M = Married), X_3 = Age, X_4 = Race/Ethnicity (N = non-White/Caucasian, W = White/Caucasian), X_5 = Annual Income (A = < $50K, B = $100K to < $150K, C = ≥ $150K, D = > $50K but < $100K), X_6 = Education Level (A = < 4-yr. college degree, B = Graduate degree, C = 4-yr. college degree), X_7 = Years of Experience, X_8 = Number of FAA Ratings (Pilot subgroup), X_9 = Total Flight Hours (Pilot subgroup), X_{10} = IOP scores. Perceptions = Ranked data of participants' perceptions of professionalism, Group = Aviation Subgroup (A = Aircraft Maintenance Technician, C = Air Traffic Controller, M = Airport Manager, N = Non-Pilot Aviation Employee, P = Pilot).

Table B.1

Raw Data (Continued)

#	*Y*	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	Perceptions	Group
301	85	M	M	36	W	A	B	6	0		12	8, 6, 7, 9, 5, 4, 10, 1, 3, 2	N
302	92	M	M	37	W	B	B	16	0		13	3, 5, 2, 4, 1, 7, 8, 6, 9, 10	N
303	71	F	N	25	N	A	B	7	0	1.4	11	3, 4, 5, 1, 2, 9, 10, 7, 6, 8	N
304	79.6	M	M	39	W	A	C	15	4	5000	13	5, 2, 3, 4, 1, 6, 7, 8, 9, 10	P
305	89	M	M	56	W	D	C	38	4	6000	15	4, 3, 1, 2, 5, 6, 7, 8, 9, 10	P
306	81	M	N	44	W	D	B	25	4		10	3, 1, 6, 4, 2, 7, 8, 9, 5, 10	P
307	85	M	M	53	W	D	C	11	0		13	7, 2, 3, 1, 4, 9, 10, 5, 6, 8	N
308	72	M	N	26	W	A	B	10	5	1450	9	3, 2, 5, 1, 4, 7, 8, 9, 6, 10	P
309	80	M	M	46	W	A	A	7	5	1300	15	5, 1, 3, 2, 4, 7, 8, 6, 10, 9	P
310	90	F	N	24	N	D	B	1.5	1		13	2, 1, 3, 4, 5, 7, 8, 9, 10, 6	P
311	78	M	N	30	W	A	C	8	5	850	10	5, 2, 3, 1, 4, 9, 8, 10, 6, 7	P
312	76	F	M	33	W	A	C	15	3	540	12	3, 4, 1, 5, 2, 6, 7, 9, 10, 8	P
313	81	M	N	28	W	D	B	11	3	325	5	6, 3, 1, 4, 2, 7, 8, 9, 5, 10	P
314	77	M	M	49	W	D	A	29	0		5	4, 1, 2, 3, 5, 6, 7, 10, 8, 9	A
315	86	M	M	57	W	D	B		1		9	4, 5, 3, 1, 6, 8, 9, 2, 7, 10	P
316	100	F	N	35	W	D	B	17	1		22	3, 4, 5, 2, 1, 7, 9, 8, 10, 6	P
317	96	M	N	63	W	D	C	41	5	18700	21	5, 4, 2, 3, 1, 7, 8, 6, 9, 10	P
318	84	M	M	61	W	B	B	43	0		16	2, 4, 3, 1, 5, 6, 7, 8, 10, 9	N
319	97	M	M	58	W	B	A	35	0		15	10, 2, 5, 3, 1, 6, 7, 4, 9, 8	A
320	94	M	M	68	W	A	A	50	0		14	7, 8, 9, 6, 10, 3, 4, 2, 5, 1	N
321	85	M	M		W	D	C	22	0		12	5, 1, 3, 2, 4, 7, 10, 8, 6, 9	A
322	94	M	N	53	W	D	A		0		13	5, 7, 3, 4, 6, 9, 10, 8, 1, 2	A
323	94	M	M		W	C	B		3	3500	27	6, 5, 2, 1, 3, 10, 9, 8, 4, 7	P
324	94	F	M	34	N	A	B	8	0		28	4, 3, 2, 5, 6, 1, 10, 7, 8, 9	N
325	92	F	M	24	W	A	C	6	4	2900	21	3, 2, 4, 5, 1, 7, 8, 9, 10, 6	P
326	84	M	M	44	W	C	C	19	3	420	20	4, 1, 2, 5, 3, 9, 10, 6, 8, 7	P
327	98.6	M	N	31	W	D	B	8	5	2500	16	1, 2, 3, 4, 6, 7, 8, 9, 5, 10	P
328	86	M	N	21	W	A	A	6	1	265	20	6, 3, 1, 2, 7, 9, 10, 4, 5, 8	N
329	82	M	M	33	N	D	B	10	0		8	2, 3, 4, 5, 1, 8, 9, 6, 10, 7	N
330	88.6	M	M		N	C	A	38	0		19	4, 1, 2, 3, 5, 6, 7, 8, 9, 10	A
331	89	M	M	46	W	C	A	28	2	14000	11	2, 3, 1, 4, 5, 7, 8, 6, 9, 10	P
332	84	M	N	22	N	A	C	4	0		11	2, 1, 3, 4, 7, 6, 9, 8, 10, 5	A
333	69	M	M	37	W	D	C	17	4	7500	6	4, 1, 3, 2, 5, 7, 8, 6, 9, 10	P
334	93	F	M	52	W	A	C	2	1		17	4, 1, 2, 5, 3, 6, 7, 8, 9, 10	P
335	81	M	N	54	W	B	A	30	4	8000	16	3, 4, 2, 5, 1, 8, 10, 9, 7, 6	P
336	91	F	M	57	W	C	B	30	4	23000	28	2, 3, 4, 5, 1, 7, 8, 6, 9, 10	P
337	107	M	M	34	W	B	A	14	0		14	5, 1, 4, 3, 2, 7, 8, 6, 10, 9	A
338	88	M	M	53	W	B	C	19	0		13.2	10, 2, 4, 3, 1, 6, 7, 5, 8, 9	N
339	80					D	C	11	4	2500	14.9	3, 1, 2, 4, 5, 7, 8, 6, 9, 10	P
340	89	M	M	55	W	A	A	14	5	6000	27	3, 1, 2, 5, 4, 9, 10, 6, 8, 7	P
341	87	F	N	21	W	A	C	4	5	1000	11	3, 1, 4, 5, 2, 8, 7, 6, 10, 9	P
342	84.2	M	M	68	W	D	A		0		8	6, 9, 7, 4, 8, 3, 10, 5, 1, 2	N
343	87	F	M	37	W	D	C	11	7	3000	26	2, 1, 5, 3, 4, 6, 8, 7, 9, 10	P
344	53	M	N	33	N	A	C	12	6	3500	9	3, 2, 1, 5, 4, 10, 9, 6, 8, 7	N
345	83	M	M	33	N	A	A	12	1		14	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	P
346	104	F	N	37	N	D	C	8	0		14	4, 3, 6, 1, 2, 7, 8, 9, 10, 5	C
347	94	M	M	52	W	C	C	23	3	11500	26	3, 4, 1, 5, 2, 8, 9, 6, 7, 10	P
348	100	M	N	27	N	A	C	3	0		16	3, 2, 4, 1, 7, 5, 6, 9, 10, 8	C
349	90	M	N		W	D	A	25	4	3200	22	4, 2, 3, 5, 1, 7, 8, 9, 10, 6	P
350	79			60	N	D	C	32	6	26700	24	2, 1, 3, 4, 6, 5, 7, 8, 9, 10	P

Note. Y = HPI scores, X_1 = Gender (M = Male, F = Female), X_2 = Marital Status (N = Not Married, M = Married), X_3 = Age, X_4 = Race/Ethnicity (N = non-White/Caucasian, W = White/Caucasian), X_5 = Annual Income (A = < $50K, B = $100K to < $150K, C = ≥ $150K, D = > $50K but < $100K), X_6 = Education Level (A = < 4-yr. college degree, B = Graduate degree, C = 4-yr. college degree), X_7 = Years of Experience, X_8 = Number of FAA Ratings (Pilot subgroup), X_9 = Total Flight Hours (Pilot subgroup), X_{10} = IOP scores. Perceptions = Ranked data of participants' perceptions of professionalism, Group = Aviation Subgroup (A = Aircraft Maintenance Technician, C = Air Traffic Controller, M = Airport Manager, N = Non-Pilot Aviation Employee, P = Pilot).

Table B.1

Raw Data (Continued)

#	Y	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	Perceptions	Group
351	107	M	M	80	W	B	B	58	0		20	2, 5, 1, 3, 4, 7, 10, 8, 9, 6	N
352	87	M	M	52	W	D	B	28	0		21	4, 1, 5, 2, 3, 7, 8, 6, 9, 10	A
353	88	M	M	44	W	D	B	25	2	1000	19	1, 10, 2, 3, 4, 8, 9, 5, 6, 7	P
354	81	M	M	51	W	D	B	33	0		20	5, 1, 4, 2, 3, 8, 9, 6, 7, 10	N
355	84	M	M	68	W	C	A	50	0		20	1, 3, 2, 4, 5, 7, 8, 6, 9, 10	N
356	76	M	M	53	W	C	C	35	1	1000	15	3, 4, 1, 2, 5, 7, 10, 6, 8, 9	A
357	93	M	M	48	N	D	C	34	1		15	6, 7, 2, 5, 1, 3, 8, 9, 4, 10	N
358	80					D	A	27	1		28	3, 1, 4, 2, 5, 8, 9, 7, 10, 6	M
359	74	M	M			D	C	31	0		14	2, 1, 5, 4, 3, 7, 8, 6, 9, 10	N
360	89	M	M	48	W	C	A	25	4	13000	8	3, 2, 1, 4, 5, 8, 7, 6, 10, 9	P
361	78	M	M	53	W	B	C	25	0		6	3, 1, 4, 2, 5, 7, 8, 6, 9, 10	A
362	78	M	M	49	W	B	C	30	0		15	1, 2, 3, 4, 5, 6, 7, 9, 8, 10	A
363	93	M	N	70	W	C	A	53	1	17500	21	5, 4, 3, 2, 1, 8, 7, 9, 6, 10	P
364	86	M	M	39	W	D	B	13	0		19	3, 2, 1, 4, 5, 7, 6, 10, 9, 8	N
365	83	M	M	40	W	B	C	19	3	7500	19	1, 2, 3, 4, 5, 9, 10, 6, 7, 8	P
366	71	M	M	61	W	D	A	16	0		20	4, 5, 2, 6, 1, 7, 8, 3, 9, 10	M
367	91	F	M	32	W	B	B	3	1	90	23	6, 3, 2, 1, 5, 8, 9, 4, 10, 7	N
368	105	M	M	82	W	D	B	60	1	26000	25	3, 4, 1, 2, 5, 10, 9, 6, 7, 8	P
369	75	M	N	28	N	A	B	5	5		17	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	P
370	98	M	M	47	W	B	C	15	2	5000	25	3, 1, 4, 5, 2, 6, 9, 7, 8, 10	P
371	81	M	M		N	A	A		1	6000	20	1, 6, 2, 3, 8, 5, 4, 7, 9, 10	P
372	80.8	F	M	57	W	A	A	15	0		13	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	N
373	94.2	M	N	62	W	D	B	42	1	160	22	1, 2, 3, 4, 5, 7, 8, 6, 9, 10	N
374	77	M	N	35	W	A	B	10	1	130	1	2, 3, 1, 4, 5, 6, 8, 7, 10, 9	N
375	69.5	M	M	52	N	C	A	25	1	12700	13	6, 1, 2, 4, 3, 8, 9, 5, 7, 10	P
376	88	M	N	32	W	D	B	10	3	300	8	4, 3, 2, 1, 5, 6, 7, 8, 9, 10	N
377	77	F	N	39	W	C	B	22	5		20	2, 1, 3, 4, 5, 9, 10, 6, 7, 8	P
378	78	M	N	54	N	D	A		3		17	5, 3, 1, 2, 4, 6, 7, 8, 9, 10	P
379	80.6	M	M	37	N	A	C	13	0		10.9	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	N
380	87	M	N	28	W	D	B	5	1		7	6, 7, 2, 1, 3, 8, 9, 10, 4, 5	N
381	84	M	N	27	W	B	A		1	4000	20	5, 3, 4, 2, 1, 7, 8, 10, 6, 9	P
382	84	M	M	31	W	B	C	10	0		20	2, 4, 1, 3, 5, 6, 7, 8, 9, 10	N
383	84.6	M	M	54	W	D	B	24	1	1300	24	6, 3, 2, 1, 4, 8, 9, 5, 7, 10	N
384	77	M	M	54	W	D	A	22	0		9	1, 5, 4, 6, 7, 9, 10, 2, 8, 3	N
385	91	M	M	60	W	D	B	40	1		20	2, 1, 3, 4, 5, 7, 8, 10, 6, 9	N
386	72	M	N	28	N	A	B	3	0		13	1, 4, 2, 6, 5, 8, 7, 10, 9, 3	N
387	85	M	M	47	W	B	C	27	2	350	21	10, 4, 1, 3, 6, 8, 9, 2, 5, 7	P
388	80.3	F	M	59	W	B	B	25	2	3500	23	5, 2, 3, 4, 1, 6, 7, 8, 9, 10	P
389	101	M	M	60	W	C	C	39	2	2400	21	4, 2, 1, 3, 5, 6, 7, 8, 9, 10	N
390	90	M	M		N	D	B	19	0		23	5, 1, 2, 3, 4, 10, 9, 8, 6, 7	N
391	91	M	M	65	W	B	C	40	4	18000	13	1, 3, 2, 4, 5, 9, 7, 6, 8, 10	P
392	101.4	M	M	53	N	B	B	30	0		24	2, 5, 4, 3, 8, 9, 10, 7, 6, 1	A
393	91	M	N	55	W	D	B	38	4		19	3, 4, 1, 2, 5, 8, 9, 7, 6, 10	P
394	94	M	M	55	W	C	A	41	5	29500	21	5, 1, 2, 3, 4, 8, 7, 6, 9, 10	P
395	88	F	N	27	W	D	B	5	2	350	21	4, 1, 2, 5, 3, 9, 8, 10, 6, 7	P
396	89.2	M	M	57	W	C	B	34	1	4400	16	3, 1, 2, 4, 5, 7, 8, 6, 9, 10	P
397	88.5	M	M	58	W	C	C	35	2	16000	13	3, 4, 1, 2, 5, 7, 8, 6, 9, 10	P
398	90	F	M	51	W	C	C	21	3	750	18	2, 5, 1, 3, 4, 7, 8, 9, 10, 6	P
399	89	F	N	69	W	B	A		4	30000	23	2, 7, 1, 6, 3, 8, 5, 4, 10, 9	P
400	65	M	M	58	N	D	A	19	0		18	1, 2, 3, 5, 6, 7, 8, 4, 9, 10	N

Note. Y = HPI scores, X_1 = Gender (M = Male, F = Female), X_2 = Marital Status (N = Not Married, M = Married), X_3 = Age, X_4 = Race/Ethnicity (N = non-White/Caucasian, W = White/Caucasian), X_5 = Annual Income (A = < $50K, B = $100K to < $150K, C = ≥ $150K, D = > $50K but < $100K), X_6 = Education Level (A = < 4-yr. college degree, B = Graduate degree, C = 4-yr. college degree), X_7 = Years of Experience, X_8 = Number of FAA Ratings (Pilot subgroup), X_9 = Total Flight Hours (Pilot subgroup), X_{10} = IOP scores. Perceptions = Ranked data of participants' perceptions of professionalism, Group = Aviation Subgroup (A = Aircraft Maintenance Technician, C = Air Traffic Controller, M = Airport Manager, N = Non-Pilot Aviation Employee, P = Pilot).

Table B.1

Raw Data (Continued)

#	*Y*	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	Perceptions	Group
401	84	M	M	60	N	D	C	40	0		12	3, 4, 1, 2, 5, 6, 7, 8, 9, 10	A
402	93	M	M	58	N	B	A		0		11	3, 4, 1, 2, 5, 9, 10, 6, 7, 8	N
403	86.3	M	M	53	N	B	A	30	0		9	6, 1, 2, 5, 7, 8, 9, 4, 10, 3	N
404	96	M	M	48	W	D	C	27	6	8900	18	2, 1, 3, 4, 5, 9, 10, 6, 7, 8	N
405	92	M	M	65	W	B	B	45	3	3000	25	5, 2, 3, 1, 4, 7, 9, 6, 8, 10	P
406	99	M	M	66	W	C	B	48	4	14400	24	4, 1, 2, 3, 5, 7, 9, 6, 10, 8	P
407	86	M	M	55	W	B	B	30	1	17000	22	2, 1, 5, 3, 4, 8, 9, 7, 10, 6	P
408	81	M	N	26	W	D	B		2	160	11	7, 1, 3, 2, 5, 9, 10, 4, 6, 8	P
409	94	M	M	64	W	B	B	28	0		20	3, 4, 2, 5, 1, 9, 10, 8, 7, 6	N
410	86	M	M	42	W	B	B	29	6	6000	24	2, 5, 1, 3, 4, 7, 8, 6, 9, 10	P
411	79	F	M	53	W	B	B	10	0		19	3, 2, 1, 4, 5, 9, 10, 7, 6, 8	N
412	93	M	M	66	W	C	B	48	1	6000	19	3, 1, 2, 4, 5, 6, 7, 8, 9, 10	P
413	96	M	M	75	W	C	C	52	3	25000	22	5, 3, 1, 2, 4, 7, 8, 9, 10, 6	P
414	85	M	M		W	B	B	45	0		15	4, 2, 1, 8, 3, 9, 10, 6, 7, 5	N
415	94	M	M	58	W	B	A	35	1	15000	11	2, 3, 1, 4, 5, 7, 8, 6, 10, 9	N
416	76	M	M	34	W	B	B	13	6	7000	12	2, 4, 1, 5, 3, 7, 8, 9, 6, 10	P
417	71	M	M	31	W	D	A	14	2	5150	11	3, 4, 2, 5, 1, 6, 7, 8, 10, 9	P
418	90	M	M	66	W	D	C	44	1	10000	18	5, 1, 3, 2, 4, 8, 9, 10, 7, 6	P
419	90	F	M	52	W	B	B	35	1	2450	23	5, 2, 3, 4, 1, 7, 8, 9, 6, 10	N
420	96.4	M	M	43	W	B	B	20	1	240	25	8, 6, 9, 10, 1, 4, 5, 7, 2, 3	N
421	71	M	M	44	W	D	B	14	4	3500	16	9, 2, 1, 3, 4, 6, 7, 8, 5, 10	P
422	68	M	M	34	W	D	B		4	2600	11	4, 5, 1, 2, 3, 9, 6, 8, 7, 10	P
423	87	M	N	36	W	D	B	15	5	2200	11	4, 3, 2, 5, 1, 8, 9, 10, 6, 7	P
424	88	M	M	64	W	D	C	45	1	2600	18	5, 4, 2, 3, 1, 7, 8, 9, 6, 10	P
425	89	M	M	35	W	D	B	13	5	4500	11	4, 2, 3, 5, 1, 7, 8, 9, 6, 10	P
426	84	M	M	60	W	B	B	40	0		19	2, 1, 4, 3, 5, 6, 7, 8, 9, 10	N
427	95	M	M	43	W	D	B	26	1		19	2, 1, 3, 4, 5, 8, 10, 9, 6, 7	N
428	71	M	N	30	W	A	B	14	4	2900	5	4, 2, 5, 3, 1, 7, 8, 6, 9, 10	P
429	86	F	M	41	W	D	B	19	0		20	5, 2, 3, 4, 1, 8, 9, 10, 6, 7	N
430	82	M	M	43	W	B	B	22	1	1000	17	5, 2, 1, 6, 4, 8, 9, 7, 3, 10	P
431	78	M	N	23	W	A	C	1	5	350	8	4, 5, 1, 2, 3, 6, 7, 8, 9, 10	P
432	86			37	W	A	C	21	4	4413	14	2, 1, 4, 5, 3, 6, 7, 9, 10, 8	P
433	86	M	M		W	D	B	11	3		26	4, 1, 2, 3, 5, 6, 7, 10, 9, 8	P
434	87	M	N	62	W	D	C	40	3	15500	25	5, 4, 3, 2, 1, 10, 9, 8, 6, 7	P
435	90	F	N	37	W	C	B	18	7	5500	13	2, 1, 3, 4, 5, 7, 8, 9, 6, 10	P
436	84	M	M	49	W	B	B	26	4	8000	15	1, 5, 2, 4, 3, 9, 10, 7, 6, 8	P
437	81	M	M	36	W	D		15	1	8000	14	3, 1, 2, 4, 5, 10, 9, 7, 8, 6	P
438	88	M	M	54	W	C	A	30	3	20000	23	5, 1, 3, 4, 2, 8, 9, 6, 10, 7	P
439	75	M	M	59	W	B	C	32	2	5900	8	1, 3, 4, 2, 5, 6, 7, 8, 9, 10	P
440	85	M	M	65	W	C	C	45	3	8500	18	3, 2, 5, 1, 4, 6, 7, 8, 9, 10	P
441	100	M	M	49	W	B	C	17	1	500	17	5, 1, 3, 2, 4, 9, 10, 8, 6, 7	N
442	80	M	M	46	W	C	C	22	1		10	2, 5, 3, 4, 1, 8, 9, 7, 6, 10	P
443	102	M	M	43	W	C	B	29	5	14000	25	5, 4, 3, 6, 1, 8, 10, 7, 2, 9	P
444	101	M	M	45	W	D	C	18	2	4000	21	4, 2, 1, 3, 5, 8, 9, 6, 7, 10	P
445	89	M	M	52	W	C	B	30	6		14	4, 2, 5, 3, 1, 9, 10, 8, 6, 7	P
446	81	M	M	45	W	C	C	27	3	9500	15	3, 2, 4, 5, 1, 7, 8, 6, 10, 9	P
447	91	M	M	58	W	C	C	23	5	17000	14	5, 1, 3, 2, 4, 6, 7, 8, 9, 10	P
448	88	M	M	51	W	B	C	29	5	6500	24	4, 1, 2, 3, 5, 9, 10, 6, 7, 8	P
449	81	M	M	59	W	B	C	36	1	13200	13	2, 5, 1, 4, 3, 7, 8, 6, 9, 10	P
450	64	M	M	34	W	A	A	10	0		6	5, 2, 3, 4, 1, 8, 9, 6, 7, 10	N

Note. Y = HPI scores, X_1 = Gender (M = Male, F = Female), X_2 = Marital Status (N = Not Married, M = Married), X_3 = Age, X_4 = Race/Ethnicity (N = non-White/Caucasian, W = White/Caucasian), X_5 = Annual Income (A = < $50K, B = $100K to < $150K, C = ≥ $150K, D = > $50K but < $100K), X_6 = Education Level (A = < 4-yr. college degree, B = Graduate degree, C = 4-yr. college degree), X_7 = Years of Experience, X_8 = Number of FAA Ratings (Pilot subgroup), X_9 = Total Flight Hours (Pilot subgroup), X_{10} = IOP scores. Perceptions = Ranked data of participants' perceptions of professionalism, Group = Aviation Subgroup (A = Aircraft Maintenance Technician, C = Air Traffic Controller, M = Airport Manager, N = Non-Pilot Aviation Employee, P = Pilot).

Table B.1

Raw Data (Continued)

#	*Y*	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	Perceptions	Group
451	97	M	M	57	W	C	C	40	3	16500	16	4, 1, 2, 3, 6, 9, 10, 8, 7, 5	P
452	98	M	M	59	W	C	C	37	3	6500	18	3, 2, 4, 5, 1, 7, 8, 6, 10, 9	N
453	72	M	M	47	W	C	C	20	4	13000	21	3, 1, 2, 4, 5, 6, 8, 7, 9, 10	P
454	95	M	M	40	W	D	C	15	6	7000	22	1, 5, 3, 4, 2, 7, 8, 6, 9, 10	P
455	71					D	C	23	6	8600	24	3, 1, 2, 5, 4, 7, 8, 6, 9, 10	P
456	93.2	M	M	57	W	C	C	37	0		24	3, 1, 2, 4, 5, 6, 7, 8, 9, 10	A
457	75	M	M	57	W	C	B	36	2	1200	9	7, 4, 2, 3, 1, 5, 6, 8, 9, 10	N
458	100	F	N	32	N	D	C	9	0		11	6, 4, 2, 3, 5, 7, 8, 1, 9, 10	M
459	91	M	M	34	W	D	A	10	6	4900	12	5, 2, 3, 4, 1, 7, 8, 6, 10, 9	P
460	79	F	M	30	W	D	A		0		15	1, 3, 2, 5, 6, 7, 8, 4, 9, 10	M
461	87	M	M	36	W	B	C	15	1	4000	20	4, 5, 2, 3, 1, 10, 9, 8, 7, 6	P
462	87	M	N	61	W	C	C	41	3	14945	15	4, 5, 3, 2, 1, 6, 7, 8, 9, 10	P
463	99	M	M	52	W	D	C	18	3	7550	15	4, 5, 2, 3, 1, 9, 10, 6, 8, 7	P
464	88	M	M	42	W	C	C	22	1		16	3, 1, 4, 2, 5, 6, 7, 8, 10, 9	A
465	101.8	M	M	68	W	C	B		3	15000	24	3, 1, 2, 4, 5, 7, 8, 6, 9, 10	P
466	79	M	N	45	W	B	A	25	1		12	6, 3, 2, 4, 1, 9, 5, 7, 10, 8	P
467	91	M	M	54	W	C	C	36	4	12000	11	5, 3, 2, 1, 4, 10, 9, 6, 7, 8	P
468	80	M	N	51	W	D	C	30	4	5000	22	3, 4, 1, 5, 2, 6, 7, 10, 9, 8	P
469	100	M	M	59	N	B	C	30	4	15300	22	4, 5, 2, 1, 6, 8, 9, 3, 7, 10	P
470	87	M	M	37	N	C	A	15	3		12	3, 4, 2, 1, 5, 7, 8, 6, 10, 9	P
471	79	M	M	51	W	C	C	30	5	12000	17	5, 2, 3, 4, 1, 6, 7, 8, 9, 10	P
472	68	M	N			D	B		3		15	5, 4, 2, 3, 1, 7, 8, 9, 10, 6	P
473	90	M	M	50	W	C	C	28	7	8000	12	6, 1, 5, 2, 3, 8, 9, 7, 10, 4	P
474	82	M	M	43	W	B	C	19	3	10000	14	2, 5, 1, 4, 3, 7, 8, 6, 10, 9	P
475	83	M	M	53	W	C	C	31	1	14500	12	4, 3, 2, 1, 5, 9, 10, 6, 7, 8	P
476	94	M	M	46	W	D	B	12	5	3000	22	5, 2, 3, 4, 1, 10, 9, 8, 7, 6	P
477	88	M	M	51	W	B	B	29	1	6500	24	4, 2, 5, 3, 1, 8, 9, 6, 7, 10	P
478	76	M	M	33	W	A	A	5	3	1250	18	3, 1, 2, 4, 5, 6, 10, 7, 8, 9	P
479	83	F	M	29	W	D	B	7	1	70	16	1, 4, 5, 3, 2, 8, 10, 6, 7, 9	M
480	91					D			0		15.1	2, 1, 3, 4, 5, 10, 9, 6, 7, 8	P
481	90.4	M	M		W	B	B	10	0		22	7, 1, 4, 2, 3, 5, 6, 9, 8, 10	N
482	37					D			0		15.1	5, 1, 3, 4, 2, 7, 9, 6, 8, 10	N
483	91	F	M	57	W	B	A	15	0		9	3, 2, 1, 4, 5, 6, 7, 8, 9, 10	N
484	84					D			0		15.1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	P
485	69.6					D			0		0	5, 4, 2, 3, 1, 7, 9, 6, 10, 8	A
486	80					D			0		14	2, 3, 1, 4, 5, 10, 9, 6, 7, 8	A
487	87					D			0		15.1	2, 4, 1, 5, 3, 6, 7, 8, 9, 10	P
488	78					D			0		11.6	5, 2, 4, 3, 1, 7, 8, 6, 10, 9	A
489	103	M	M	74	W	B	C	35	0		16	4, 1, 3, 2, 5, 7, 8, 9, 10, 6	N
490	93	M	N	24	N	D	C	4	0		14	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	P
491	87	F	N	29	W	D			0		8	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	C
492	91	M	N	22	N	D	C	1	0		11	1, 2, 3, 4, 5, 8, 9, 10, 6, 7	P
493	86					D			0		15.1	5, 2, 3, 1, 4, 9, 10, 6, 7, 8	M
494	77	M	M	55	W	D	A	33	0		10	6, 2, 3, 4, 1, 10, 8, 7, 5, 9	A
495	93	M	N	27	W	A	C		4	1100	16	2, 1, 3, 5, 6, 9, 10, 8, 4, 7	P
496	76.5					D			0		15.1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	P
497	81	M	N	28	N	A	C	0	0		0	1, 2, 3, 7, 4, 9, 10, 5, 8, 6	N
498	84					D			0		15.1	1, 4, 2, 3, 7, 5, 10, 9, 6, 8	N
499	95					D			0		15.1	4, 1, 3, 5, 2, 7, 8, 9, 10, 6	P
500	103	M	M	67	W	D	A	47	7	25000	20	1, 2, 3, 4, 5, 8, 9, 7, 10, 6	A

Note. Y = HPI scores, X_1 = Gender (M = Male, F = Female), X_2 = Marital Status (N = Not Married, M = Married), X_3 = Age, X_4 = Race/Ethnicity (N = non-White/Caucasian, W = White/Caucasian), X_5 = Annual Income (A = < $50K, B = $100K to < $150K, C = ≥ $150K, D = > $50K but < $100K), X_6 = Education Level (A = < 4-yr. college degree, B = Graduate degree, C = 4-yr. college degree), X_7 = Years of Experience, X_8 = Number of FAA Ratings (Pilot subgroup), X_9 = Total Flight Hours (Pilot subgroup), X_{10} = IOP scores. Perceptions = Ranked data of participants' perceptions of professionalism, Group = Aviation Subgroup (A = Aircraft Maintenance Technician, C = Air Traffic Controller, M = Airport Manager, N = Non-Pilot Aviation Employee, P = Pilot).

Table B.1

Raw Data (Continued)

#	Y	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	Perceptions	Group
501	85					D			0		15.1	2, 1, 3, 5, 4, 8, 9, 7, 6, 10	A
502	93	M	M	54	W	B	C	30	0		15	2, 4, 1, 3, 6, 7, 8, 5, 9, 10	P
503	81	M	N	50	W	D		30	0		15	2, 1, 3, 4, 5, 7, 8, 6, 10, 9	N
504	71	M	N	34	W	B	C	15	0		16	3, 2, 1, 4, 5, 7, 10, 8, 9, 6	P
505	89	M	M	64	W	C	A	43	3		16	1, 3, 4, 5, 2, 6, 8, 7, 9, 10	P
506	85	M	M	48	W	C			0		17	1, 2, 4, 3, 5, 6, 10, 9, 7, 8	A
507	92.2					D			0		18	1, 2, 4, 3, 5, 7, 8, 9, 6, 10	P
508	96	M	M	57	W	C	C	30	0		15	1, 2, 4, 5, 3, 9, 10, 6, 8, 7	P
509	76	M	M	51	W	C	C	30	5	12000	17	4, 2, 5, 3, 1, 8, 9, 10, 6, 7	P
510	85	M	M	64	W	C	C	42	0		18	5, 1, 3, 2, 4, 9, 10, 8, 7, 6	P
511	107	M	M	52	W	D	B	30	5	15500	20	4, 5, 2, 3, 1, 6, 9, 8, 10, 7	P
512	87	M	N		N	D	B	6	2		24	4, 1, 8, 2, 3, 5, 6, 7, 9, 10	N
513	76	M	M	53	N	D	B	28	0		18	5, 6, 2, 1, 3, 10, 9, 8, 4, 7	A
514	93	M	M	65	W	C	B	30	0		24	9, 5, 1, 8, 4, 6, 7, 3, 2, 10	N
515	81	M	M	33	W	A	B		0		7	1, 2, 3, 4, 5, 7, 8, 6, 10, 9	M
516	93	M	M	28	N	A	B	7	2	250	21	2, 3, 1, 4, 5, 6, 7, 9, 8, 10	M
517	80	M	N	27	N	A	B	3	0		11	1, 3, 4, 2, 5, 7, 6, 8, 9, 10	A
518	87	M	M	60	W	B	C	32	0		15	5, 2, 3, 4, 1, 8, 9, 6, 7, 10	N
519	96	M	N	28	N	A	B	3	1		8	3, 7, 2, 8, 1, 4, 5, 6, 10, 9	P
520	92.6	M	N	31	W	D	B	7	4	2600	15	3, 1, 4, 5, 6, 8, 2, 9, 7, 10	P
521	91	M	N	23	W	A	C	5	0		7	5, 4, 3, 2, 1, 10, 9, 8, 6, 7	M
522	96.2	M	M	62	W	B	B	46	1		23	5, 3, 7, 4, 8, 9, 10, 1, 6, 2	P
523	90	F	N	28	N	A	B	4	0	38	8	5, 4, 2, 1, 6, 3, 10, 7, 8, 9	N
524	71	M	N	26	N	A	B	0	0		12	1, 3, 2, 4, 5, 7, 8, 6, 9, 10	N
525	99	M	M	73	W	C	B	52	3	1400	25	3, 5, 2, 1, 4, 8, 9, 6, 10, 7	P
526	107	M	M	35	W	D	B	10	1	100	21	1, 4, 2, 3, 7, 9, 10, 6, 5, 8	N
527	88	M	N	18	N	A			0		5	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	P
528	85	M	N	21	N	A	C	7	4	650	19	3, 4, 1, 2, 5, 6, 8, 7, 10, 9	P
529	99	F	N	25	N	D	B		0		13	3, 4, 2, 5, 9, 6, 7, 8, 1, 10	N
530	96	M	N	23	W	A	C	1	0		10	4, 2, 5, 3, 1, 9, 10, 8, 6, 7	M
531	93	M	M	54	W	B	C	30	1	18000	15	2, 4, 1, 3, 6, 7, 8, 5, 9, 10	P
532	87	M	M	30	W	B	A	10	2	4000	18	4, 3, 1, 5, 2, 7, 8, 6, 10, 9	P
533	85	M	M	55	W	B	C	37	3	20000	18	4, 5, 3, 2, 1, 10, 9, 6, 7, 8	P
534	89	F	M	62	W	D	B	23	1	900	21	6, 2, 4, 3, 1, 7, 8, 9, 10, 5	P
535	95	M	M	58	W	B	B	34	3	9960	18	1, 2, 3, 4, 5, 7, 8, 6, 9, 10	P
536	80.6	M	M	40	N	C	C	20	1		13	7, 2, 3, 1, 9, 4, 5, 6, 10, 8	P
537	75	M	N	28	W	D	C	3	0		12	5, 1, 4, 3, 2, 7, 8, 6, 9, 10	N
538	72	M	M	29	W	D	B	4	0		8	3, 2, 1, 5, 4, 7, 8, 6, 9, 10	N
539	81	M	N	23	W	A	C	2	1	150	7	3, 5, 2, 7, 1, 10, 9, 8, 4, 6	P
540	89	M	M	60	W	D	A	36	4	11500	20	5, 1, 4, 3, 2, 9, 10, 6, 8, 7	P
541	82	F	N	27	W	A	B		0		7	5, 1, 3, 2, 4, 7, 9, 6, 10, 8	N
542	96	M	M	28	W	A	C	7	6	4000	12	2, 1, 4, 5, 3, 8, 9, 10, 7, 6	P
543	94	M	N	43	N	D	C	20	0		16	4, 2, 3, 1, 5, 7, 6, 9, 10, 8	N
544	80	M	M	40	W	D	A	17	0		11	3, 4, 5, 1, 2, 7, 9, 6, 10, 8	N
545	92	M	M	34	W	D	B	12	0		14	5, 3, 2, 4, 1, 10, 6, 8, 7, 9	M
546	91	M	M	62	N	A		33	0		5	4, 5, 3, 1, 2, 7, 6, 10, 9, 8	N
547	83	M	M	34	W	A	B	10	0		18	2, 3, 4, 5, 9, 10, 8, 1, 6, 7	N
548	83	M	N	33	W	D	B	12	0		5	5, 4, 2, 3, 1, 9, 8, 6, 7, 10	M
549	87	M	M	33	W	A	C	3	0		10	3, 1, 2, 4, 8, 5, 7, 6, 9, 10	M
550	78	M	N	25	N	A	C	2	0		10	4, 3, 2, 5, 1, 10, 6, 8, 7, 9	M

Note. Y = HPI scores, X_1 = Gender (M = Male, F = Female), X_2 = Marital Status (N = Not Married, M = Married), X_3 = Age, X_4 = Race/Ethnicity (N = non-White/Caucasian, W = White/Caucasian), X_5 = Annual Income (A = < $50K, B = $100K to < $150K, C = ≥ $150K, D = > $50K but < $100K), X_6 = Education Level (A = < 4-yr. college degree, B = Graduate degree, C = 4-yr. college degree), X_7 = Years of Experience, X_8 = Number of FAA Ratings (Pilot subgroup), X_9 = Total Flight Hours (Pilot subgroup), X_{10} = IOP scores. Perceptions = Ranked data of participants' perceptions of professionalism, Group = Aviation Subgroup (A = Aircraft Maintenance Technician, C = Air Traffic Controller, M = Airport Manager, N = Non-Pilot Aviation Employee, P = Pilot).

Table B.1

Raw Data (Continued)

#	*Y*	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	Perceptions	Group
551	72	F	N	30	W	D	C	7	0		15	5, 1, 3, 4, 7, 8, 2, 6, 10, 9	C
552	80	M	M	31	W	D		10	0		3	4, 3, 2, 10, 1, 5, 6, 8, 7, 9	C
553	77	M	M	55	N	A	A	30	0		6	3, 1, 4, 2, 6, 7, 10, 5, 8, 9	N
554	74	M	M	34	N	D	C	8	0		13	2, 3, 4, 8, 9, 10, 5, 1, 6, 7	M
555	79	M	M	31	N	D	C	8	0		11	5, 2, 7, 3, 4, 9, 8, 6, 1, 10	M
556	78	M	M	37	N	D	C	8	0		13	8, 7, 1, 9, 5, 2, 6, 4, 3, 10	M
557	82	M	M	33	N	D	C	8	0		17	9, 8, 3, 4, 5, 6, 7, 2, 1, 10	M
558	75	M	M	34	N	A		8	0		12	7, 9, 10, 6, 5, 3, 7, 1, 2, 10	N
559	77	M	M	54	N	D	C	36	0		8	9, 10, 1, 3, 2, 7, 8, 5, 6, 4	C
560	86	M	M	29		D	C	9	0		13	9, 10, 1, 3, 7, 2, 5, 4, 6, 8	C
561	76	M	M	55		A	C	7	0		14	3, 2, 9, 1, 8, 4, 5, 6, 7, 10	C
562	78	M	M	33		D		11	0		1	5, 10, 1, 8, 7, 6, 4, 3, 2, 9	N
563	82	M	M	48		D	C	18	0		4	4, 3, 2, 6, 1, 5, 10, 8, 7, 9	C
564	72	M	M	44		D	C	16	0		6	4, 5, 3, 1, 6, 7, 2, 10, 9, 8	N
565	81	M	M	66	W	A	A	46	0		10	4, 6, 3, 1, 2, 10, 7, 8, 5, 9	C
566	76	M	M	55	N	D	C	31	0		8	4, 6, 10, 1, 2, 3, 7, 8, 5, 9	C
567	71	M	M	62	W	D		44	0		10	2, 3, 4, 1, 5, 6, 9, 7, 8, 10	N
568	76	M	N	29	N	D	C	4	0		1	2, 3, 4, 1, 5, 10, 9, 7, 8, 6	N
569	71	M	M	46		D	C	20	0		5	7, 6, 1, 9, 2, 8, 5, 10, 3, 4	N
570	80	M	M	38		D	B	14	0		4	5, 10, 9, 8, 7, 6, 4, 3, 2, 1	N
571	72	M	M	56	N	D	C	20	0		9	3, 10, 2, 4, 8, 5, 7, 6, 9, 1	N
572	85	M	M	63	W	D		40	0		12	4, 3, 2, 10, 1, 5, 6, 8, 7, 9	C
573	77	M	M	40	N	D	A	18	0		4	4, 3, 2, 7, 1, 10, 6, 8, 5, 9	C
574	73	M	M	32	N	D	B	9	0		8	4, 2, 1, 3, 8, 5, 6, 9, 7, 10	N
575	78	M	N	31	W	D	C	3	0		9	5, 8, 1, 10, 7, 6, 4, 3, 2, 9	C
576	77	M	N	28		D	C	5	0		6	5, 10, 1, 8, 7, 6, 4, 3, 2, 9	N
577	86	F	M	45	W	D		26	0		16	10, 9, 8, 6, 5, 4, 7, 3, 1, 2	C
578	81	F	M	47	N	D	C	23	0		16	10, 7, 5, 6, 1, 8, 4, 2, 3, 2	N
579	71	F	M	42	N	D	A	12	0		5	5, 8, 1, 10, 7, 6, 4, 3, 2, 9	C
580	78	M	M	58	W	B	C	36	0		6	1, 5, 7, 3, 2, 4, 8, 6, 9, 10	C
581	74	M	M	59	W	D		33	0		9	8, 7, 1, 9, 5, 2, 6, 4, 3, 10	C
582	77	M	M	46	N	D	B	25	0		15	10, 7, 5, 6, 1, 8, 4, 2, 3, 2	M
583	89	M	M	28	N	A	C	3	0		16	2, 3, 4, 1, 5, 10, 9, 7, 8, 6	N
584	77	M	M	33		D	B	9	0		9	1, 3, 2, 4, 10, 5, 6, 7, 9, 10	N
585	69	M	M	65	N	D	B	30	0		15	1, 3, 2, 4, 10, 5, 6, 7, 9, 10	N
586	73	M	M	50	N	D	B	25	0		11	9, 10, 1, 3, 2, 7, 8, 5, 6, 4	N
587	81	M	M	40	W	D	C	15	0		14	2, 3, 8, 10, 4, 7, 5, 6, 1, 9	C
588	70	M	N	36	N	A	B	13	0		9	5, 8, 1, 10, 7, 6, 4, 3, 2, 9	N
589	77	M	N	35	N	D	B	8	0		16	4, 3, 2, 7, 1, 10, 6, 8, 5, 9	N
590	79	M	M	62	N	D	B	33	0		17	1, 5, 7, 3, 2, 4, 8, 6, 9, 10	M
591	77	M	M	44	W	D	A	22	0		20	1, 5, 7, 3, 2, 4, 8, 6, 9, 10	C
592	73	M	M	38	N	D		8	0		6	1, 5, 7, 3, 2, 4, 8, 6, 9, 10	C
593	74	F	M	42		D	B	20	0		6	3, 10, 2, 4, 8, 5, 7, 6, 9, 1	N
594	68	F	N	34	N	A	C	7	0		12	2, 4, 1, 3, 5, 10, 9, 6, 7, 8	N
595	90	M	M	37	W	D	B	14	0		25	5, 3, 4, 1, 10, 2, 8, 9, 7, 6	M
596	65	M	M	38	N	A	B	8	0		2	10, 7, 5, 6, 1, 8, 4, 2, 3, 2	M
597	69	M	M	44	N	D	C	17	0		12	8, 7, 1, 9, 5, 2, 6, 4, 3, 10	N
598	82	M	M	69	W	D		40	0		10	3, 5, 4, 2, 1, 8, 9, 7, 6, 10	C
599	78	M	M	58	N	B	C	32	0		22	4, 3, 1, 2, 7, 8, 10, 6, 5, 9	N
600	77	M	M	39		D	C	15	0		18	8, 7, 1, 9, 5, 2, 6, 4, 3, 10	M

Note. Y = HPI scores, X_1 = Gender (M = Male, F = Female), X_2 = Marital Status (N = Not Married, M = Married), X_3 = Age, X_4 = Race/Ethnicity (N = non-White/Caucasian, W = White/Caucasian), X_5 = Annual Income (A = < $50K, B = $100K to < $150K, C = ≥ $150K, D = > $50K but < $100K), X_6 = Education Level (A = < 4-yr. college degree, B = Graduate degree, C = 4-yr. college degree), X_7 = Years of Experience, X_8 = Number of FAA Ratings (Pilot subgroup), X_9 = Total Flight Hours (Pilot subgroup), X_{10} = IOP scores. Perceptions = Ranked data of participants' perceptions of professionalism, Group = Aviation Subgroup (A = Aircraft Maintenance Technician, C = Air Traffic Controller, M = Airport Manager, N = Non-Pilot Aviation Employee, P = Pilot).

Table B.1

Raw Data (Continued)

#	*Y*	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	Perceptions	Group
601	73	M	M	51	N	D		30	0		22	2, 6, 5, 7, 1, 3, 4, 8, 9, 10	C
602	82	M	M	49	W	D	A	20	0		20	3, 5, 4, 2, 1, 8, 9, 7, 6, 10	C
603	76	F	M	38	N	D	B	12	0		19	9, 10, 1, 3, 7, 2, 5, 4, 6, 8	N
604	81	M	M	54	N	D	A	32	0		17	10, 5, 4, 6, 1, 2, 3, 7, 8, 9	C
605	83	M	M	40	N	A	B	12	0		19	4, 3, 1, 2, 7, 8, 10, 6, 5, 9	C
606	78	M	N	50	N	D		22	0		13	10, 7, 5, 6, 1, 8, 4, 2, 3, 2	N
607	73	M	M	55	W	D	A	23	0		18	3, 5, 4, 2, 1, 8, 9, 7, 6, 10	N
608	95	F	M	34	W	A	B	15	0		13	2, 8, 9, 1, 3, 4, 5, 10, 6, 7	N
609	82	M	M	59	N	D		37	1	10000	24	5, 3, 4, 1, 10, 2, 8, 9, 7, 6	P
610	80	M	M	52	W	D		31	1	13000	20	4, 3, 1, 2, 7, 8, 10, 6, 5, 9	P
611	79	F	N	27	W	A	B	3	0		8	1, 2, 4, 3, 5, 8, 9, 10, 6, 7	N
612	91	M	M	57	N	D	B	32	0		27	3, 5, 4, 2, 1, 8, 9, 7, 6, 10	N
613	72	M	M	55	W	A	C	16	0		10	3, 2, 1, 4, 5, 6, 8, 7, 9, 10	N
614	86	M	M	40		D	C	15	0		19	10, 7, 5, 6, 1, 8, 4, 2, 3, 2	C
615	84	M	M	60	N	D	A	40	0		19	4, 3, 1, 2, 7, 8, 10, 6, 5, 9	C
616	81	M	M	34	W	D		12	1	555.2	23	1, 4, 8, 10, 2, 3, 6, 7, 5, 9	P
617	82	F	N	25	N	A	C	3	0		18	1, 4, 8, 6, 3, 9, 10, 5, 2, 7	N
618	80	M	N	36	N	D	C	4	0		19	4, 3, 1, 2, 7, 8, 10, 6, 5, 9	N
619	74	M	N	26	N	A	C	3	0		17	10, 7, 5, 6, 1, 8, 4, 2, 3, 2	N
620	77	M	M	45	W	D	C	18	0		13	3, 5, 4, 2, 1, 8, 9, 7, 6, 10	C
621	72	M	M	50	N	D	C	23	0		25	9, 10, 1, 3, 2, 7, 8, 5, 6, 4	N
622	70	M	M	55	W	D	B	26	0		16	2, 8, 9, 1, 3, 4, 5, 10, 6, 7	M
623	75	M	M	31	N	A	A	8	0		18	1, 4, 8, 6, 3, 9, 10, 5, 2, 7	A
624	79	F	M	42	N	D	A	16	0		23	7, 6, 1, 9, 2, 8, 5, 10, 3, 4	N
625	74	M	M	46	N	D		20	0		20	7, 6, 1, 9, 2, 8, 5, 10, 3, 4	A
626	70	M	M	50	N	D	A	20	0		18	1, 4, 8, 6, 3, 9, 10, 5, 2, 7	C
627	75	M	N	26		A		3	0		20	2, 4, 5, 6, 7, 3, 8, 1, 10, 9	A
628	70	M	M	46	W	D	B	21	0		19	7, 8, 9, 10, 5, 3, 4, 2, 6, 1	A
629	75	M	M	40		A		18	0		16	1, 4, 8, 6, 3, 9, 10, 5, 2, 7	A
630	75	F	M	37	N	D	C	10	0		19	1, 2, 4, 3, 6, 5, 7, 8, 9, 10	N
631	76	M	N	34	W	A	C	8	0		11	4, 3, 1, 2, 7, 8, 10, 6, 5, 9	N
632	70	F	M	36	N	A	C	14	0		13	4, 3, 1, 2, 7, 8, 10, 6, 5, 9	N
633	76	M	M	59	N	D	B	39	1	10000	25	2, 4, 5, 6, 7, 3, 8, 1, 10, 9	P
634	76	M	M	65	W	D	C	35	0		18	9, 10, 7, 8, 6, 5, 3, 2, 1, 4	N
635	74	M	M	54	N	D		36	0	11000	24	1, 2, 4, 3, 6, 5, 7, 8, 9, 10	P
636	81	F	M	46	N	A	A	24	0		12	4, 3, 1, 2, 7, 8, 10, 6, 5, 9	C
637	72	M	M	52	W	D	A	34	0		25	1, 2, 4, 3, 6, 5, 7, 8, 9, 10	C
638	93	M	N	32	W	A	C	11	0		15	4, 3, 1, 2, 7, 8, 10, 6, 5, 9	N
639	80	M	M	25	N	A	C	1	0		6	5, 3, 4, 1, 10, 2, 8, 9, 7, 6	N
640	81	M	N	32	N	A	C	2	1	250	13	2, 3, 1, 4, 8, 6, 7, 9, 5, 10	P
641	81	F	N	24	N	A	B		0		8	4, 3, 1, 2, 7, 8, 10, 6, 5, 9	N
642	81	M	N	23	N	A	C	1	0		14	3, 9, 5, 4, 8, 10, 1, 2, 7, 6	N
643	83	F	N	22	N	A	C	1	0		13	10, 7, 5, 6, 1, 8, 4, 2, 3, 2	M
644	78	M	N	26	W	A	B		0		8	5, 4, 10, 8, 2, 3, 1, 9, 7, 6	N
645	80	M	N	21	N	A	B		0		14	7, 6, 1, 9, 2, 8, 5, 10, 3, 4	N
646	69	F	M	29	W	D	B	7	0		3	3, 4, 5, 2, 1, 8, 9, 10, 7, 5	N
647	89	F	N	28	W	A	C	8	1	920	15	10, 7, 5, 6, 1, 8, 4, 2, 3, 2	P
648	66	F	N	20	W	A	C	8	1	174	3	5, 3, 4, 8, 1, 2, 7, 6, 9, 10	P
649	75	M	N	20	W	A	C	1	1	170	16	5, 2, 1, 3, 4, 8, 9, 6, 7, 10	P
650	76	M	N	19	W	A		3	1	200	5	3, 2, 4, 1, 5, 9, 8, 7, 8, 10	P

Note. Y = HPI scores, X_1 = Gender (M = Male, F = Female), X_2 = Marital Status (N = Not Married, M = Married), X_3 = Age, X_4 = Race/Ethnicity (N = non-White/Caucasian, W = White/Caucasian), X_5 = Annual Income (A = < $50K, B = $100K to < $150K, C = ≥ $150K, D = > $50K but < $100K), X_6 = Education Level (A = < 4-yr. college degree, B = Graduate degree, C = 4-yr. college degree), X_7 = Years of Experience, X_8 = Number of FAA Ratings (Pilot subgroup), X_9 = Total Flight Hours (Pilot subgroup), X_{10} = IOP scores. Perceptions = Ranked data of participants' perceptions of professionalism, Group = Aviation Subgroup (A = Aircraft Maintenance Technician, C = Air Traffic Controller, M = Airport Manager, N = Non-Pilot Aviation Employee, P = Pilot).

Table B.1

Raw Data (Continued)

#	*Y*	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	Perceptions	Group
651	80	M	N	22	N	A	C	2	0		12	3, 2, 4, 1, 5, 9, 8, 7, 8, 10	N
652	83	M	N	25		D			0	20	0	2, 3, 1, 4, 8, 6, 7, 9, 5, 10	N
653	77	M	N	23	N	A	C	1	1	100	2	10, 7, 5, 6, 1, 8, 4, 2, 3, 2	P
654	72	M	N	23	W	A			0	60	0	1, 2, 4, 3, 6, 5, 7, 8, 9, 10	P
655	84	M	N	21	W	A		2	1	175	9	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	P
656	72	M	N	33	N	A	C	4	1	260	11	3, 2, 4, 1, 5, 9, 8, 7, 8, 10	A
657	96	M	N	22	W	A	C	7	1	325	6	10, 7, 5, 6, 1, 8, 4, 2, 3, 2	P
658	71	M	N	20		A			0		0	5, 4, 2, 3, 1, 9, 8, 10, 7, 6	P
659	83	M	N	23	W	A	C	2	0	27	15	1, 2, 5, 3, 4, 8, 6, 9, 7, 10	P
660	82	M	N	21	N	A	C		1	200	1	1, 3, 6, 7, 8, 4, 2, 5, 9, 10	P
661	74	M	N	23	W	A	C	2	1	100	3	9, 10, 7, 8, 6, 5, 3, 2, 1, 4	P
662	81	M	N	28	W	A	C	1	0	60	6	4, 3, 5, 1, 2, 6, 8, 7, 10, 9	P
663	75	M	N	20	W	D		3	1	190	13	4, 3, 5, 1, 2, 6, 8, 7, 10, 9	P
664	83	M	N	20	W	A	C	2	1	130	9	5, 4, 3, 1, 2, 8, 7, 6, 10, 9	P
665	85	F	N	20	W	A		3	1	150	11	1, 4, 3, 5, 2, 7, 6, 8, 10, 9	P
666	74	F	N	22	N	A			0		7	1, 2, 5, 8, 4, 3, 7, 6, 10, 9	N
667	72	M	M	27	W	D		2	0		19	3, 4, 5, 2, 8, 7, 9, 1, 6, 10	M
668	83	F	N	23	N	A		2	1	130	11	2, 3, 4, 5, 9, 7, 10, 8, 6, 1	P
669	97	F	N	27	N	A	B	7	0		11	7, 6, 3, 8, 10, 5, 2, 9, 4, 1	N
670	84	F	N	23	N	A	B	3	0		18	2, 4, 10, 8, 5, 9, 3, 1, 6, 7	N
671	73	M	N	23	W	D	B	2	0		4	3, 1, 9, 2, 10, 4, 8, 5, 6, 7	M
672	84	M	M	62	W	D	C	41	0		20	4, 5, 3, 1, 2, 10, 6, 7, 8, 9	N
673	77	M	M	49	W	D	C	27	0		20	1, 2, 4, 3, 5, 8, 6, 7, 9, 10	M
674	85	M	M	63	W	B	C	45	1	100	20	3, 4, 2, 5, 1, 9, 8, 6, 7, 10	N

Note. *Y* = HPI scores, X_1 = Gender (M = Male, F = Female), X_2 = Marital Status (N = Not Married, M = Married), X_3 = Age, X_4 = Race/Ethnicity (N = non-White/Caucasian, W = White/Caucasian), X_5 = Annual Income (A = < $50K, B = $100K to < $150K, C = ≥ $150K, D = > $50K but < $100K), X_6 = Education Level (A = < 4-yr. college degree, B = Graduate degree, C = 4-yr. college degree), X_7 = Years of Experience, X_8 = Number of FAA Ratings (Pilot subgroup), X_9 = Total Flight Hours (Pilot subgroup), X_{10} = IOP scores. Perceptions = Ranked data of participants' perceptions of professionalism, Group = Aviation Subgroup (A = Aircraft Maintenance Technician, C = Air Traffic Controller, M = Airport Manager, N = Non-Pilot Aviation Employee, P = Pilot).