The Psychological Health of Airline Pilots: A Flight Deck Crew's Perceptions and Willingness to Fly

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Abstract

TITLE: The Psychological Health of Airline Pilots: A Flight Deck Crew's Perceptions and Willingness to Fly

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Pilots have an image of bravado and charisma which includes that of a hardened, unemotional professional. What happens when the inevitable hardship occurs to a pilot? In the past, physical attributes were highly sought after in the recruitment of pilots. Eventually, pilots can and will suffer from the same psychological stressors as the general population.

The purpose of this study is to determine the effect stigmatizing attitudes and psychological treatment of pilots have on a flight deck crew’s willingness to fly. The current study incorporated several different methodologies including a between subjects true experimental, an analysis of covariance (ANCOVA), an explanatory correlational, and an attribute-treatment interaction (ATI) design.

A regression analysis found that psychological treatment was significant in determining willingness to fly among flight crew. An ANCOVA found that there is a significant interaction between mental illness stigma and psychological treatment. An ATI analysis indicated there were many interactions between the targeted variables with a significant interaction between mental illness stigma and willingness
to fly. A hierarchical regression analysis and a stepwise regression analysis found that age and stigma were significant variables.

Findings were consistent with Stickney et al. (2012), Corrigan and Watson (2007), and Feldman and Crandall’s (2007) findings. The current study did not support the findings in Corrigan and Rüsch’s (2011), Link et al.’s (1997), Link and Phelan’s (2004; 2014), Allport’s (1954), Lauber et al.’s (2004), Blundell et al.’s (2016), or Kraemer et al.’s (2015) studies. The study’s findings provided evidence that pilots should be encouraged to report their psychological health.
# Table of Contents

Abstract......................................................................................................................................................... iii  
List of Figures..................................................................................................................................................... ix  
List of Tables..................................................................................................................................................... x  
Acknowledgments ............................................................................................................................................... xii  
Dedication........................................................................................................................................................ xiv  
Chapter 1: Introduction ................................................................................................................................... 1  
  Background and Purpose ................................................................................................................................. 1  
    Background .................................................................................................................................................. 1  
    Purpose ...................................................................................................................................................... 6  
  Definition of Terms ......................................................................................................................................... 9  
  Research Questions and Hypotheses .................................................................................................................. 14  
    Research Questions .................................................................................................................................... 14  
    Research Hypotheses ................................................................................................................................. 15  
  Study Design .................................................................................................................................................. 16  
  Significance of the Study ................................................................................................................................. 18  
  Study Limitations and Delimitations ............................................................................................................... 18  
    Limitations ................................................................................................................................................ 19  
    Delimitations ........................................................................................................................................... 20  
Chapter 2: Review of Related Literature ...................................................................................................... 23  
  Introduction ................................................................................................................................................. 23
Inferential Statistics ................................................................. 97

Overview .................................................................................. 97

Preliminary analysis .................................................................. 98

Primary analyses ......................................................................... 107

Results of Hypothesis Testing .................................................... 127

Chapter 5: Conclusions, Implications, and Recommendations ........ 130

Summary of Study ....................................................................... 130

Summary of Findings ................................................................... 133

Conclusions and Inferences ....................................................... 147

Implications ................................................................................ 153

Implications relative to theory ................................................... 153

Implications relative to prior research ...................................... 156

Implications for aviation practice .............................................. 163

Generalizability, Limitations, and Delimitations ......................... 165

Generalizability ........................................................................ 165

Study limitations and delimitations .......................................... 166

Recommendations for Research and Practice ......................... 170

Recommendations for research relative to study limitations .......... 170

Recommendations for research relative to study delimitations ....... 171

Recommendations for future research relative to implications ....... 173
Recommendations for practice relative to implications .......... 176

References ............................................................................................................. 180

Appendix A: Tables .......................................................................................... 191

Appendix B: Figures ......................................................................................... 214

Appendix C: Instrument .................................................................................... 229

Appendix D: IRB Documentation ..................................................................... 236

Appendix E: Correspondence .......................................................................... 244

Appendix F: Raw Data ....................................................................................... 251
List of Figures

Chapter 2

2.1 Overview of Link and Phelan’s (2001) model ........................................ 29
2.2 Application of Link and Phelan’s (2001) model ........................................ 31

Appendix B

4.1 Summary of ATI for the OMS-HC .............................................................. 215
4.2 Summary of ATI for the Gender ............................................................... 216
4.3 Summary of ATI for the Age ................................................................. 217
4.4 Summary of ATI for the Race/Ethnicity .................................................. 218
4.5 Summary of ATI for the Education Level ................................................. 219
4.6 Summary of ATI for the Marital Status .................................................... 220
4.7 Summary of ATI for the Flight Rank ....................................................... 221
4.8 Summary of ATI for the Type Rating ...................................................... 222
4.9 Summary of ATI for the Total Flight Hours ............................................ 223
4.10 Summary of ATI for the PIC Flight Hours .............................................. 224
4.11 Summary of ATI for the Multi-crew Flight Hours .................................. 225
4.12 Summary of ATI for the Type of Flight Operation .................................. 226
4.13 Summary of ATI for the Military Flight Experience ............................... 227
4.14 Summary of ATI for Social Distance ..................................................... 228
List of Tables

Appendix A

3.1 Summary of Target Population Demographics .................................. 192
3.2 Summary of Participants’ Race/Ethnicity and
    Marital Status by Gender and Overall ............................... 193
3.3 Summary of Participants’ Education Level by Gender ....................... 194
3.4 Summary of Participants’ Flight Experience (Overall) ....................... 195
3.5 Summary of Participants’ Flight Operation by Flight Rank ............... 196
3.6 Power Analysis and Calculated Powers for $\alpha = .05$ .................... 197
3.7 Instrument Reliability Information .......................................... 198
3.8 Summary and Description of Independent and Dependent
    Variables ........................................................................ 199
4.1 Summary of Pilots’ Scores by Gender, Age, and Overall .................. 201
4.2 Summary of Pilots’ Scores by Education, Marital
    Status, and Overall .......................................................... 202
4.3 Summary of Pilots’ Scores by Flight Rank,
    License, and Overall ....................................................... 203
4.4 Summary of Pilots’ Scores by Operation and Overall ...................... 204
4.5 Item Analysis of the Opening Minds Scale for
    Health Care workers (OMS-HC) ....................................... 205
4.6 Item Analysis of the Social Distance Scale ................................. 206
4.7 Item Analysis of the Willingness to Fly Scale ............................... 207
4.8 Summary of Missing Data Resolution ....................................... 208
4.9 Summary of Results from Regression Analysis for the First Research Question .......................................................... 209

4.10 Summary of Hierarchical Multiple Regression of Analysis of Covariance ..................................................................................210

4.11 Summary of Results from Stepwise Regression ................................. 211

4.12 Summary of Hierarchical Multiple Regression ................................. 212

5.1 Summary of the Results of Hypothesis Testing ......................................... 213
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Dedication

I am dedicating this dissertation to the many people who have supported me throughout my life’s endeavors. To my wife, Rebeca, without her unending reservoir of patience, I could not have achieved anything I have in this life. Her support has been imperative and I thank her.

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Chapter 1

Introduction

Background and Purpose

**Background.** Pilots have an image of bravado and charisma, which includes that of a hardened, unemotional professional. Psychologists have written much on the desired psychological attributes of commercial and military flight deck crew (Butcher, 2002). Airline pilots have an immense responsibility toward the safety of flight (Butcher, 2002). Washout rates are very high in the training stage of aviation as potential pilots are exposed to the stress that comes with the responsibility of piloting an aircraft. As a result, airline pilots are likely to be among the most reliable and psychologically problem-free group of individuals (Butcher, 2002). Yet, psychological problems can and do occur among individuals who pursue this occupation (Bor, Field, & Scragg, 2002). Many psychological problems go unreported by pilots, though, due to fear of losing their medical certificates, which could threaten their livelihood and possibly end their career.

In the wake of Germanwings flight 9525 crash in the French Alps on March 24, 2015, the world has taken a closer look at the role a pilot’s psychological health has on safety of flight (Huggler, 2016). On the Germanwings flight, First Officer Andreas Lubitz suffered a psychotic episode and deliberately crashed his aircraft killing himself and all passengers and crew on board the Airbus 320 (Huggler, 2016). This accident is not the only accident to occur due to the psychological health of a
pilot. “It has been estimated that between 0.72% and 2.4% of general aviation accidents are as a result of pilot suicide” (Bor et al., 2002, p. 251).

In the U.S., the Federal Aviation Administration (FAA) is charged with the responsibility of regulating air commerce. The regulation also includes medically certifying all pilots. Citing Butcher (2002), the FAA requires a first-class medical certificate to operate air passenger aircraft, and pilots are responsible for recertifying this medical certificate every 6 or 12 months, depending on age. Due to the brevity of the pilot-doctor contact, it is up to pilots to provide information to the medical examiner about any psychological health issues they might be experiencing. If a pilot chooses not to be forthright in this regard, then the medical examiner will not know if a pilot has any psychological health issues. In fact, it was reported that Andreas Lubitz suffered a psychotic episode and was advised by his doctor to seek treatment in a psychiatric hospital 2 weeks before the crash (Huggler, 2016). “According to the FAA’s 2015 Guide for Aviation Medical Examiners, the FAA does not expect the examiner to perform a formal psychiatric examination of pilots taking the medical reviews” (Steelhammer, 2015, p. 4).

Although the U.S. system is designed to provide pilots a certain degree of confidentiality, the debate over pilot confidentiality versus public safety has increased since the Germanwings crash. In the United Kingdom, “General Medical Council guidelines for doctors say that disclosure of personal information about a
patient without their consent could be justified if others are at risk of death or serious harm” (Huggler, 2016, p. 4).

The goal of self-reporting by pilots, mechanics, and flight crew is met in other current programs. For example, the Aviation Safety Reporting System (ASRS) is designed to receive, process, and analyze voluntarily submitted incident reports (The NASA Aviation Safety Reporting System, 2016). By collecting data anonymously and voluntarily, the FAA attempts to make the aviation system better by identifying risk in the system. Once identified, the risk can be reduced. The FAA calls this compliance philosophy (FAA, 2016). The same type of approach does not exist for aviation medical certification.

Pilot culture tends to protect the pilot. If a pilot has a problem, another crewmember may be unwilling to compromise that pilot’s career. It may take an extreme event for one pilot to report another pilot (Butcher, 2002). Yet, psychological issues among flight deck crews are a stealthy threat.

Psychological problems among flight deck crew may impair performance and therefore compromise safety. The job of the modern pilot may itself exacerbate or cause psychological problems. Stress, jet lag, fatigue, disrupted personal relationships, unusual routines, frequent medical assessments may all take their toll on even the most resilient crew members. (Bor et al., 2002, p. 244)
Pilots are a unique professional group. They are unique in terms of selection, training, lifestyle, and medical standards. How these issues affect a pilot during a career or other flight deck crew performing daily flight duties is unknown.

“When people talk about the ‘right stuff’ they are usually referring to the physical and psychomotor characteristics of the person, however, attitudes, motivations, and personality qualities are also part of the schema to some degree” (Butcher, 2002, pp. 170–171). Pilots can and do suffer from the same psychological stressors as the general population. Psychological problems are the second leading reason for early retirement from flying (Butcher, 2002). Pilots are aware of the consequences of divulging psychological problems to the FAA. Not reporting these problems to the FAA or their doctors can lead many pilots to self-medicate. Almost 2% of pilots have been convicted of driving while impaired (Butcher, 2002). A pilot also is motivated to hide these problems from family, friends, and co-workers. As part of public safety, a pilot can be reported to the FAA by anybody who suspects an issue.

Pilot confidentiality versus public safety is an ethical or moral issue. Yang et al. (2007) introduces a definition of stigma as a moral issue. “Stigma is an essentially moral issue in which stigmatized conditions threaten what is at stake for the sufferers” (Yang et al., 2007, p. 1524). Essentially, moral experience is what is most at stake for a person in a local social world (Yang et al., 2007). Pilots may feel threatened if they have perceived flaws that can separate themselves from the larger
pilot population. “Stigma takes place when the mark links an individual via attributional processes to undesirable characteristics that lead to discrediting” (Yang et al., 2007, p. 1526).

Ultimately, pilots who are experiencing psychological issues will not divulge their illness. Pilots will learn how to cope to pass themselves off as normal to avoid stigmatization by other pilots.

If recipients of stigma find that what is held to be most dear may be seriously menaced or even remotely lost, these threats are also felt by non-stigmatized others and may lead them to respond to the threat embedded in the stigmatizing situation by discriminating against the marginalized other. (Yang et al., 2007, p. 1528)

Pilots who have any psychological issue may reject help because they reject their condition. The rejection of acceptance of a condition does not solve an issue.

Wishing that a broken leg was not broken does not heal the leg. A physical ailment can be seen, and therefore, corrected. The same is not true with psychological problems. The belief that others perceive an individual as socially unacceptable can lead to a pilot to self-stigmatize (Kassam, 2012). A pilot who self-stigmatizes increases the risk associated with flight. “The mystique commonly associated with psychological treatment should also be removed. Airline company policy and the attitude of the regulatory aviation medical authorities are important in helping to
achieve these important goals” (Bor et al, 2002, p. 253). Without identifying the risk, the aviation community cannot hope to reduce risk.

As discussed in this section, pilots’ psychological health often is disregarded within the aviation community, it is concealed from medical examiners because of the associated stigma, or because of the possibility pilots could lose their pilot certificate. Although this approach might be accepted within the profession, the absence of open dialogue can be deadly as was the case with the Germanwings crash.

This openness also is lacking in the literature. The current literature is replete with studies of stigma in the general population and other professional disciplines such as healthcare. However, within the field of aviation, there is a dearth of research that has examined the relationship between the stigma associated with mental illness and psychological treatment involving pilots (Bor et al., 2002; Butcher, 2002). As a result, the current study endeavored to investigate the concept of mental illness stigma and psychological treatment in aviation.

Purpose

The purpose of this study was to investigate whether knowledge of a pilot’s psychological treatment makes a difference to the flight crew working with the pilot. Specifically, the study looked at:

1. The effect three different types of psychological treatment pilots might undergo have on a flight deck crew’s willingness to fly with these pilots;
2. the effect a flight deck crew’s level of mental illness stigma and the
closeness of the crew have on a flight deck crew’s willingness to fly
across the different types of psychological treatment;
3. the relationship a flight deck crew’s personal demographics and flight
experiences have with their level of mental illness stigma; and
4. the interaction mental illness stigma, personal demographics, and flight
experiences have across the different types of psychological treatment
relative to a flight deck crew’s willingness to fly.

In the context of the current study, psychological treatment was defined as
one of three treatment scenarios: (a) a pilot who has been removed from flight duty
and is returning to duty after successfully completing treatment, (b) a pilot who is
concurrently receiving treatment while flying, and (c) a pilot who has not disclosed a
psychological issue and is self-treating while continuing to fly. Flight deck crew was
defined as commercial airline pilots in a multi-crew environment in the U.S. and
Canada. A multi-crew environment was defined as the flight deck environment that
requires at least a captain and a first officer, but can include a relief flight crew and
second officer, or flight engineer, in addition to a captain and first officer. Mental
illness stigma was defined as scores on a researcher-modified version of Modgill,
Patten, Knaak, Kassam, and Szeto’s (2014) Opening Minds Stigma Scale for Health
Care providers (OMS-HC). Closeness of the crew was defined as scores on a
researcher-modified version of Katz and Foley’s (1974) Social Distance scale. The
dependent variable, willingness to fly, was defined as scores on a researcher-modified version of Rice et al.’s (2015) Willingness to Fly scale.

Pilots’ personal demographics consisted of gender, age, race/ethnicity, education level, and marital status. Pilots’ flight experiences included flight rank, pilot licenses, number of type ratings held, total flight hours, total flight hours as pilot-in-command (PIC), total multi-crew flight hours, and type of flight operation currently being flown. Flight rank was defined as captain, first officer, and flight engineer. Pilot licenses were defined as a commercial pilot license (CPL) or an airline transport pilot (ATP) rating. A type rating is required for an aircraft that weighs more than 12,500 pounds. Although not exclusive, a type rating is required to fly an aircraft in a multi-crew environment, and the number of type ratings a pilot has can indicate a pilot’s level of experience. Rice, Richardson, and Kraemer (2014) suggested, “Considering that the construct of trust is associated with prosocial behavior, it follows that the social hardships stigmatized groups face develop from distrust” (p. 3). The term “willingness to fly” was used to measure one of the facets that defines the construct of stigma between flight deck crewmembers, primarily social distance. Trust is imperative on a flight deck. More accurately, distrust should be avoided at all costs on a flight deck to enhance crew coordination for flight safety. In the past, pilots were selected for physical skills, but now pilots are selected for their ability to complete a mission (Hedge et al., 2000). Hedge et al. (2000) suggested proper crew resource management skills stress the “importance of certain
knowledge, skills, and abilities related to crew interaction, including such things as
communication, problem solving, decision-making, interpersonal skills, situation
awareness, and leadership” (pp. 377–378). A lack of trust can influence any one of
these attributes necessary for safe flight.

**Definition of Terms**

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

1. *Airline transport pilot (ATP)* rating was defined as a certificate issued to a
   commercial pilot. The ATP certificate is highest level of aircraft pilot
certificate issued by the FAA. In part 121, or air carrier operations, each
pilot is required to have an ATP certificate. A flight engineer is not
required to have an ATP. In part 135, or air charter operations, the pilot in
command of the aircraft is required to have an ATP. In part 91 or general
flight operations, an ATP is required for all pilots who serve as the pilot
in command of turbine-powered aircraft.

2. *Captain* was defined as the person who is ultimately responsible for the
   safe operation of an aircraft in flight. The captain is also referred to as the
pilot-in-command (PIC) in a multi-crew flight operation.

3. *Closeness of the crew* was defined as a measure of social distance that
   represents the degree to which individuals are willing to accept people
who are different from themselves into their own social group (Triandis
& Triandis, 1965). “Closeness” was measured using a researcher-modified version of Katz and Foley (1974) nine-item scale, which is a modified version of Bogardus’s (1925) Social Distance scale. Scoring was based on a continuum from 1 to 9. Thus, scores could range from 9 to 81 with higher scores reflecting greater social distance and the less willingness a pilot is to engage in social contact with members of his/her flight crew.

4. *Commercial pilot license* was defined as a license that permits the holder to act as a pilot of a flight operation and receive pay for the operation.

5. *Discrimination* is the practice of unfairly treating a person or group of people differently from other people or groups of people. Corrigan, Markowitz, and Watson (2004) listed discrimination as one of three components of stigma along with stereotype and prejudice.

6. *First officer* was defined as the person who is second in command, after the captain, and is responsible for the safe operation of an aircraft in flight along with the captain. The first officer is also referred to as the second in command in a multi-crew flight operation.

7. *Flight deck crew* was defined as commercial airline pilots working in a multi-crew environment in the U.S. and Canada.

8. *Flight engineer* was defined as a member of a flight crew who is responsible for aircraft systems and aircraft engines during flight.
Although most flight engineers do not have piloting responsibilities, flight engineers are pilots certified by the FAA with an additional flight engineer certificate.

9. *Flight experience* was defined as a set of metrics pilots have achieved throughout their career. These metrics included flight rank, pilot licenses, number of type ratings held, total flight hours, total flight hours as pilot-in-command (PIC), total multi-crew flight hours, and type of flight operation. These terms are defined separately throughout this section.

10. *Flight operation* was defined as flight operations that occur under the rules and regulations of the FAA’s Code of Federal Regulations, Federal Aviation Regulations (FARs) Part 91, Part 121, or Part 135. Part 91 is general aviation flight operations, Part 121 is air carrier operations, and Part 135 is air charter operations. Flight operations were further delimited to include cargo operations and passenger operations.

11. *Flight rank* was defined as the rank a crewmember has while performing flight duties. Flight ranks can include, captain, first officer, flight engineer, or a relief crew for longer flights. Relief crew can consist of a relief captain, relief first officer, or a relief flight engineer.

12. *Intergroup contact theory* was defined using Allport’s (1954) theory that describes the positive effects of intergroup contact that occurs as a result of four key conditions: equal group status within the situation; common
goals; intergroup cooperation; and the support of authorities, law, or custom.

13. Multi-crew environment was defined as an aircraft flight deck that is designed and certified to be flown and operated by at least two pilots, a captain and a first officer, but can include a relief flight crew and flight engineer in addition to the captain and first officer.

14. Personal demographics were defined as the personological characteristics of pilots including their gender, age, race/ethnicity, education level, and marital status. These demographic variables are self-evident and do not require further definitions.

15. Pilot-in-command (PIC) was defined as the person with “final authority and responsibility for the operation and safety of the flight; has been designated as PIC before or during the flight; and holds the appropriate category, class, and type rating, if appropriate, for the conduct of the flight” (Code of Federal Regulations, 2017, Para. 1.1).

16. Pilot licenses were defined as a commercial pilot license (CPL) and an airline transport pilot (ATP) rating. Both terms are defined separately in this section.

17. Prejudice was defined as having a negative attitude towards a person or group of people. Corrigan et al., (2004) listed prejudice as one of three components of stigma along with stereotype and discrimination.
18. *Psychological treatment* was defined as one of three scenarios: (1) A pilot who has been removed from flight duty and is returning to duty after successfully completing treatment, (2) a pilot who is concurrently receiving treatment while flying, and (3) a pilot who has not disclosed a psychological issue and is self-treating while continuing to fly.

19. *Second in command* was defined as “a pilot who is designated to be second in command of an aircraft during flight time” (Code of Federal Regulations, 2017, Para. 1.1).

20. *Stereotype* was defined as the set of beliefs someone has about a person or group. Corrigan et al., (2004) listed stereotype as one of three components of stigma along with prejudice and discrimination.

21. *Stigma* was defined as an attribute that is deeply discrediting (Goffman, 1963), and attitudes toward stigma were based on Corrigan and Watson’s (2002) model. In the context of the current study, stigma was associated with mental illness and was measured using a researcher-modified version of Modgill et al.’s (2014) Opening Minds Stigma scale for Health Care providers (OMS-HC).

22. *Structural stigma* is the structural or institutional discrimination that occurs because of the policies of private and governmental institutions that intentionally or unintentionally restrict the opportunities of people with a stigmatized attribute.
23. *Total flight hours* were defined as the aggregate amount of time logged in an aircraft as (a) the pilot solely in control of the aircraft, the pilot-in-command (PIC); (b) a required flight deck crewmember who is not the sole pilot responsible for the flight, the second-in-command (SIC); and (c) a flight engineer. In a multi-crew environment, the captain is the PIC and the first officer is the SIC.

24. *Total flight hours* as pilot-in-command (PIC) was defined as the total number of hours a pilot has logged in an aircraft as PIC.

25. *Total multi-crew flight hours* were defined as the total number of hours a pilot as logged in an aircraft working in a multi-crew environment.

26. *Type ratings* were defined as a specific rating a pilot must be trained for to act as a pilot-in-command of any aircraft that exceeds 12,500 pounds.

27. *Willingness to fly* was defined as a pilot’s perception of whether or not to fly with another pilot who is undergoing psychological treatment.

Willingness to fly was measured using a researcher-modified version of Rice et al.’s (2015) Willingness to Fly scale.

**Research Questions and Hypotheses**

**Research questions.** The research questions that guided the current study are as follows:

RQ1. What effect does the different types of psychological treatment a pilot might undergo have on a flight deck crew’s willingness to fly?
RQ2. What effect do flight deck crews’ level of mental illness stigma and the closeness of the crew have on a flight deck crew’s willingness to fly across the different types of psychological treatment?

RQ3: What is the relationship among a flight deck crew’s personal demographics, flight experiences, and level of mental illness stigma relative to a flight deck crew’s willingness to fly?

RQ4. What is the interaction between key factors of a flight deck crew (i.e., level of mental illness stigma, closeness of relationship, personal demographics, and flight experiences) across the different types of psychological treatment relative to a flight deck crew’s willingness to fly?

Research hypotheses. The research hypotheses that corresponded to the research questions are as follows:

**Hypothesis 1.** The type of psychological treatment a pilot undergoes will have a nonzero relationship with a flight deck crew’s willingness to fly.

**Hypothesis 2.** A flight deck crew’s level of mental illness stigma and the closeness of the crew will have a confounding effect across the three levels of psychological treatment relative to a flight deck crew’s willingness to fly.

**Hypothesis 3.** The set of variables comprising a flight deck crew’s personal demographics, flight experiences, and mental illness stigma will have a nonzero relationship with willingness to fly.
**Hypothesis 4.** There will be at least one disordinal interaction between the type of psychological treatment a pilot undergoes and a flight deck crew’s level of mental illness stigma, closeness of relationship, personal demographics, and flight experiences with respect to the crew’s willingness to fly.

**Study Design**

The current study incorporated several different research methodologies. To answer the first research question, a between subjects true experimental design was used. This design was appropriate because participants were randomly assigned to one of the three psychological treatments, presented with the treatment’s corresponding scenario, and then post-assessed on their willingness to fly. To answer the second research questions, an analysis of covariance (ANCOVA) design was used. This design was appropriate because both stigma theory (Link & Phelan, 2001) and contact theory (Allport, 1954) suggested that stigma and the closeness of a relationship can influence how a person perceives someone who is undergoing psychological treatment. The ANCOVA design held these two factors constant so their influence on participants’ willingness to fly could be removed to yield a more accurate representation of the relationship between the types of psychological treatment and willingness to fly. To answer the third research question, an explanatory correlational design was used. This design was appropriate because multiple factors of a single group were examined for their relationship with willingness to fly and level of mental illness stigma. To answer the last research
question, an attribute-treatment interaction (ATI) design was used. This design was appropriate because the level of mental illness stigma was examined from an interaction perspective to determine if stigma operated consistently or differently across the three types of psychological treatment relative to willingness to fly. Similar ATI analyses were also conducted with respect to key demographic and flight experience variables.

Study participants were first randomly assigned to one of the three treatment scenarios. Once this assignment was made, they completed the researcher-modified version of Modgill et al.’s (2014) OMS-HC to determine their level of mental illness stigma. They then completed the researcher-modified version of Katz and Foley’s (1974) Social Distance scale to determine the closeness of their relationship. After these instruments were administered, participants were presented with the vignette that corresponded to the psychological treatment to which they were assigned. After reviewing the vignette, participants’ willingness to fly was assessed using the researcher-modified version of Rice et al.’s (2015) Willingness to Fly scale. Lastly, participants completed a researcher-prepared background questionnaire to self-report their personal demographics and flight experiences. These instruments were packaged into a single multi-section data collection instrument and made available electronically via SurveyMonkey.
Significance of Study

The current study was one of the first that systematically examined the relationship between mental illness stigma and psychological treatment with respect to a flight deck crew’s willingness to fly on a flight with a pilot who is experiencing psychological health problems. To date, no published studies have examined this relationship. As a result, the current study was seminal in nature and expanded on the existing body of knowledge within the aviation profession by helping explain the relationship between stigma and psychological treatment among a flight deck crew. The results from the study could be used to re-evaluate the current stance of the FAA on medical certification of pilots with benign psychological issues to reduce risk to the safety of the aviation system. The results from the study also provide suggestions for improving the mindset of pilots with respect to their psychological health and subsequent treatment.

Study Limitations and Delimitations

Limitations of a study are conditions, events, or circumstances beyond the control of the researcher. These limitations affect the generalizability of a study. Though it is not possible to avoid all limitations, they must be acknowledged. Delimitations are conditions, events, or circumstances that a researcher imposes on a study to make the study feasible to implement. These delimitations further limit the generalizability of the study. The limitations and delimitations associated with the current study are outlined below.
Limitations.

1. **Sample size.** I did not have any control over the sample size because the participants volunteered for the study. Thus, a similar study with a higher or lower response rate might get different results.

2. **Sample demographics.** I did not have any control over the personal demographics and flight experiences of the study participants. There was a larger female to male ratio in the sample versus the targeted population. There was also a younger sample with a higher amount of ATP’s than the target population. If a similar study is conducted with different demographics/experiences, then the results might be different.

3. **Authenticity of pilots’ responses.** It is conceivable that pilots might have been reluctant to acknowledge their “true” beliefs or attitudes when responding to the items on the stigma and willingness to fly scales, and inaccurate responses from pilots limited the inferences and conclusions that were drawn from the study results. Although safeguards were incorporated into the manner in which the data were collected to ensure confidentiality and anonymity, it is still possible that participants did not respond to the items truthfully.

4. **Type and source of study.** The current study was a non-funded Ph.D. dissertation research study. Therefore, if a similar study were to be conducted that had the support of a funding agency such as the FAA, or a
pilot group association such as the Air Line Pilots Association (ALPA), where the study sample could be larger, then the results might be different.

**Delimitations.**

1. **Data collection instruments.** The current study employed five data collection instruments packaged into a single, multi-section instrument. The first section consisted of the researcher-modified version of Modgill et al.’s (2014) OMS-HC, which was used to measure level of mental illness stigma. The second section consisted of the researcher-modified version of Katz and Foley’s (1974) Social Distance scale, which was used to measure the closeness of relationship. The third section consisted of the researcher-developed psychological treatment vignettes that provided participants with a stress–related scenario and three different psychological treatments. The fourth section consisted of the researcher-modified version of Rice et al.’s (2015) Willingness to Fly scale. The fifth section consisted of a researcher-prepared background questionnaire for participants to self-report their personal demographics and flight experiences. Thus, similar studies that use different instruments might not get the same results.

2. **Sampling sources.** The Spirit Airlines ALPA was used as the primary source of volunteers who made up the sample. I anticipated this to be the
case because I am a member of ALPA and requested ALPA’s support. Secondary sources included two pilot forums, airlinepilotforums.com and flightlevel350.com. As a result, similar studies that use different sampling sources might get different results.

3. **Study design.** Several different research designs were incorporated into the current study. These included a between groups true experimental design, an ANCOVA design, an explanatory correlation design, and an ATI design. Therefore, replication studies that use a different experimental design (e.g., quasieperimental or repeated measures), use mediation analyses instead of ANCOVA, or examine interactions from a factorial ANOVA perspective might get different results.

4. **Flight deck crew.** The current study limited the location of flight deck crews to the U.S. and restricted participation to civilian multi-crew flight deck crewmembers. Thus, similar studies that include participants from outside the U.S. and Canada, or include military flight deck crews and single pilot flight deck crewmembers might get different results.

5. **Data collection strategy.** Data were collected electronically by making the data collection instrument accessible via the web-hosting site, SurveyMonkey. As a result, similar studies that use a different data collection strategy might get different results.
6. **Study period.** The current study’s data collection period was between May 1, 2017 and August 13, 2017. As a result, similar studies conducted during a different period of time, or for a longer or shorter period, might get different results.

7. **Preexisting experiences with psychological health issues.** The current study did not collect any data that captured participants’ previous experiences dealing with psychological health and/or mental illness issues. Thus, it is possible that the results could be a function of preexisting experiences participants brought to the current study and not due to any of the study protocols. As a result, if similar studies are conducted that capture this information, it is possible that the results will be different.
Chapter 2
Review of Related Literature

Introduction

This chapter is organized into three sections. The first section presents the theoretical grounding of the current study, which is based on stigma theory and contact theory. The second section contains a review of the relevant literature. In this section, an overview of prior research will be described, as well as how the current study fits into and adds to the current body of knowledge with respect to airline pilots who either have completed or are undergoing psychological treatment. The third section contains a summary of the key aspects of the chapter and their implications to the current study.

Overview of Underlying Theory

The overriding purpose of the current study was to examine the relationship among airline pilots’ level of sigma associated with mental illness, the different types of psychological treatment pilots might undertake, and their perceptions on whether or not they would be willing to fly with pilots who have completed or are undergoing psychological treatment. The current literature contains an extensive body of published research and theoretical models on stigma and willingness to fly from a consumer perspective. However, the current literature does not address this issue from airline pilots’ perspective. The salient findings from these prior studies indicate that (a) stigma of psychological health or mental illness plays an important role in
how a person who is undergoing psychological treatment is perceived and (b) stigma can lead to apathy towards seeking treatment, under-treatment, and social marginalization (Kassam, 2012; Modgill et al., 2014). A discussion of the corresponding theories related to stigma follows.

**The concept of stigma.** The concept of stigma initially was considered from a research perspective after the publication of Goffman’s (1963) paper in which he defined stigma as “an attribute that is deeply discrediting,” and one that has the effect of transforming a “whole and usual person to a tainted, discounted one” (p. 3). Crocker, Major, and Steele (1998) further refined Goffman’s definition by describing stigma as a “devaluing social identity” (p. 505). Crocker et al. observed that a negative attribute is found in a stigmatized individual within a social context and that a society or group must define a characteristic as negative (Yang et al., 2007). Thus, there is both a social component and a self-component of stigma.

**Social component of stigma.** The social component of stigma exists as a situational threat to an individual (Yang et al., 2007) and relates to the current study in that a pilot does not act as an individual in an aircraft that requires more than one pilot. In the case of a multi-crew flight operation environment, the social component of stigma comes from the perceived threat of being marked as a flawed pilot from other flight crew members due to having completed or undergoing psychological treatment. “Stigma takes place when the mark links an individual via attributional processes to undesirable characteristics that lead to discrediting” (Yang et al., 2007,
In the case of a visible stigma, a person cannot conceal the stigma, thus a discrediting of the individual occurs. This stigma is a result of society defining a particular attribute as negative. Crocker et al. (1998) posited, “stigmatized individuals possess some attribute, or characteristic, that conveys a social identity that is devalued in a particular social context” (p. 505). In the past, it was beneficial to avoid people with a disease because disease could lead to infection and death to the person who catches the disease. As a result, the person with the disease was often removed from society. Thus, the disease stigmatized the person, and the group exercised dominance over the individual to deal with the threat of disease (Yang et al.).

In the case of a non-visible stigma such as a psychological illness, individuals will “pass from normal to a discredited status if they disclose their condition” (Yang et al., 2007, p. 1527). Therefore, there is motivation for individuals to conceal their condition. If the condition is disclosed, a new social identity is developed to incorporate the stigma. The perception of pilots and the flying public is the driver behind many of these stigmas that exist in aviation. It is this perception that motivated the research questions in the current study.

In the case of the Germanwings crash, First Officer Andreas Lubitz had serious psychological issues. The media and the public were asking why the pilot in question and pilots in general were not and are not screened for psychological issues (Huggler, 2016). Research by Kassam et al. (2012) indicates a person who has a
psychological illness is perceived as dangerous, and the fear of a dangerous person increases the perception of risk estimates. When applied to the current study, a pilot who views psychological illness as dangerous most likely would not be willing to fly with another pilot who is undergoing psychological treatment. Admitting that a psychological illness exists within the pilot profession alters the public’s perception of a hardened, unemotional pilot (Butcher, 2002). Butcher (2002) describes this as a type of cognitive dissonance in which pilots know that a psychological illness exists but they enforce the image of the hardened, unemotional pilot among the pilot ranks. It is this difference between the reality of the existence of pilots’ psychological issues and the image of a pilot that is the center of the research questions in the current study.

_Self-component of stigma._ Corrigan and Watson (2002) described the self-component of stigma as “persons with mental illness, living in a culture steeped in stigmatizing images, may accept these notions and suffer diminished self-esteem and self-efficacy as a result” (p. 35). The self-component of stigma relates to the current study in that pilots who have psychological issues may choose not to seek appropriate treatment due to the perceived image of someone with a psychological issue. If a pilot chooses to hide a psychological issue due to the perceived image of having a psychological issue, a pilot may not receive the help that is needed and will suffer from lower self-esteem and self-efficacy, thereby retreating from the current flight crew and the larger population of pilots. In the case of psychological illness,
this is exacerbated by the media, which portray people with these issues as dangerous (Corrigan & Watson, 2002).

When individuals with a psychological illness accept the social stigma of their illness, negative emotional responses can occur, such as low self-efficacy (Corrigan & Watson, 2002). Self-efficacy is “judgments of how well one can execute courses of action required to deal with perspective situations” (Bandura, 1982, p. 122). In the context of the current study, pilots must have a high level of self-efficacy because there are times when a pilot will be asked to perform a task that is outside of normal training. An example of this is the water landing of US Airways Flight 1549 in the Hudson River in 2009 when the Airbus 320 lost power to both engines after striking a flock of geese (Garcia, 2016). The pilots of this flight had to accomplish a task that was not part of normal training.

The negative belief people have about the stigma of their own psychological illness will form their expectations of rejection.

People form expectations as to whether most people will reject an individual with a mental illness as a friend, employee, neighbor, or intimate partner and whether people will devalue a person with mental illness as less trustworthy, intelligent, and competent. If one believes that others will devalue and reject people with mental illnesses, one must now fear that this rejection applies personally. (Link & Phelan, 2001, p. 373)
The fear associated with this belief becomes part of a person’s world-view and is a reality that must be lived.

**Link and Phelan’s (2001) conceptual model of stigma.** Link and Phelan (2001) developed a conceptual model of stigma to describe its core concepts. The model consists of five interrelated components: labeling, stereotyping, separation, status loss, and discrimination. According to Link and Phelan, “stigma exists when (these) interrelated components converge” (p. 367). The first component, labeling, places an individual into a group. Some groupings are more appealing than others are. For example, tall may be more appealing than short. This concept of grouping could also lead to discriminatory practices. For example, black skin versus white skin has led to a culture of racial discrimination.

In the second component, stereotyping, “cultural beliefs link labeled persons to undesirable characteristics—to negative stereotypes” (p. 367). For example, people who are labeled as suffering from a mental illness might be stereotyped as being dangerous. This then leads to the third component, separation. Continuing with the current example, these dangerous people must be separated from society so there is a certain degree of separation between “us” and “them.” This thinking led to placing mentally ill people into insane asylums where they were separated from the rest of society. The fourth and fifth components of Link
Figure 2.1. Overview of Link and Phelan’s (2001) conceptual model of stigma.

and Phelan’s (2001) model are status loss and discrimination. Thus, individuals who are placed in a mental institution lose their status as a “normal” citizen and are discriminated against where they are perceived as being “different.” “Most definitions of stigma do not include these components but the term stigma cannot hold the meaning we commonly assign to it when these aspects are left out” (Link & Phelan, 2001, p. 370). Even if separated into groups, unless there was a discriminatory practice and status loss as a result, stigma would not exist. Figure 2.1 provides a summary of Link and Phelan’s (2001) conceptual model of stigma.

Applying Link and Phelan’s (2001) conceptual model of stigma to the current study, consider the situation of a pilot who is either seeking or undergoing psychological treated for a mental issue. With respect to the first component of the model, a pilot who discloses a psychological illness would be labeled as being
“unfit” because “Personality disorders, substance abuse disorders, bipolar disorder, and psychosis are mental health problems that can prevent a person from holding medical certification required in airline flying” (Butcher, 2002, p. 168). This would now lead to the second component, stereotyping. Corrigan (2002) considered media portrayal of psychological illness as dangerous. Thus, such pilots would now be stereotyped as being “mentally ill” or dangerous. This, in turn, would result in the pilot being removed from flight duty, which is the third component of Link and Phelan’s conceptual model of stigma. After being labeled “unfit,” stereotyped as “dangerous,” and removed from duty, such pilots would then lose their eminent status of being an airline pilot, and it is possible that the airlines or the FAA will then begin a mental illness campaign that would discriminate against pilots who are seeking or undergoing psychological treatment. This example is illustrated in Figure 2.2.

Based on Link and Phelan’s (2001) conceptual model of stigma, I would expect that with respect to Research Question 1, there would be a significant difference in willingness to fly scores across the three different psychological treatments. More specifically, the model suggests that willingness to fly scores would be lower for Scenarios 1 and 2 in which pilots who either were removed from flight duty and are returning after completing treatment or are currently receiving treatment while flying. The model also implies that willingness to fly
A mental illness campaign leads to a policy that discriminates against pilots who are seeking or undergoing psychological treatment in an effort to rid the profession of such pilots.

Pilots who were once held in high esteem lose this status and are now considered a “regular” person suffering from a mental illness.

Pilots seeking or undergoing psychological treatment are labelled as “unfit” for duty.

Pilots seeking or undergoing psychological treatment are stereotyped as being “mentally ill” or “dangerous.”

Pilots considered “mentally ill” or “dangerous” are removed from flight duty because they can compromise safety.

**Figure 2.2.** Applying Link and Phelan’s (2001) conceptual model of stigma to the current study. Adapted from https://www.slideshare.net/AFAO/stigma

scores will be higher for Scenario 3 in which pilots who do not disclose a psychological issue and are self-treating while flying.

**Structural stigma.** Link, Phelan, and Dovidio (2008) posited that stigma, as a threat, is not a complete explanation of the discrimination that occurs because of an undesirable attribute. Rather, a dominant group must exploit or exert control over a lower status group. “The function of stigma and prejudice based on exploitation and domination is the desire to maintain advantage rather than the threat of losing advantage” (Link et al., 2008, p. 363). The irony is that it is easy to avoid a person with a visible disease or imperfection; it is much more difficult to avoid someone with a non-visible disease or imperfection.
To understand the effect stigma has on a pilot’s decision to divulge psychological treatment to a flight crew, structural stigma must be examined closer. According to Link et al. (2008), stigma and prejudice are related and they concluded that stigma and prejudice are nearly identical constructs. There is a difference in emphasis between stigma and prejudice. Link et al. posited three functions that unite the two constructs. The first function is keeping people down. In this function, another group must dominate a stigmatized group. Without power, one group could not act discriminatorily towards another group. Each group would have an equal standing in society. Instead, stigma and prejudice exist when one group has a greater status than another. In the case of pilots, the FAA has authority over pilots. Applying this first function to the current study, a pilot with a medical issue is grounded by the FAA until that pilot is healthy again. Most pilots can accept when another pilot is returning to flight duty after breaking a leg, for instance. Yet the same is not true for a psychological illness. If a pilot suffers from a psychological illness, receives treatment, and then returns to flight duty, the FAA usually has restrictions on the pilot in the form of additional medical certification, provided the FAA decided to allow the pilot to return to flight duty at all (FAA, 2017). This policy by the FAA does not reduce the stigma associated with psychological illness and treatment.

Link et al.’s (2008) second function is keeping “people in.” Once a group possesses power over another group, enforcement of a norm can occur. In essence, a group possesses all of the desirable attributes and gets to define the desirable
attributes. Other groups, then, must have undesirable attributes. A person does not want to exhibit undesirable characteristics, so conformity is necessary. “The function of stigma and prejudice may be to make the deviant conform and re-join the in-group” (Link et al., 2008, p. 362). A person must conform to all of the desirable attributes of the group in order to be accepted, and remain part of the group. Additionally, Link et al. suggested the second function serves to clarify norms, and boundaries, and the consequences of failure to maintain the norms and boundaries to all in-group members. Applying this second function to the current study, consider the choice a pilot must make when considering whether or not to seek treatment for a psychological illness. Pilots who choose to seek treatment effectively are admitting an undesirable characteristic. It is undesirable because the FAA makes it difficult to receive medical clearance after receiving treatment for a psychological illness. The way to avoid disclosing the undesirable characteristic is to avoid admitting the characteristic in the first place.

Link et al.’s (2008) third function is keeping people away. After a group determines what are desirable characteristics, that group then needs to keep people with undesirable attributes from becoming members or separating them from the group if the person already is a member. The easiest way to do this is through distance. This applies to visible stigmas. In evolutionary terms, a person with a visible stigma may be infected with a disease and physical distance would aid in avoiding the disease (Link et al., 2008).
In non-visible stigma, there needs to be a way to keep people with undesirable characteristics away from the group. This distance can include discrimination, or discriminatory policies to keep people from joining. In order to have discrimination, a stigma must be defined and accepted. Applying this to the current study, consider a pilot returning to flight duty after receiving psychological treatment. The FAA (2017), in its guide to medical examiners, makes it clear there is a process to becoming medically re-certified to return to flight duty. The process includes seeking specific psychologists to perform specific tests. Those tests must be submitted to the designated medical examiner. The medical examiner is not qualified to make a final determination. Therefore, the examiner must submit the application, psychological exams, and the medical exam to the FAA medical certifications division for a final approval. The pilot may not get a final approval. The discrimination a pilot may face if treatment for a psychological issue is divulged is daunting. The bureaucracy of a government regulatory agency would control a pilot’s entire career.


Structural, or institutional, discrimination includes the policies of private and governmental institutions that intentionally restrict the opportunities of people with mental illness. It also includes major institutions’ policies that
are not intended to discriminate but whose consequences nevertheless hinder the options of people with mental illness. (Corrigan et al., 2004, p. 481)

Discrimination against pilots with psychological issues is allowed to occur even though, just like physical illness, psychological illness can be treated. The FAA, under the guise of safety, will not allow a medical certification of a pilot if a psychosis has occurred (FAA, 2017), even if the psychosis has been treated successfully. Pilots may not report their psychological health as a result.

In the context of the current study, the FAA provides the overall regulatory environment in the industry and on a flight deck. The attitudes that the FAA insinuates can and will be felt on the flight deck. Based on Corrigan et al. (2004), the FAA policies are not intended to discriminate but have the consequence of causing a discriminatory effect and hinder the options of pilots who need psychological treatment for psychological issues. The discriminatory effect can be measured with the construct of willingness or unwillingness to fly with a pilot who is undergoing psychological treatment.

**Intergroup contact theory.** In addition to stigma theory, the current study also is partly grounded in contact theory, which hypothesizes that contact and social distance will have a diminishing effect on discrimination exhibited towards a stigmatized group. This is applicable to the current study because pilots spend days and sometimes weeks together traveling. An flight crew becomes a family away from home. Pilots who are part of a multi-crew eat together, work together, and
enjoy time off between flights together. While on the flight deck, the flight crew is physically close, usually an arm’s length away from each other. Thus, it is reasonable to conjecture that pilots who have a close relationship with another pilot who either has completed or is undergoing psychological treatment might give the pilot more latitude before passing judgment.

Contact theory, which Allport (1954) originally hypothesized as increased contact with a stigmatized group reduces stigma identified with that group, had its start in observations of racial bias of the 1950s (Blundell et al., 2016). As reported by Blundell et al. (2016), Allport observed there were six criteria under which contact leads to diminished stigma towards a racial group. These conditions are that contact:

(1) is between members of different groups who are of equal status in the situation; (2) supports the realization of a common, valued goal; (3) involves members of higher status within the minority group; (4) is promoted by officials/the social climate; (5) is intimate and pleasurable and (6) occurs by choice. (Blundell et al., 2016, p. 219)

Extending Allport’s concept of contact theory, other researchers continued to provide evidence that any contact had a positive effect in reducing negative attitudes between groups outside of racial groups (Blundell et al., 2016).

Pinto-Foltz, Logsdon, and Myers’ (2011) definition of contact included groups with mental illness. Pinto-Foltz et al. posited, “Intergroup contact theory suggests that contact under optimal conditions—equal status between groups,
common goals, intergroup cooperation, and support of laws and authorities—can reduce prejudice” (p. 2012). For example, a mother with a child who has Down syndrome will be more sympathetic and have less stigma towards another child with Down syndrome. Thus, the more contact a person has with a stigmatized group, the less stigma that person will have towards the group. Similarly, Pryor, Reeder, and Landau (1999) posited that a person, when initially coming in contact with a stigmatized person, will react with negative associations just as the Link and Phelan (2001) model predicts. Given time and contact with the stigmatized individual, though, a person will adjust the reaction from the initial negative reaction to one that is less negative or even positive.

Burris (2002) suggested that contact in any form could lead to a situation where stigma is reduced or eliminated when resources and motivation are provided. Although some contact is better than no contact, specific types of contact have been shown to be better than others (Seewooruttun & Scior, 2014). For example, Blundell, Das, Potts, and Scior (2016) indicated, “quality and type of contact, as well as circumstance of the contact experience, influence the effect of contact on prejudice” (p. 218). Blundell et al. also indicated there are optimal conditions in which contact will lead to improved attitudes towards a stigmatized group. These include intimacy of the contact, free choice to initiate the contact, and encouragement by officials or social climate. Blundell et al. acknowledged that these optimal conditions are not all necessary to reduce stigma because contact alone can produce a positive effect on
reducing stigma. “Contact is thought to provide opportunities for the individual to encounter a member of a stigmatised group who does not meet the negative expectations of the individual’s stereotypes” (Blundell et al., 2016, p. 219). By reducing the negative expectations, outcomes that are more positive are realized.

In the context of the current study, the concept of social distance implied that the time spent on a flight deck among a flight crew—casually between flights and off-duty—can influence the effect stigma of psychological treatment has on willingness to fly among pilots. To control for this possible confounding effect, I incorporated Bogardus’s (1925) Social Distance Scale into the psychological treatment vignettes to measure the degree of “closeness” participants have with the pilot who is being portrayed in the vignettes. I also examined the relationship between stigma and social distance. Thus, based on intergroup contact theory and with respect to Research Question 2, I expected social distance would influence both stigma and willingness to fly differently across the three types of psychological treatment.

**Review of Past Research Studies**

Past research involving mental illness stigma primarily has been related to the individual components or the interaction of a few components of Link and Phelan’s (2001) conceptual model of stigma. For example, based on an exhaustive search of the mental illness stigma literature published between 1995 and 2003, Link, Yang, Phelan, and Collins (2004) reported that the majority of articles were related to
stereotyping, followed by status loss/discrimination, emotional reactions, and separation of “us” from “them.” The context of these studies also was with respect to the general population and/or public policy. To date, there has been a dearth of published studies related directly to the effect of mental illness stigma within the aviation profession, particularly among airline pilots (Yang et al., 2007/2013). Nevertheless, a parallel can be drawn between past studies on mental illness stigma within the general population to stigma among flight crews because, after all, pilots also are human. Although not exhaustive, the studies reviewed in this section are representative of those that helped inform the current study.

**Stigma of psychological illness.** Stigma of psychological treatment can be detrimental. An acknowledgement of psychological treatment opens up a pilot to potential ridicule among flight crew and possible discrimination from the FAA and the employing airline. The issue of psychological treatment is closely related to the perceptions of psychological issues such as the perception of dangerousness of a psychologically ill person. Characteristics such as perception of danger are of utmost importance to an airline pilot. Feldman and Crandall (2007) studied the effect these characteristics have on stigma. Feldman and Crandall defined stigma as the (1) direct effect psychological illness has on the stigmatized and the (2) social rejection or fractured identity. As described in the theory section, these represent two components of stigma: self-stigma and social stigma.
Feldman and Crandall (2007) endeavored to determine if a severe psychological illness had a greater stigmatizing effect than a subtle or common psychological illness. To accomplish this, Feldman and Crandall described cultural norms as “the rules of status, organization, conventions of conformity and deviance, and the implicit and explicit systems of justice, value, morality, and prestige that form social relations” (p. 139). In essence, they were trying to find links between types of stigma and perceptions of those stigmas.

Feldman and Crandall (2007) implemented a true experimental design involving a vignette and questionnaire that were distributed to 281 undergraduate students in an introductory psychology course. Eleven students were eliminated from the results due to not following directions. The vignette consisted of two paragraphs. The first paragraph contained descriptive information of an individual with a psychological issue. The second paragraph consisted of a diagnosis of a psychological issue. The questionnaire consisted of 17 dimensions and students were to respond to each dimension using a 7-point semantic differential scale that measured social distance. Each student was given a packet at the beginning of class containing the two vignettes and questionnaire. The students were given 10 minutes to answer the questionnaire. The 270 students produced 540 vignette ratings.

Feldman and Crandall (2007) reported that personal responsibility was the largest predictor of stigma. If a person believes that someone with a psychological illness is responsible for his/her illness, stigma is greatest. After personal
responsibility, dangerousness and rarity were the next two predictors with the greatest influence on stigma. The results showed personal responsibility, $B = 0.43, p < .0001$, dangerousness, $B = 0.38, p < .005$, and rarity $B = .33, p < .01$, as the statistically significant characteristics of psychological illness.

Feldman and Crandall’s (2007) findings relative to dangerousness helped inform the current study because the concept of dangerousness may be considered a measure of social distance. If a person is perceived to be dangerous, it is reasonable to expect distance to be placed between an individual and the danger. As presented in the theory section of this chapter, Kraemer et al. (2014) describes contact as an integral part of reducing stigma. Dangerousness is a measure of social distance; therefore, distance does not lend itself to reducing stigma, but instead lack of contact would increase stigma. Because of this relationship, I measured social distance to examine its effect on both stigma and willingness to fly across the three types of treatment.

Wu et al. (2016) performed a cross-sectional descriptive survey that in part examined the psychological health of airline pilots. Wu et al. collected data via an anonymous web-based survey from April 2015 to December 2015. In all, 1,837 pilots responded to the survey, which included the Job Content Questionnaire and the Nutrition Examination Survey. Wu et al. reported that 233 pilots (12.6%) met the criteria for depression. Yet, very few pilots disclosed their depression to get treatment. This finding from Wu et al. helped guide the design of the three
psychological treatments in the current study. One vignette was specifically developed that describes a pilot who is self-treating an undisclosed psychological ailment. Including this particular scenario helped understand the role stigma has in inducing a pilot to fly while suffering from untreated psychological issues.

**Self-stigma.** Corrigan and Watson (2002) described the concept of self-stigma as “persons with mental illness, living in a culture steeped in stigmatizing images, may accept these notions and suffer diminished self-esteem and self-efficacy as a result” (p. 35). Self-stigma can result in lower hope and self-esteem for those suffering from psychological illness (Corrigan & Watson, 2002). How people view themselves within a larger population is important in their psychological well-being and can aggravate their psychological state (Corrigan & Rüsch, 2011).

Corrigan and Rüsch (2011) advanced that prejudice is agreeing with a negative stereotype. It is bad enough when stigma leads to discrimination, but when individuals believe the discrimination is justified due to a stereotype, negative self-esteem results. Corrigan and Rüsch labeled three stages a person goes through when perceiving devaluation due to a psychological illness: awareness, agreement, and application. A person first must (a) be aware of a stereotype, (b) agree with the stereotype, and (c) apply the stereotype.

Corrigan and Rüsch (2011) tried to determine if there was a greater effect on self-stigma by applying a stereotype rather than just being aware of a stereotype. Whereas other researchers focused on self-stigma as it is associated with the social
norms and discrimination, Corrigan and Rüsch took a different perspective. They hypothesized that the application of a stereotype would be responsible for the self-stigma associated with psychological illness. Thus, their study focused on the attitude a person has toward a stigmatized characteristic.

Corrigan and Rüsch (2011) examined stigma by developing an experiment with a questionnaire that was distributed to 85 participants. The participants were people with psychiatric disorders recruited from mental health service centers in the Chicago area. The experiment had a pretest and an identical posttest that was administered 6 months after the pretest. Of the 85 participants, 75 completed the posttest. The scales used were the 40-item Self-Stigma of Mental Illness Scale and the 12-item Perceived Devaluation-Discrimination Questionnaire.

Corrigan and Rüsch (2011) reported that applying a stigma to a person causes great harm to that person. If a person believes his/her psychological illness is negative and that can be the cause of discrimination, then that realization can lead to lower self-esteem. Corrigan and Rüsch’s findings also provided support for the idea that self-stigma can progress over time. Their results indicated there was a statistically significant difference between awareness and application of self-stigma, $F(1, 84) = 23.9, p < .001$.

Applying Corrigan and Rüsch’s (2011) study to the current study, when pilots are aware of the stigma of psychological treatment, their attitudes towards psychological treatment will be negative. If a pilot believes treatment will be viewed
negatively, that pilot may believe a discriminatory attitude will develop if the treatment is divulged. In the current study, this discriminatory attitude was measured as willingness to fly with that pilot.

Link, Nuttbrock, Phelan, Rahay, and Struening (1997) also posited a link between stigma and well-being. Link et al. studied a sample of adult males in New York City who were classified as mentally ill chemical abusers. The study used a 12-item dichotomous scale that measured rejection experience from a chemical dependence perspective and patient status. The results were significant, $p < .001$. Participants in the Link et al. study indicated that secrecy and withdrawal were primary coping mechanisms. “The descriptive data suggest that most of the clients believe they will be rejected, have experienced at least some form of rejection by others, and have taken steps to avoid such rejection” (Link et al., 1997, p. 184). Link et al. also reported a statistically significant correlation between discrimination and depression, $r = .307$, $p < .01$.

Findings from Link et al.’s (1997) study support the position that the devaluing and discrimination that occurs because of disclosing a psychological issue will lead to more psychological stress in an individual afflicted. In the context of the current study, this is a self-induced cycle of psychological stress. Psychological issues cause a pilot to seek treatment. Disclosure of the treatment causes stress due to discrimination. The discrimination causes more stress that exacerbates the psychological issue. Instead of being caught in this cycle, pilots may choose to
develop self-coping mechanisms such as substance abuse as documented by Butcher (2002). With respect to the current study, Link et al.’s findings provided a plausible explanation for significant differences on willingness to fly that are found across the three types of psychological treatment.

*Structural stigma.* In the context of the current study, stigma was evaluated to determine the acute risk posed to flight crews and the overall risk to the aviation safety system. The goal of a regulatory agency such as the FAA is to reduce risk by implementing laws, regulation, and policy that positively affect safety. Corrigan et al. (2004) described a system whereby unintended consequences occur because of intended policy. In this case, the FAA intended to have a policy to remove a pilot from duty if medical standards were not met. The unintended consequence of this policy is many pilots do not divulge psychological issues to the FAA or their company and continue to fly (Wu et al., 2016).

Link and Phelan (2014) examined the relationship between power and stigma, which represents the fourth and fifth components of the conceptual model of stigma. Link and Phelan defined stigma power as “instances in which stigma processes achieve the aims of stigmatizers with respect to the exploitation, control or exclusion of others” (Link & Phelan, 2014, p. 24).

Link and Phelan (2014) described three generic goals for the use of stigma: keeping people down, keeping people in, and keeping people away. The exercise of this stigma power is sometimes taken for granted by both the person who stigmatizes
and the stigmatized. In the context of the current study, safety is the overarching cultural goal and neither the FAA nor pilots recognize stigma for what it is worth. This misrecognition serves the interest of the FAA and effectively achieves the goal of portraying only psychologically healthy pilots to the public.

Link and Phelan (2014) developed a study with an ex post facto design with 65 people who suffered from schizophrenia. The study used various scales including the Perceived Devaluation-Discrimination Scale to determine the effect societal conceptions, attitudes, and beliefs that led these schizophrenic individuals to be concerned with staying within social norms. Similar to Corrigan and Rüsch (2011), Link and Phelan found a statistically significant relationship between perceived discrimination and concern with staying within the boundaries of the socially accepted norms, \( p < .01 \). The discrimination that was determined to exist led to a perception of stigma for the afflicted. To avoid the stigma, a person would define the boundaries for what passes as normal and stay within those boundaries to appear normal. In these cases, secrecy and withdrawal are the preferred coping mechanisms if it is determined that staying in the boundaries of normal could not be achieved.

In the current study, the perceived stigma of a psychological illness causes an environment of discrimination to occur because of FAA regulations. This environment extends all the way to the flight deck. Each pilot in an flight crew will define the boundaries for what passes as normal. If the attitude of psychological treatment is determined to be outside of norms because of stigma towards
psychological treatment, a pilot may employ secrecy and withdrawal. As a result, the current study examined the effect stigma had on the perception of psychological treatment.

**Social distance.** As discussed in the theory section, closeness of relationship is hypothesized to have an indirect effect on mental illness stigma: As the relationship a person has with someone suffering from mental illness increases (i.e., becomes closer or more intimate), the level stigma is reduced. Link and Phelan (2004) examined the perception that people with psychological illness are more dangerous when compared to a person without a psychological illness. Link and Phelan telephone interviewed 1,507 adult residents between August 1, 1990 and November 20, 1990 as part of a cross-sectional survey. They defined the construct of perceived threat and threat by measuring responses based on personal contact and impersonal contact. Personal contact was defined as how much direct contact a person had with someone who was suffering from a psychological illness. Impersonal contact was defined as the time someone spent in a public place with someone who appeared to have a psychological illness. An example of impersonal contact would be the amount of time someone would spend on a bus during a commute to work with a homeless person who appeared to have a psychological illness.

Link and Phelan (2004) reported that 59% of respondents thought, “it’s only natural to be afraid of a person who is mentally ill” (p. 72). They also reported there
was no positive correlation between contact, personal and impersonal, and perceived threat. However, “people with greater exposure to the mentally ill, perceived people with mental illness to be less dangerous” (p. 74). That is, the more time spent with an afflicted person, the perception of danger decreased. This finding was significant, $p < .01$.

Extending Link and Phelan (2004), Blundell et al. (2016) examined the effect of contact in the general population on people with intellectual disabilities. Using an online survey, Blundell et al. collected responses from 1,264 participants using a snowball selection strategy. Once participants accessed the instrument on a website, Blundell et al. presented participants with a vignette, and asked them to provide demographic information and details about their contact with people with intellectual disabilities. The instrument used a 9-point Likert-type scale with zero representing no contact and nine representing close contact. The participants were also asked about the social distance with the intellectually disabled. Blundell et al. reported that contact explained much of the variance in social distance, which provides support to intergroup contact theory. “The results indicate that closeness of the contact relationship may be more important than frequency and nature of contact” (p. 225). They also concluded that contact in any form might be helpful in reducing stigma.

In the context of the current study, Link and Phelan’s (2004) study brought to light the possible impact the concept of closeness of relationship could have on willingness to fly. Pilots spend a considerable amount of time together not only
during flight, but also between and after flights when traveling. The effect contact has on social distance is an important factor when examining stigma. For example, a pilot who spends a lot of time with an flight crew may find this level of contact decreases social distance with an flight crew, and a decreased social distance may diminish the stigma an flight crew has towards a pilot undergoing psychological treatment. As a result, this relationship was considered in the current study.

Demographics and stigma. Independent of theory, personal demographic variables such as gender, age, and race/ethnicity merit study for their possible influence on stigma. For example, Corrigan and Watson (2007) argued, “an important question is how characteristics of the perceiver may influence endorsement of the primary and courtesy stigma of psychiatric disorders” (p. 440). With respect to the current study and as observed by Bor et al. (2002), pilots face the same stresses as everyone else in everyday life, and thus, “the extent to which these problems interfere with flying duties must always be considered” (p. 241).

Stickney, Yanosky, Black, and Stickney (2012) combined just world theory and attribution theory to study the construct of stigma. According to Stickney et al., attribution theory relates to a person’s belief about what factors can be attributed to an event in his/her life. By identifying attribution as an appropriate theory in which they grounded their study, Stickney et al. explored the relationship gender and ethnicity had in mental illness stigma with respect to their view of a just world. The basic thesis of their study was whether gender or ethnicity affected stigma. Although
age was not part of their hypotheses, Stickney et al. included age and state of residency as additional variables.

Stickney et al.'s (2012) study comprised 456 undergraduate and graduate students from a large state-funded university. A cross-sectional descriptive design with a 48-item survey was used to acquire the data. A vignette was developed and administered to the participants. The vignette consisted of a male or female varying by ethnicity. The questionnaire consisted of 48 dichotomous questions. There were two constructs in the study so the authors used structural equation modeling (SEM) to analyze the data. Stickney et al. found that all the factors in the study were statistically significant regarding their effect on stigma. Specifically: men where stigmatized more than women, $B = -0.396, t(1278) = -2.54, p = .0113$; and Caucasians and Asian American were stigmatized more than African American and Hispanic Americans, $B = -0.551, t(1278) = -4.02, p < .0001$. Age was not analyzed even though Stickney et al. identified it as a variable.

Corrigan and Watson (2007) also assessed the extent to which demographic factors influence mental illness stigma as well as substance abuse disorders. Grounding their study in attribution theory, Corrigan and Watson targeted gender, ethnicity, and education. They posited that the more educated people are, the less likely they would be willing to stigmatize. Corrigan and Watson selected 968 individuals from the Knowledge Network for the Family Stigma Survey. An experimental design that incorporated a 14-item Likert-type questionnaire was used
to collect data. A vignette was developed and administered to the participants. The vignette consisted of either a male or a female person suffering from a psychological illness, or a family member of someone who was suffering from a psychological illness. Participants were asked to read the vignette and then respond to the items on the questionnaire. Corrigan and Watson (2007) reported: (a) women were statistically more likely to endorse stigma than men, \( F(7, 941) = 2.38, p < .05 \); (b) participants with higher education were less likely to stigmatize than participants who were less educated, \( F(21, 2,811) = 1.65, p < .05 \); and (c) Caucasians were less likely to endorse stigma than non-Caucasians \( F(7, 941) = 2.39, p < .05 \).

One plausible explanation for Corrigan and Watson’s (2007) findings is predicated on the presumption that the higher level of education a person achieves, the more familiar that person would be with mental illness due to knowledge and experience gained in the education process. This position also is directly related to contact theory, which infers that a person who is exposed to a psychological illness will have less stigma towards someone who has that psychological illness. This was reflected in Corrigan and Watson’s comment that “education has been shown to be one proxy of familiarity; namely, people who completed more years of education are likely to have more knowledge about and/or experience with psychiatric disorders which, in turn, leads to less endorsement of stigma” (p. 443).

Similar to the previous studies cited in the foregoing paragraphs, Lauber, Nordt, Falcato, and Rössler (2004) also examined factors that could contribute to
social distance. They targeted gender, age, and contact to a person with mental illness. Nordt et al. reported that all three variables had a significant relationship with social distance: (a) women had greater social distance than men, $B = 0.137, p < .0000$, which is in opposition to the previous studies and counter to the belief that women generally have less stigmatizing attitudes toward mental illness than men; (b) age had a direct relationship with social distance, $B = 0.150, p < .0000$, which implies that older participants had greater social distance than younger participants; and (c) contact had an indirect relationship to social distance, $B = -0.074, p < .05$, which implies that as contact increases, social distance decreases.

The three studies presented here informed the current study in two ways: They made me aware of the role personal demographics have with stigma, and helped me identify which personal demographic variables to target. As a result, gender, age, race/ethnicity, education level, and marital status were incorporated into the current study as part of Research Questions 3 and 4. I also included marital status because a “spouse can function as a very helpful social support system, thus aiding the pilot in dealing effectively with psychosocial stressors” (Bor et al., 2002, p. 247). Although these targeted demographic variables were based on a different population than airline pilots, it was reasonable to assume that the targeted demographics of the general population would transfer to the airline pilot population.

Further extending this logical reasoning, I also identified another set of demographic-type variables that are related to pilots’ flight experiences. Because of
the paucity in the literature relative to airline pilots’ flight experiences and stigma, the variables I targeted were based on my experience as an airline pilot coupled with research from previous stigma studies in different populations. For example, the studies by Stickney et al. (2002), Corrigan and Watson (2007), and Lauber et al. (2004) were grounded in attribution theory: How a person attributes characteristics as negative or positive leads to stigma. With this in mind, the targeted flight experience variables included flight rank, pilot license, number of ratings, total flight hours, total flight hours as pilot-in-command, multi-crew hours, and current type of flight operation. Each of these variables indicates experience. For example, a captain should have more experience than a first officer. An ATP should have more experience than a private pilot. A pilot with multiple type ratings should have more experience when compared to a pilot with zero or one type rating. An airline pilot should have more experience that a corporate pilot. In addition to these categorical variables, pilot in command hours and multi-crew hours are indicators of experience in flight operations, just as education is an indicator of experience.

**Willingness to fly.** Pilots do not choose with whom they will fly. Modern airline operations with multi-crew aircraft dictate the need for flexibility to meet the demands of a constantly changing environment. Even though pilots have very limited control over the choice of whom they fly with, there are factors that cause a pilot to be willing or not willing to fly with other pilots.
In the first of two experiments, Kraemer, Mehta, Oyman, Rice, and Winter (2015) examined consumers’ willingness to fly on a flight with a pilot who was taking prescribed antidepressants compared to a pilot who was not. The sample consisted of 88 U.S. participants who were presented with a scenario and eight different conditions that involved a high or low dose of four different medications. The participants were asked to assess their willingness to fly relative to the scenarios/conditions. Kraemer et al. reported that taking medications led to a significant reduction in willingness to fly, $F(3, 261) = 53.17, p < .001$, with Prozac leading to the greatest decrease. The high dosage of drugs also reduced willingness to fly, $F(1, 87) = 187.83, p < .001$.

In the second experiment, Kraemer et al. (2015) examined if the cognitive or affective domain influenced the results of the first experiment. They presented 492 participants with the same scenario as the first experiment, but now the participants were asked how they felt before being asked how willing they were to fly. Kraemer et al. reported that the overall results were significant, $F(4, 491) = 37.13, p < .001$. They also reported a significant mediation analysis, $r = .569, p < .001$, which indicated that affect was a mediating variable for all medications except ibuprofen for willingness to fly.

In a replication study of Kraemer et al. (2015), Winter, Rice, Rains, Milner, and Mehta (2017) examined a consumer’s willingness to fly relative to medications, but also considered this longitudinally beginning with the time
shortly after the Germanwings crash. Consumers’ ratings for willingness to fly were lower when a pilot used medications, which supported Winter et al.’s hypotheses. With respect to the time factor, Winter et al. reported significant effects for both time, $F(4, 2533) = 3.05, p < .05$ and medication, $F(4, 2533) = 264.98, p < .001$, when affect was concerned. With respect to willingness to fly, the effects of time, $F(4, 2533) = 3.62, p < .01$ and type of medication also were significant, $F(4, 2533) = 240.04, p < .001$. Following the Germanwings accident, the willingness to fly ratings for medicine related to psychosis decreased significantly, $t(198) = 2.69, p = .008$, and by the 12-week mark after the accident, the ratings returned to their pre-accident levels.

The results of Kraemer et al.’s (2015) and Winter et al.’s (2017) respective studies were invaluable to the current study. First, they provided a valid and reliable instrument to measure willingness to fly. Although I modified this scale to reflect a pilot’s perspective and not that of a consumer, it is much easier to modify an existing instrument than to create a new one. Second, the studies also provided the foundation for the current study’s research questions. Lastly, based on Kraemer et al.’s and Winter et al.’s studies, I suspected there would be a difference in willingness to fly across the three different types of psychological treatment. I also suspected willingness to fly scores would be lower in the treatment scenarios versus the control scenario.
Summary and Study Implications

As noted throughout this chapter, the current literature on mental illness stigma informed the current study from several perspectives. First, because many of the past studies were grounded in Link and Phelan’s (2001) conceptual model of stigma, it became obvious that the current study also should be grounded in this theoretical model. Second, past research also supported the notion that the strength of a stigmatizing attitude could be influenced by the closeness of the relationship between the person who has a stigma and the stigmatized. This resulted in also grounding the current study in intergroup contact theory. Third, the literature was instrumental in guiding me to various instruments that could be used in the study to acquire the data I needed to answer the study’s research questions. This especially was the case with Rice et al.’s (2015) Willingness to Fly Scale. Finally, the literature guided me in determining what factors to target.

Although the studies reviewed in this chapter were not exhaustive, they demonstrated the extent to which mental illness stigma has been studied in the general population. Neither the studies reviewed nor those consulted, considered or examined mental illness stigma relative to the population of airline pilots. One possible reason for this is that pilots initially and routinely are screened for specific attributes (Butcher, 2002). Thus, pilots generally are free of psychological problems, at least initially in their careers. Psychological issues still can arise in airline pilots, though, just as they arise in the general population. As Wu et al. (2016) observed in
their study of approximately 2,000 pilots, nearly 13% met the criteria for depression, but very few disclose their depression to get treatment. As a result, it is critical to examine the relationship between mental illness stigma and psychological treatment among airline pilots. It also is critical to determine possible factors associated with mental illness stigma, including demographics and flight experiences. The current study endeavored to do both by acquiring data directly from pilots about their perceptions of stigma and psychological treatment.
Chapter 3

Methodology

Population and Sample

**Population.** The target population for the current study was professional pilots who hold either a CPL or an ATP operating in the United States and Canada. The target population was further defined as commercial pilots who fly in Part 121, Part 135, or Part 91 operations under Title 14 of the Code of Federal Regulations who flew in multi-engine operations. As of December 31, 2016, there were 96,081 commercial pilots and 157,894 ATPs registered in the U.S. (FAA, 2016). Of the commercial pilots, 6,081 (6.3%) were women, and of the ATPs, 6,888 (4.4%) were women. The overall mean age of commercial pilots was $M = 46.0$ years old, and the overall mean age of ATPs was $M = 50.2$ years old. With respect to women pilots only, the mean age of female commercial pilots was $M = 40.8$ years old, and the mean age of female ATPs was $M = 45.6$ years old. The demographic information about the target population is summarized in Table 3.1. The reader will note that the target population does not include military pilots, because these pilots receive different initial and ongoing physical and psychological screening as a requirement for military flight operations.

The accessible population consisted of airline pilots who fly for the Air Line Pilot Association, International (ALPA) carriers. The pilots who were targeted for this study were airline pilots from the Spirit Airlines. Spirit Airlines has multi-crew
operations in a commercially operated environment. ALPA is a professional union organization of airline pilots that was founded in the 1930s to represent airline pilots and their concerns with airline management.

The primary presence of ALPA is Internet-based (Air Line Pilots Association, 2016). ALPA’s physical location is Herndon, VA, with local councils in the pilot domiciles of the airlines they represent. These local councils are called local executive councils (LEC) and the LEC’s of an airline are represented collectively by master executive councils (MEC). Pilots mainly communicate through e-mail but have local meetings with their LECs and MECs.

The accessible population was further accessed through other electronic sources to foster a more robust sample. Airline pilot web-based forums were accessed to invite potential participants to the study instruments. Pilots at airlines not represented by ALPA were accessed through the web-based forum. The forums included were airlinepilotforums.com and flightlevel350.com. It is unknown how many members of the forums are airline pilots who work in a multi-crew environment or what their demographics were. It is also unknown how many participants accessed the survey through these online forums.

**Sample and sample representation.** The primary sampling strategy was convenience sampling and consisted of pilots who volunteered to participate in the study. I recruited participants by enlisting the support of the targeted professional organization (ALPA) and online forums and requesting they announce the study to
their respective memberships electronically with an invitation to participate. In addition to the primary sampling strategy, it became clear that snowball sampling was occurring. Pilots approached me to participate after hearing about it from another pilot. In these cases, the prospective participants were led to an ALPA email with the link to the survey for their participation.

As reported in Table 3.1, a significant portion of the participants were female. The total number of participants was 184, but 35.6%, or 64 of the respondents were female. As reported by the FAA and indicated in the table, only 8.4% of commercial pilots and ATPs are female in the pilot population that was targeted. The high amount of female responses was unexpected. This may be due to other unrelated studies that indicate females may be more inclined to share sensitive information than males are. As this number is significantly higher than other aviation studies that have a more representative sample of the target pilot population, a focus on male versus female during the analyses seemed prudent.

One other anomaly in the sample is the number of airline transport pilots. As reported in Table 3.1, 92.3% of pilots identified themselves as an ATP versus 37.9% in the target population. In the sample, 6.6% and 1.1% of pilots identified themselves as a commercial pilot and private pilot, respectively, versus 23.1% and 40.0% in the target population. This anomaly was not unexpected as the sample comes directly from airline pilots who, by regulation, are required to have an ATP for employment.
The mode of ages for the sample is younger than the mode of the population. As indicated in Table 3.1, the mode of ages for the sample was the 30–39 age group. For the population, the mode is the 50–59 age group. Again, this was not unexpected. Most of the participants were from Spirit Airlines. Spirit Airlines is a young company with a high growth rate (Spirit Airlines, 2017). Many new pilots have been hired since the high growth rate began in 2010.

The race of the participants was separated into two groups, Caucasian and Non-Caucasian. The breakdown of race by female versus male as reported in Table 3.2 was 58 Caucasian and six Non-Caucasian. Caucasian males outnumbered Non-Caucasian males 102 to 14. The overall percentage of Caucasian to Non-Caucasian was 88.9% to 11.1%. According to the FAA (2016), approximately 94% of pilot are Caucasian. A possible reason for this difference may be the young age of the sample. As the demographics of the country change, it is reasonable to expect the demographics of the target population to change. A sample of older pilots may indicate a proportion closer to the target population. In addition to race, Table 3.2 indicates 37 females and 73 males were married for a total of 110 married participants in comparison to 74 not married.

Table 3.3 indicates that most participants (65%) had a 4-year degree. More males had a 4-year degree than females, 77 to 40, totaling 117. Overall, 29 pilots had
graduate degrees (13 females and 16 males), 14 had 2-year degrees (3 females to 11 males), and 20 had a high school diploma (8 females to 12 males).

In regards to flight experience, as noted in Table 3.4, the sample was comprised of relatively experienced pilots even though the sample was younger than the population demographics supplied by the FAA. The average number of type ratings held was nearly three. The total flight hours mean for the sample was $M = 7,224.4$ hours ($Mdn = 6050$, $SD = 4,814$). The total PIC hours for the sample was $M = 3,612$ hours ($Mdn = 2,500$, $SD = 3,261$). The total multi-crew hours for the sample was $M = 5,490$ hours ($Mdn = 5,000$, $SD = 4,522$).

The type of operation also swayed toward Part 121 flight operations. Again, this was expected because most of the participants were airline pilots. Table 3.5 indicates 138 participants (59 captains and 75 first officers) flew in Part 121 operations, 28 (14 captains and 4 first officers) in Part 135 operations, and 21 (11 captains and 2 first officers) flew in Part 91 operations. Of that group, 11 captains stated they also flew in the military and 11 first officers indicated the same.

**Power analysis.** The power of every significance test is based on four parameters: the alpha level, the size of the effect, the amount of variation in the data, and the sample size. Power calculations are based on the smallest effect that is scientifically or clinically meaningful. Effect size is a “quantitative reflection of the magnitude of some phenomenon that is used for the purpose of addressing a question of interest” (Kelley & Preacher, 2012, p. 140). Based on Cohen, Cohen, West, and
Aiken’s (2003) beta-alpha ratio of 4 to 1, the alpha was .05 and minimum power was .80.

Because I employed different statistical strategies to answer the research questions, I conducted a separate power analysis for each question. The results of these analyses, which were acquired using G*Power, are summarized in Table 3.6. During the a priori power analysis, the effect size of $ES = .25$ was based on Blundell et al. (2016). I did not have any basis for the other effect sizes, though, and therefore based them on a medium effect as suggested by Cohen et al. (2003). Given these results, I needed an overall sample size of at least $N = 159$.

Calculating a post hoc analysis, Table 3.6 contains a summary of the actual power of the study. Effect sizes and number of predictors relative to the sample size of $N = 184$ was calculated. As reported, the overall power of the study was .98. The power of each set was .86 for Set A, .66 for Set B, and .78 for Set C. Except for Set B, all power values were near or greater than Cohen et al.’s (2003) recommended minimum power of .80. The smaller power that was observed in Set B was due to the size of the sample, $N = 184$.

**Instrumentation**

The primary data collection instrument consisted of five sections: (a) the researcher-modified version of Modgill et al.’s (2014) OMS-HC, which was used to assess participants’ level of mental illness stigma; (b) the researcher-modified version of Katz and Foley’s (1974), Social Distance scale, which was used to
determine the closeness of their relationship; (c) a vignette that corresponded to the three psychological treatments to which participants were randomly assigned; (d) a researcher-modified version of Rice et al.’s (2015) Willingness to Fly scale; and (e) a background section for participants to self-report their personal demographics and flight experiences. A copy of these instruments is provided in Appendix A and discussion of each section follows.

**Section A: Modgill et al.’s (2014) OMS-HC scale.** Stigma was measured using the researcher-modified version of Modgill et al.’s (2014) OMS-HC, which was designed to measure stigmatizing attitudes in the health care profession. Most scales that exist measure stigma in the general population toward people with mental illness (Kassam, 2012), but few relate specifically to a professional group. The OMS-HC consists of 15 statements measured on a Likert-type scale ranging from Strongly Disagree (1) to Strongly Agree (5).

The development of the scale was tested for content validity using a focus group, and construct validity was addressed using a sample of \( N = 787 \) health care professionals. The initial scale consisted of 20 items and has a reported Cronbach’s alpha of \( \alpha = .82 \). Modgill et al. (2014) tested the scale a second time using a larger sample of \( N = 1,523 \) and the corresponding Cronbach’s alpha was \( \alpha = .79 \). Modgill et al. also identified three distinct subscales from this second validation: Attitude, Disclosure and Help Seeking, and Social Distance. The second validation of the scale also resulted in 15 items. Although the OMS-HC was developed for and
applied to the health care industry, the reader will note that the items also are applicable to the current study and responses to the 15 items provided a measure of mental illness stigma among airline pilots.

The overall reliability coefficient was calculated to be .68 (Table 3.7). This is lower than the reported .79. Based on the current study’s sample data, the reliability coefficients for the attitude, disclosure, and social distance subscales were .45, .52, and .69, respectively whereas the reported reliability coefficients in the literature were .68, .67, and .68, respectively. Comparing the two sources, the reliability coefficients for the attitude and disclosure subscales were lower than those reported in the literature, but the social distance subscale was nearly the same. The lower reliability coefficients were due to the small sample size.

**Section B: Bogardus’ (1925) social distance scale.** Social distance, which initially was measured by Bogardus (1925), is a metric that represents the degree to which individuals are willing to accept people who are different from themselves into their own social group (Triandis & Triandis, 1965). In the current study, social distance was measured using a researcher-modified version of the scale developed by Katz and Foley (1974), which is a modified version of Bogardus’ scale. Katz and Foley developed their scale for the U.S. Navy to assess how willing Navy personnel would be to engage in social contact with host country nationals. The scale consisted of nine items that describe various social settings. Participants were asked to assess how personal or impersonal they believed each statement describes based on a
continuum ranging from 1 to 9, where 1 represents extremely high degree of personal interaction or closeness and 9 represents Extremely highly impersonal interaction and no closeness. Thus, higher scores reflect greater social distance and the less willingness to engage in social contact with host country nationals.

For the current study, I modified the nine items to reflect a multi-crew environment. For example, the statement “To perform a service for him as part of my job” was revised to “To perform a service for a member of my flight crew as part of my job,” and the statement “To attend a sports activity with him” was revised to “To attend a sports activity with a member of my flight crew.” In this context, higher scores reflected greater social distance and the less willingness a pilot is to engage in social contact with members of his/her flight crew. Thus, if a participant has a high social distance score, then this would suggest he or she also would have a high degree of stigma and be less willing to fly if a member of his or her crew had a mental illness.

Katz and Foley (1974) did not report what attention to validity they gave to their revised instrument. However, based on a factor analysis they confirmed that the instrument was unidimensional, and they reported a split-half reliability coefficient of .97, which infers it is a highly stable instrument. For the current study, I calculated Cronbach’s alpha (Table 3.6) using the sample data to determine its reliability. The reliability coefficient was calculated to be .68. This was lower than the reported .97 due to the small sample size.
Section C: The vignette and treatment scenarios. The vignette was a researcher-developed scenario that described a hypothetical psychological issue that pilots conceivably could experience. Accompanying the vignette were three different types of psychological treatments. The vignette described an 8-year airline captain who decided to self-refer to a psychologist because of his phobic concerns over thunderstorms. He reported he had constant fear of thunderstorms. The pilot presented to the psychologist with possible symptoms of Post-Traumatic Stress Disorder (PTSD) after an incident that occurred because of flying in the vicinity of thunderstorms.

Following the vignette, participants were presented with one of three randomly selected treatment scenarios. The first treatment scenario involved the pilot being removed from duty to undergo therapy. After successfully completing treatment, the pilot is cleared to fly and returns to duty. The second treatment scenario was similar to the first except instead of being removed from duty to undergo therapy, the pilot underwent therapy concurrently while flying. Ultimately, the therapist deemed the therapy successful. The third treatment scenario was the control scenario. It was similar to the first two except the pilot did not inform anyone of his problem but instead used self-help books on stress management and coping mechanisms to deal with his PTSD. The pilot also believed he was improving because of his self-treatment. Following each treatment scenario, participants completed the Willingness to Fly scale.
Section D: Rice et al.’s (2015) willingness to fly scale. Pilots’ willingness to fly was measured using a researcher-modified version of Rice et al.’s Willingness to Fly scale, which was developed to measure consumers’ perceptions of their willingness to fly on a flight based on a hypothetical situation. The modification to this scale involved augmenting each statement to include “with this pilot,” which reflected the pilot described in the treatment scenarios. For example, the statement “I would be willing to fly on this flight” was revised to “I would be willing to fly on this flight with this pilot,” and the statement “I have no fear of flying on this flight” was revised to “I have no fear of flying on this flight with this pilot.”

The Willingness to Fly scale consists of seven statements and uses a Likert-type scale ranging from Strongly Disagree (-2) to Strongly Agree (+2) with a choice of neutral (0). Thus, higher scores reflect a greater willingness to fly. Rice et al. (2015) reported that the scale was valid and reliable. For the current study, I calculated Cronbach’s alpha (see Table 3.6) using the sample data to determine its reliability. The reliability coefficient was calculated to be .95, which was higher than the .72 reported by Rice et al.

Section E: Background information. The last section of the instrument consisted of a researcher-prepared set of items for participants to self-report specific demographic and flight experience information. Personal demographics included gender, age, race/ethnicity, education level, and marital status. Flight experiences included flight rank, pilot licenses, number of type ratings held, total flight hours,
total flight hours as PIC, total multi-crew flight hours, and type of flight operation currently being flown.

**Procedures**

**Research methodology.** The current study involved several different research methodologies based on the research questions. The first research question was answered using an intervention study with an experimental design. This design was appropriate because participants were randomly assigned to one of the three psychological treatment scenarios and post-assessed on their willingness to fly after the scenario was presented.

The second research question was answered using an ANCOVA design. This design was appropriate because both stigma theory (Link & Phelan, 2001) and contact theory (Allport, 1954) suggested that stigma and the closeness of a relationship can affect how a person perceives someone who is undergoing psychological treatment. The ANCOVA design held these two factors constant so their influence on participants’ willingness to fly could be removed to yield a more accurate representation of the relationship between the types of psychological treatment and willingness to fly.

The third research question was answered using an explanatory correlational design. This design was appropriate because multiple factors of a single group were examined for their relationship with willingness to fly and level of mental illness stigma.
The last research question was answered using an ATI design. This design was appropriate because the level of mental illness stigma was examined from an interaction perspective to determine if stigma operated consistently or differently across the three types of psychological treatment relative to willingness to fly. Similar ATI analyses were also conducted with respect to key demographic and flight experience variables.

**Human subjects research.** Human subjects were used in this study. To protect the participants and the data collected, I submitted an application to Florida Institute of Technology’s Institutional Review Board (IRB). Given the nature of the current study, an exempt application was submitted. I began implementing the study after I received IRB approval. A copy of the IRB application is provided in Appendix B.

**Study implementation.** The single, multi-section data collection instrument as described in the Instrumentation section was made available online via Survey Monkey. After receiving IRB approval, I requested support from ALPA and the online pilot forums to inform their membership about the study and invite them to participate. ALPA tentatively agreed to send the web link to their members and their subscribers as part of an e-mail announcement/invitation to participate in the study. Unfortunately, I ran into an issue with ALPA National. Instead of an email going out to all ALPA represented pilot groups, only Spirit ALPA agreed to send my invite out to the Spirit Airlines pilot group. I made the instrument accessible for approximately
3 months, from May 20, 2017 until August 10, 2017. The online data were downloaded to a Microsoft Excel file and imported into JMP Pro 13.0.0, statistical analysis program. After all data analyses were completed, the online data were deleted from the host website.

**Threats to internal validity.** Internal validity is the “inference about whether the changes observed in a dependent variable are, in fact, caused by the independent variable in a particular research study rather than by some extraneous factors” (Ary, Jacobs, & Sorensen, 2010, p. 272). If threats to internal validity are not controlled, then the results on the dependent variable are in question, which implies that the dependent variable is being affected by something other than the targeted independent variables. Extending the work of Campbell, Stanley, and Gage (1963), Ary et al. (2010) identified 12 threats to internal validity. A discussion of these threats, including their definitions, their possible impact on the current study, and how I controlled for these threats follows.

**History.** According to Ary et al. (2010), it is possible for events to occur during the course of a study that can affect the dependent variable. For example, if the current study were implemented at the same time the Germanwings accident occurred, the results of this study most likely would have been impacted by the accident. Because the current study measured the effect of mental illness stigma on psychological treatment, a history threat was possible if an outside political, social, or cultural event were to occur because of an act by a mentally ill person. During the
course of the current study, I did not observe any event that could be considered a history threat, and therefore this threat was not applicable to the current study.

Maturation. Maturation refers to the normal and ongoing processes that occur within an individual because of time and can include physiological, biological, and psychological changes (Ary et al., 2010). Everybody grows and learns over time. In an experiment, it is possible for the natural effects of the maturation process to be attributed to the treatment variable. In the context of the current study, if, for example, participants were to get married, return to school, or acquire more ratings, it is conceivable that their responses might be different from what they would have been at the beginning of the study. Given that the current study effectively was cross-sectional in nature and involved adult participants, maturation did not pose a threat to the study.

Testing. Exposure to a pre-assessment may affect participants’ performance on subsequent assessments. People learn from their experiences. Participants will learn from a pre-assessment and use that knowledge to score better on the assessment if it is used again. This is referred to as testing threat. In such instances, it would be uncertain whether participants were responding to post-assessment items genuinely, or if they were aware of how to answer the post-assessment based on their exposure to the pre-assessment. In the context of the current study, if participants were asked about their willingness to fly with a psychologically ill person as a pre-assessment and then later asked about their willingness to fly with a pilot undergoing
psychological treatment, the participants may be primed to answer a particular way. As a result, Ary et al. (2010) recommend administering a pre-assessment only if it is necessary. Because I did not use a pre-assessment, the testing threat was not applicable to the current study.

**Instrumentation.** According to Ary et al. (2010), an instrumentation threat is a result of a change in the instrument used in a study. “The changes in the way the dependent variable was measured from the first time to the second time, rather than the treatment, may bring around the observed outcome” (Ary et al., 2010, p. 275). Different scorers, different observers, and different ways the instrument is administered are ways to induce instrument error. The outcome can be affected by any change to the instrument or its administration. If an instrument change occurs, then it would be impossible to know if the observed outcome was a result of treatment or a result of changes to the instrument. In the current study, an instrumentation threat was not applicable because I used a single, multi-section instrument, which was administered one time, and it was done so electronically via a host web site. Furthermore, participants’ responses were electronically entered and scored.

**Statistical regression.** The term statistical regression refers to the “well-known tendency for subjects who score extremely high or extremely low on a pretest to score closer to the mean (regression toward the mean) on a posttest” (Ary et al., 2010, p. 276). In the context of the current study, if participants with the highest
measurable mental illness stigma or the largest social distance score were selected for education about psychological illness, statistical regression would occur because the mean of the group would tend to move toward the mean of the population regardless of the educational administration on subsequent stigma or social distance measurement instruments. This threat was not applicable to the current study because I did not focus on any subgroups of the sample nor did I administer any pre-assessments.

**Selection bias.** The selection bias threat refers to the situation where individuals selected for the sample have differences prior to the application of a treatment on the experimental group. Ary et al. (2010) defined selection bias as “important differences between the experimental and control groups even before the experiment begins” (p. 278). Thus, the selection bias threat is related to the concept of group equivalency. In the context of the current study, there were three different treatment groups, so it was possible that the groups might have been equivalent with respect to key factors. For example, one group might have had statistically higher levels of mental illness stigma than another group, or have statistically higher levels of social distance. To control for this threat, participants were randomly assigned to one of the three treatments. I also confirmed group equivalency by examining differences among the groups with respect to key attributes, including stigma, social distance, personal demographics, and professional experiences. As a result, the selection threat was not applicable to the current study.
Mortality. Mortality, also known as attrition, refers to the loss of participants during a study. For example, if older, more experienced, and more educated pilots were to drop out of the study, the remaining participants might reflect a completely different population than what was targeted. The mortality threat is possible in the current study because some participants did not complete all the study’s protocols resulting in a set of participants who “dropped out.” I minimized this threat by documenting the attrition rate so the reader can judge the extent to which the mortality threat was applicable. The original number of participants were $N = 208$. 24 participants did not complete the instrument. Of the 24 participants, 20 only completed the OMS-HC, leaving the other scales, demographics, and flight experiences blank. The remaining four participants did not complete a single item in the survey.

Selection-maturation interaction. The selection-maturation interaction threat is the combination of the selection and maturation threats. Between groups, this selection-maturation interaction can occur if groups are not randomly selected causing a mistaken treatment effect. By dealing with the selection bias threat, I was able to control for the selection-maturation interaction threat also.

Experimenter effect. An experimenter effect refers to the unintentional influence the person administering a treatment could have on the outcome. Any of the experimenter’s personological characteristics such as age, gender, level of education, and any other bias or stereotype can affect the observed outcomes of the
treatment. For example, if pilots completing the questionnaire thought I was an FAA employee or another government administrator instead of an airline pilot, they might respond differently to the items. This threat was not applicable to the current study because the study was implemented electronically via an online survey site.

**Subject effects.** A subject effect refers to subjects’ attitudes towards a study, which in turn can affect the outcome. For example, if participants know they are part of an experiment, they might want to do well regardless of the treatment. This is known as the Hawthorne effect. It also is possible that participants in a control group will feel compelled to increase their performance above what might be expected because they want to “show-up” the treatment group. This is known as the John Henry effect. On the other hand, it also is possible for participants in the control group to underperform because they might feel resentful or demoralized that they are not receiving treatment. The subject effects threat was applicable to the current study because there were three different treatment groups and a Hawthorne effect was plausible. However, this threat was mitigated by the manner in which the study was implemented: Participants were assigned to a group electronically without the knowledge of what participant was being assigned to which group. Nevertheless, a Hawthorne effect still was possible because participants might have felt honored to help bring attention to the concept of mental illness stigma among airline pilots.

**Diffusion.** Diffusion occurs when there is communication about the treatment between the control and treatment groups. If the treatment group talks to the control
group and discusses the treatment it is receiving, this could influence the control
group’s behavior on the dependent variable. Although the current study involved
three different groups, diffusion was not applicable because participants were
assigned to a group electronically without the knowledge of what participant was
being assigned to which group. The study also was cross-sectional in nature and
involved a one-time data collection event, which also helped control for the diffusion
threat to internal validity.

**Location.** The location in which data are collected could provide an
alternative explanation for the outcomes of an experiment. For example, in an
experiment that involves a blood pressure reduction drug, participants might suffer
from white-coat effect, which is a numerical value that describes an elevated BP
reading in the presence of a medical practitioner (Martin & McGrath, 2014). Their
blood pressure will be higher in a medical office if a medical practitioner takes their
blood pressure than it would be if they took their own blood pressure at home via a
portable blood pressure device. The difference in the observed blood pressure may
yield an incorrect measurement that affects the dependent measure. In the current
study, the multi-section data collection instrument was hosted and administered
online, and participants were asked to complete the questionnaire at their various
locations wherever they had Internet access. Although I did not have control over the
location at which participants choose to complete the instrument, participants
presumably completed it in a comfortable environment. Therefore, I did not consider the location threat to be applicable to the current study.

**Treatment verification and fidelity.** The concept of treatment verification and fidelity refers to how the researcher will safeguard that a study’s procedures will be implemented as proposed to ensure the manipulation of the independent variable has occurred as intended. “Fidelity of treatment in outcome research refers to confirmation that the manipulation of the independent variable occurred as planned. Verification of fidelity is needed to ensure that fair, powerful, and valid comparisons of replicable treatments can be made” (Moncher & Prinz, 1991, p. 247). Without treatment fidelity, the internal validity of the study is in question and replicating the research becomes very difficult for future researchers. There are three facets of treatment fidelity spread across five domains that were addressed in the current study (Borrelli, 2011). The three facets are assessment, monitoring, and enhancing treatment fidelity. The five domains are study design, provider training, treatment delivery, treatment receipt, and treatment enactment.

Because the current study was a dissertation research, its design was under the direction and guidance of a major advisor and a committee. Borrelli (2011) indicated that a protocol review group should be used to ensure that the “study design is operationalized as hypothesized is particularly important if the intervention is to target a specific population” (p. S53). The review group verified that an inventory of the study design was conducted. A theoretical model of stigma towards
psychological illness was used and the measures of the study reflected the hypothesized theoretical construct. The second domain Borrelli described is training the providers. In the current study, the instruments were administered equally through an online platform and hence no training was required because the instrument was accessed, answered, and recorded electronically. For the same reasons, the third domain of delivery of treatment was satisfied. The fourth domain was receipt of treatment. Instruction on the completion of the instruments were available to the participants. The instructions were in English because every pilot needs to be English proficient. The final domain was treatment enactment. The current study was cross-sectional in nature and reflected a snapshot in time to measure flight crews’ willingness to fly. Borrelli described enactment as the distinction between what is taught, what is learned, and what is actually used. There was no follow-up with the participants to measure changes in willingness to fly because there was no educational implementation of stigma reducing strategies.

To enhance fidelity and verification, I have given careful attention to external validity issues as recommended by Shaver (1983). This attention is concerned with complete description of the variables, data collection procedures, and data analysis methods. Relative to these issues: (a) I provided a detailed description of the variables earlier in this chapter and summarized them in Table 3.8, (b) I documented the procedures in the Study Implementation section of this chapter, (c) I reported validity and reliability information about the data collection instruments I used, and
(d) in the next section I describe the appropriate statistical strategies I used to answer the research questions.

**Data Analysis**

Data analyses were conducted using both descriptive and inferential statistical procedures. A brief summary of these procedures follows.

**Description of independent and dependent variables.** The current study included 22 independent variables and one dependent variable. Following Cohen et al.’s (2003) “less is more” edict, the variables were grouped into four functional sets. A brief description of each set is provided below and in Table 3.8.

**Set A = Demographics.** Set A consisted of five variables that reflected participants’ personal demographics: \( X_1 \) = Gender, which was dummy coded with males as the reference group and \( X_1 \) representing female; \( X_2, X_3, X_4, X_5 = \) Age, which was dummy coded with age 60 and older as the reference group, and \( X_2, X_3, X_4, \) and \( X_5 \) representing 18–29, 30–39, 40–49, and 50–59, respectively; \( X_6 = \) Race/Ethnicity, which was dummy coded with Caucasian as the reference group and \( X_6 \) representing Non-Caucasian; \( X_7, X_8, X_9 = \) Education level, which was dummy coded with graduate degree as the reference group, and \( X_7, X_8, \) and \( X_9 \) representing high school, 2-year, 4-year degrees, respectively; and \( X_{10} = \) Marital status, which was dummy coded with not married as the reference group and \( X_{10} \) representing married pilots.

**Set B = Flight experiences.** Set B consisted of eight variables that reflected participants’ flight experiences: \( X_{11} = \) Flight rank, which was dummy coded with
first officer as the reference group and $X_{11}$ representing captain; $X_{12}, X_{13} =$ Pilot license, which was dummy coded with private pilot license as the reference group, and $X_{12}$, and $X_{13}$ representing CPL and ATP ratings, respectively; $X_{14} =$ Number of ratings, which was continuous; $X_{15} =$ Total flight hours, which was continuous; $X_{16} =$ Flight hours as PIC, which was continuous; $X_{17} =$ Multi-crew flight hours, which was continuous; and $X_{18}$ and $X_{19} =$ Current flight operation, which was dummy coded with Part 91 flight operations as the reference group, and $X_{18}$, and $X_{19}$ representing Part 135 air charter and Part 121 airline operations, respectively; and $X_{20} =$ Military flight experience, which was dummy coded with no military experience as the reference group, and $X_{20}$ representing military flight experience.

**Set C = Affective domain.** Set C consisted of two variables that reflected the two targeted affective domain variables: $X_{21} =$ Social distance, which was continuous and represented scores on the nine-item researcher-modified version of Katz and Foley’s (1974) Social Distance scale; and $X_{22} =$ Stigma, which was continuous and represented scores on Modgill et al.’s (2014) 15-item OMS-HC.

**Set D = Willingness to fly.** Set E represented the single dependent variable, willingness to fly, which was continuous and represented scores on the researcher-modified version Rice et al.’s (2015) seven-item Willingness to Fly scale.

**Inferential statistics.** Inferential statistics were accomplished primarily via multiple regression. With respect to the first research question, multiple regression was used to determine the effect group membership (the three psychological
treatments) had on willingness to fly. With respect to the second research question, an ANCOVA was conducted from a multiple regression perspective. Furthermore, in the event that the ANCOVA model was not valid, follow-up interactions were conducted using multiple regression. With respect to the third research question, a hierarchical multiple regression analysis was performed to determine the relationship between the targeted set of variables and stigma. Finally, with respect to the last research question, all ATI analyses were done from a multiple regression perspective. Results from these analyses are provided in the next chapter.
Chapter 4

Results

Introduction

This chapter is organized into three main sections. The first section presents descriptive statistics and contains the results of the researcher developed instrument including a summary of pilots’ OMS-HC scores, Social Distance scale scores, flight experience, and demographics. The first section also provides the results of an item analysis for each scale of the instrument, and a summary of information obtained from the responses to the open-ended questions.

The second section presents the results of inferential statistical analyses consisting of preliminary and primary analyses of the sample data. The preliminary analysis addresses modifications made to the data set to prepare it for analysis, invalid and missing data, outliers in the sample, and compliance with the assumptions for the multiple regression strategies employed in the analyses. The primary data analyses address the relationship among the targeted sets of independent variables, the dependent measure, and the relationships among the IVs independent of the dependent measure.

The last section of the chapter presents the results of hypothesis testing that corresponded to the four research questions outlined in Chapter 1. The null hypotheses for the research questions from Chapter 1 were developed and the decision to reject or fail to reject the null hypothesis was given.
Descriptive Statistics

The researcher developed questionnaire consisted of three sets (Sets A, B, and C) and was presented to study participants in the order A-B-C. The OMS-HC scale, the Social Distance scale, and the Willingness to Fly scale were presented first as Set A. Pilot flight experiences were presented next as Set B. Finally, pilot demographics were presented last as Set C. The questionnaire was administered online via SurveyMonkey for an approximately 3-month period beginning on May 20, 2017 and ending on August 10, 2017. During this time, 208 pilots responded to the questionnaire and 184 provided complete data (an 88% response rate). A summary of the responses to the OMS-HC, Social Distance, and Willingness to Fly scales follows. The reader will note there is no “Section C” presented here because this section contained the vignette and treatment scenarios.

Section A: Modgill et al.’s (2014) OMS-HC scale. The first scale that was presented to the respondents was the OMS-HC scale. The OMS-HC scale measures the amount of stigma a person possesses towards psychological health. Most scales that exist measure stigma in the general population toward people with mental illness (Kassam, 2012), but few relate specifically to a professional group. The OMS-HC scale consisted of 15 statements measured on a Likert-type scale ranging from Strongly Disagree (1) to Strongly Agree (5). Scores could range from 9 to 75 with higher scores indicating a more negative attitude toward psychological health, or in the context of the current study, a higher level of mental illness stigma. Overall
scores ranged from 23 to 61 with the midrange of 42. The mean was $M = 39.77$ $(SD = 7.67)$. Overall, the mean mental illness stigma score recorded in the sample was higher than the median of the scale. The mean was within a standard deviation of the median.

The data were disaggregated by gender, age, education level, marital status, flight rank, license, operations, and military flight service. As summarized in Table 4.1, the female mean score for the OMS-HC scale was $M = 38.99$ $(SD = 7.71)$ and the male mean score was $M = 40.70$ $(SD = 7.65)$. Overall, scores ranged from 23 to 61. Females had a lower level of mental illness stigma than males, but this difference was not significant.

When the data were examined by age, the results indicated a trend toward a higher level of mental illness stigma as age increased. The youngest age group, the 18–29 age group, had the highest mean of $M = 38.53$ $(SD = 6.50)$. The age group of 30–39 had a mean of $M = 40.01$ $(SD = 7.92)$, followed by age group 40–49 with a mean of $M = 40.44$ $(SD = 8.24)$, age group 50–59 with a mean of $M = 41.41$ $(SD = 6.97)$, and finally age group 60 and older had a mean of $M = 41.43$ $(SD = 8.30)$. The overall scores ranged from 23 to 61 with a mode of age group 30–39, indicating a relatively youthful sample. Differences in the mean scores among the groups were not significant even though the trend was toward a lower level of physiological health stigma.
Table 4.2 contains a summary of the results of OMS-HC scale scores by education and marital status. Most participants in the study earned a 4-year degree, \( N = 117 \). The 2-year degree group had the lowest mean of \( M = 38.93 \) \( (SD = 7.88) \). High school graduates had a mean of \( M = 39.40 \) \( (SD = 7.96) \), 4-year degree holders had a mean of \( M = 39.73 \) \( (SD = 7.86) \), and finally those participants with a graduate degree had a mean of \( M = 42.33 \) \( (SD = 6.53) \). The overall scores ranged from 23 to 61. Differences in the mean scores among the groups were not significant.

As summarized in Table 4.2, married pilots’ mean score for the OMS-HC scale was \( M = 39.98 \) \( (SD = 7.58) \) and non-married pilots’ mean score was \( M = 40.21 \) \( (SD = 7.92) \). Overall scores ranged from 23 to 61. Married pilots had a lower level of mental illness stigma than non-married pilots, but this difference was not significant.

Table 4.3 contains a summary of the results of OMS-HC scores by current flight rank and license held. Starting with flight rank, the captain mean score for the OMS-HC scale was \( M = 39.87 \) \( (SD = 8.03) \) and the first officer mean score was \( M = 39.82 \) \( (SD = 7.26) \). A third category of Other was included to indicate a response other than captain or first officer. The mean of this group was \( M = 42.62 \) \( (SD = 8.22) \), and \( N = 13 \). Overall scores ranged from 23 to 61. Captains had a higher level of mental illness stigma than first officers but it was not significant. Both captains and first officers scored lower than those who answered other, but the difference in mean scores was not significant.
Most participants in the study were ATP, N = 167. The ATP group had a mean score of $M = 40.08$ ($SD = 7.69$). Commercial pilots had the lowest mean score of $M = 39.75$ ($SD = 8.27$), and private pilots had a mean of $M = 40.00$ ($SD = 5.66$). The overall scores ranged 23 to 61. Differences in the mean scores among the groups were not significant.

Finally, Table 4.4 contains a summary of the results of OMS-HC scores by type of operation that a pilot is flying under and if a pilot has flown in the military. Most participants of the study were flying under Part 121 rules of the Federal Aviation Regulations, N = 139. The Part 121 group had a mean of $M = 40.19$ ($SD = 7.97$). Part 135 pilots had a mean of $M = 37.44$ ($SD = 7.01$), and Part 91 pilots had a mean of $M = 41.67$ ($SD = 6.23$). The overall scores ranged 23 to 61. Differences in the mean scores among the groups were not significant.

Those pilots who had military flight experience, N = 27, had a mean score for the OMS-HC of $M = 41.78$ ($SD = 6.01$), and civilian pilots’ mean score was $M = 39.70$ ($SD = 7.96$). Military pilots had a higher level of mental illness stigma than non-military pilots, but this difference was not significant.

Table 4.5 contains a summary of the item analysis of pilots’ responses to the OMS-HC scale. As noted in Table 4.5, pilots’ mean responses ranged from -1.72 to 4.22, which indicates their tendency to be neutral toward the statements related to their stigma towards psychological health. Pilots tended to agree or strongly agree with item MH3, “If I were under treatment for a mental illness I would not disclose
this to any of my colleagues,” \( N = 184, M = 4.22 (SD = 0.99) \). Pilots also tended to agree or strongly agree with item MH8, “If I had a mental illness, I would tell my friends,” \( N = 184, M = 3.67 (SD = 1.28) \), and item MH1, “I am more comfortable helping a person who has a physical illness than I am helping a person who has a mental illness,” \( N = 184, M = 3.19 (SD = 1.20) \).

Pilots tended to disagree or strongly disagree with item MH15, “I struggle to feel compassion for a person with mental illness,” \( N = 184, M = 1.72 (SD = 0.86) \). Pilots also tended to disagree or strongly disagree with item MH13, “Healthcare providers do not need to be advocates for people with mental illness,” \( N = 184, M = 1.83 (SD = 0.84) \).

To discern the differences among the three dimensions for the current study \( (N = 184) \), a factor analysis was undertaken. The three dimensions noted in Modgill et al.’s (2014) analysis are attitude, disclosure, and social. The Attitude dimension consisted of six items (MH1, MH9, MH10, MH11, MH13, MH15) measured on a Likert scale (1 = Strongly Disagree to 5 Strongly Agree). The Disclosure dimension consisted of four items (MH3, MH4, MH5, MH8) measured on a Likert scale (1 = Strongly Disagree to 5 Strongly Agree). The Social Distance dimension consisted of five items (MH2, MH6, MH7, MH12, MH14) measured on a Likert scale (1 = Strongly Disagree to 5 Strongly Agree).

In the current study, when a three factor analysis was undertaken to compare the results to the Modgill et al. (2014), the results were similar but had some
discrepancies in a few items on the scale. The Attitude subscale matched the results from Modgill et al., but the other two subscales did not match completely. When a four factor analysis was undertaken, the results yielded an almost identical representation of the three subscales from Modgill et al.’s study when the third and fourth factors were combined into a single factor.

**Section B: Bogardus’ (1925) social distance scale.** The second scale that was presented to the respondents was a researcher-modified version of the Katz and Foley’s (1974) social distance scale, which is a modified version of the Bogardus’ (1925) social distance scale. Social distance, which initially was measured by Bogardus (1925), is a metric that represents the degree to which individuals are willing to accept people who are different from themselves into their own social group (Triandis & Triandis, 1965). The scale consisted of nine items that describe various social settings. Participants were asked to assess how personal or impersonal they believed each statement describes based on a continuum ranging from 1 to 9, where 1 represents an extremely high degree of personal interaction or closeness and 9 represents an extremely high impersonal interaction and no closeness. Thus, higher scores reflect greater social distance and the less willingness to engage in social contact with host country nationals. Scores could range from 9 to 81. Overall scores ranged from 12 to 81, thus the midrange was \( \frac{81-12}{2} = 34.5 \). The mean was \( M = 31.94 \) \((SD = 10.40)\). Overall, the lower than median scores indicated a higher
level of personal interaction and more willingness to engage another crewmember. In other words, there was a certain degree of closeness among flight crew in the sample.

The data were disaggregated by gender, age, education level, marital status, flight rank, license, operations, and military flight service. As summarized in Table 4.1, the female mean score for the Social Distance scale was $M = 31.28$ ($SD = 9.11$) and the male mean score was $M = 32.38$ ($SD = 11.16$). Overall, scores ranged from 12 to 81. Females had lower scores indicating they were more willing to engage another crewmember than males, but this difference was not significant.

As with the trend from the OMS-HC scale sample results, when the data were examined by age, the results indicated a trend toward higher scores on the Social Distance scale. The increasing scores on the social distance scale indicates a move from a more personal interaction, or closeness, in the younger age groups, to a more impersonal interaction, or less closeness, in the older age group. The youngest age group, the 18–29 age group, had the lowest mean of $M = 28.93$ ($SD = 10.03$). Age group 30–39 had a mean of $M = 32.47$ ($SD = 9.52$), followed by age group 40–49 with a mean of $M = 32.81$ ($SD = 11.55$), age group 50–59 had a mean of $M = 31.82$ ($SD = 8.83$), and finally age 60 and older had a mean of $M = 35.57$ ($SD = 15.66$). The overall scores ranged from 12 to 81 with a mode of age group 30–39. Differences in the mean scores among the groups were not significant even though the trend was toward a higher level of social distance or impersonal interaction.
Table 4.2 contains a summary of the results of Social Distance scores by education and marital status. Most participants in the study earned a 4-year degree, \( N = 117 \). The 4-year degree group had the lowest mean of \( M = 31.00 \) (\( SD = 8.97 \)). High school graduates had a mean of \( M = 34.69 \) (\( SD = 12.76 \)), 2-year degree holders had a mean of \( M = 36.00 \) (\( SD = 10.27 \)), and finally those participants with a graduate degree had a mean of \( M = 32.22 \) (\( SD = 13.55 \)). The overall scores ranged from 12 to 81. Differences in the mean scores among the groups were not significant.

As summarized in Table 4.2, the married pilots’ mean score for the Social Distance scale was \( M = 31.33 \) (\( SD = 9.75 \)) and non-married pilot mean score was \( M = 33.25 \) (\( SD = 11.59 \)). Overall scores ranged from 12 to 81. Married pilots had lower social distance scale score indicating an increased level of personal interaction than non-married pilots, but this difference was not significant.

Table 4.3 contains a summary of the results of Social Distance scale score by current flight rank and license held. Starting with flight rank, the captain mean score for the Social Distance scale was \( M = 31.98 \) (\( SD = 10.07 \)) and first officer mean score was \( M = 32.74 \) (\( SD = 10.88 \)). A third category of Other was included to indicate a response other than captain or first officer. The mean of this group was \( M = 28.68 \) (\( SD = 9.41 \)), and \( N = 13 \). Overall scores ranged from 12 to 81. Captains had lower social distance scale score indicating an increased level of personal interaction than non-married pilots, but this difference was not significant.
Most participants in the study were ATPs, \( N = 167 \). The ATP group had a mean of \( M = 32.19 \) \( (SD = 10.63) \). Private pilots had the lowest mean of \( M = 20.0 \) \( (SD = 0) \), and commercial pilots had a mean of \( M = 31.32 \) \( (SD = 6.99) \). The overall scores ranged 12 to 81. Differences in the mean scores among the groups were not significant.

Finally, Table 4.4 contains a summary of the results of the Social Distance scale scores by type of operation that a pilot is flying under and if a pilot has flown in the military. Most participants to the study were flying under Part 121 rules of the Federal Aviation Regulations, \( N = 139 \). The Part 121 group had a mean of \( M = 32.16 \) \( (SD = 10.76) \). From Part 121 pilots, the trend from there to Part 91 flight operations trended lower. Part 135 pilots had a mean of \( M = 31.78 \) \( (SD = 10.65) \), and Part 91 pilots had a mean of \( M = 30.87 \) \( (SD = 9.08) \). The overall scores ranged 12 to 81. Differences in the mean scores among the groups were not significant.

Those pilots who had military flight experience had a mean score for the Social Distance scale of \( M = 32.38 \) \( (SD = 9.35) \) and civilian pilot mean score was \( M = 31.70 \) \( (SD = 9.90) \). Military pilots had higher social distance scale score indicating an increased level of impersonal interaction than non-married pilots, but this difference was not significant.

Table 4.6 contains a summary of the item analysis of pilots’ responses to the Katz and Foley (1974) scale. As noted in Table 4.6, pilots’ mean responses ranged from \( M = 2.37 \) to \( M = 5.47 \), which indicate they tended to be lower towards a closer
personal relationship. Pilots tended to score very high on item SD3, “To accept a member of my flight crew as my supervisor,” $N = 184, M = 5.47 \ (SD = 2.53)$. Pilots have a hierarchical authority structure. A higher score would indicate an impersonal relationship as that relationship is necessary for the successful completion of a task. Pilots also tended to rate high item SD1, “To perform a service for a member of my flight crew as part of my job,” $N = 184, M = 5.02 \ (SD = 2.36)$, and item SD2, “To do business with a member of my flight crew,” $N = 184, M = 4.48 \ (SD = 2.29)$.

Pilots tended to score low on item SD6, “To have my daughter date the son of a member of my flight crew,” $N = 184, M = 2.37 \ (SD = 2.04)$, which suggests a close personal relationship with crew members. Pilots also scored lower with item SD5, “To have my children be close friends with the children of a member of my flight crew,” $N = 184, M = 2.55 \ (SD = 1.86)$. The reader will note from Table 4.6 there was a fair amount of variability within each item. The range for each question ranged from a possible 1 to 9 and the standard deviation ranged from 1.77 to 2.53. The distribution for SD4, SD5, SD6, SD7, SD8, and SD9 are all skewed right. Items SD1, SD2, and SD3 are more evenly distributed around the midrange.

**Section D: Rice et al.’s (2015) willingness to fly scale.** The third scale that was presented to the respondents was a researcher-modified version of Rice et al.’s (2015) Willingness to Fly scale, which was developed to measure consumers’ perceptions of their willingness to fly on a flight based on a hypothetical situation. The Willingness to Fly scale consists of seven statements and uses a Likert-type
scale ranging from Strongly Disagree (-2) to Strongly Agree (+2) with a choice of neutral (0). The scores could range from -14 to 14. Thus, higher scores reflect a greater willingness to fly. Rice et al. (2015) reported that the scale was valid and reliable. The mean was $M = 3.09$ with a standard deviation of $SD = 6.40$. Overall, the higher than median scores indicated a higher willingness to fly with another crewmember.

As summarized in Table 4.1, females’ mean score for the Willingness to Fly scale was $M = 3.92$ ($SD = 5.92$) and males’ mean score was $M = 2.83$ ($SD = 6.57$). Overall scores ranged from -14 to 14. Females had higher scores indicating they were more willing to fly with another crewmember than males, but this difference was not significant.

Unlike the trends from the other two scales, the Willingness to Fly scale did not indicate a trend in either direction for the targeted age groups. The youngest age group, the 18–29 age group, had a mean of $M = 3.00$ ($SD = 5.44$). Age 30–39 had a mean of $M = 4.45$ ($SD = 9.51$), followed by age 40–49 with a mean of $M = 1.63$ ($SD = 7.05$), age 50–59 $M = 2.82$ ($SD = 6.97$), and finally age 60 and older had a mean of $M = 2.00$ ($SD = 7.70$). The overall scores ranged -14 to 14 with a mode of age group 30–39. Differences in mean scores among the age groups were not significant.

Table 4.2 summarized the results of Willingness to Fly scores by education and marital status. Most participants in the study earned a 4-year degree, $N = 117$. 

94
The graduate degree group had the lowest mean of $M = 1.33$ ($SD = 7.56$). Pilots who earned a 4-year degree had a mean of $M = 3.22$ ($SD = 6.28$), 2-year degree holders had a mean of $M = 3.79$ ($SD = 5.69$), and high school graduates had a mean of $M = 4.90$ ($SD = 5.64$). The overall scores ranged from -14 to 14. There was a trend in the education level. The more educated the pilot, the lower the scores were on the Willingness to Fly scale. Differences in mean scores among the groups were not significant.

As summarized in Table 4.2, the married pilot mean score for the Willingness to Fly scale was $M = 2.97$ ($SD = 6.36$) and non-married pilot mean score was $M = 3.46$ ($SD = 6.57$). Overall scores ranged from -14 to 14. Married pilots were less willing to fly than non-married pilots, but this difference was not significant.

Table 4.3 contains a summary of the results of Social Distance scale scores by current flight rank and license held. Starting with flight rank, the captains’ mean score for the Willingness to Fly scale was $M = 2.55$ ($SD = 5.49$) and the first officers’ mean score was $M = 3.99$ ($SD = 7.39$). A third category of Other was included to indicate a response other than captain or first officer. The mean of this group was $M = 1.92$ ($SD = 5.39$), and $N = 13$. Overall scores ranged from -14 to 14. Captains were less willing to fly than a first officer, but this difference was not significant.

Most participants to the study were ATPs, $N = 167$. The ATP group had a mean of $M = 3.25$ ($SD = 6.47$). Private pilots had the lowest mean of $M = 4.5$
(SD = 2.12), and commercial pilots had a mean of $M = 1.33$ (SD = 6.18). The overall scores ranged from -14 to 14. Differences in mean scores among the groups were not significant.

Finally, Table 4.4 contains a summary of the results of the Willingness to Fly scale by type of operation that a pilot is flying under and if a pilot has flown in the military. Most participants to the study were flying under Part 121 rules of the Federal Aviation Regulations, $N = 139$. The Part 121 group had a mean of $M = 3.46$ (SD = 6.81). Part 135 pilots had a mean of $M = 0.56$ (SD = 6.02), and Part 91 pilots had a mean of $M = 2.90$ (SD = 3.49). The overall scores ranged from -14 to 14. Differences in mean scores among the groups were not significant.

Those pilots who had military flight experience had a mean score for the Willingness to Fly scale of $M = 3.07$ (SD = 6.89) and civilian pilot mean score was $M = 3.35$ (SD = 6.10). Military pilots had slightly lower scores indicating less willingness to fly, but this difference was not significant.

Table 4.7 contains a summary of the item analysis of pilots’ responses to Rice et al.’s (2015) scale. As noted in Table 4.7, pilots’ mean responses ranged from 0.19 to 0.99, which indicates they tended to be more willing to fly. Pilots tended to score very high on item WF1, “I would be willing to fly with this pilot,” $N = 184$, $M = 0.99$ (SD = 0.89). Pilots also tended to score relatively high on item WF2, “I would be comfortable flying with this pilot,” $N = 184$, $M = 0.55$ (SD = 1.00).
Pilots tended to score just above the midrange of zero, indicating a willingness to fly with all the items. The lowest scored item was item WF4, “I would be happy to fly with this pilot,” \( N = 184, M = 0.19 (SD = 0.99) \). Pilots also scored low with item WF6, “I have no fear of flying with this pilot,” \( N = 184, M = 0.23 (SD = 1.13) \). The reader will note from Table 4.7 there was stable variability based on the respective standard deviations centered around 1.00 with a high of 1.13 and a low of 0.89.

**Section E: Demographics.** Section E of the data collection instrument consisted of 13 items. The first five items related to pilot personological demographics and the other eight items were related to their flight experience. The reader is reminded that a summary of these data was presented in Tables 3.1–3.5 in Chapter 3.

**Inferential Statistics**

**Overview.** The purpose of this study was manifold: (a) to determine the effect three different types of psychological treatment pilots might undergo have on a flight deck crew’s willingness to fly with these pilots, (b) to determine the effect a flight deck crew’s level of mental illness stigma and the closeness of the crew have on a flight deck crew’s willingness to fly across the different types of psychological treatment, (c) to determine the relationship a flight deck crew’s personal demographics and flight experiences have with their level of mental illness stigma, and (d) to determine the interaction mental illness stigma, personal demographics,
and flight experiences have across the different types of psychological treatment relative to a flight deck crew’s willingness to fly.

The initial factors that were targeted were partitioned into three functional sets: Set A = Demographics; Set B = Flight Experience; and Set C = Affective Domain, which included the OMS-HC and the Social Distance scale. To answer the four research questions, a regression analysis, an ANCOVA, a hierarchical regression, and an attribute-treatment interaction (ATI) design were used.

**Preliminary analysis.** Prior to performing any analyses, several preliminary data screening steps were undertaken. These steps were taken to ensure the data set was “clean” before undergoing the primary analyses. These steps included preparing the raw data for analysis, examining missing data, performing an outlier analysis, checking for “singularity,” and confirming the data set was compliant with the assumptions of regression. A summary of the steps taken and the corresponding results are discussed below.

**Data set modifications.** To prepare the raw data for analysis, the first step undertaken was to add a “case number” column to maintain numerical order of the raw data. The next step was to change the data types from nominal variables to continuous variables where appropriate. I also deleted the columns labeled Response ID, Collector ID, Start Date, End Date, IP Address, Email Address, First Name, Last Name, and Custom Data 1 prior to uploading the data set into JMP Pro.
There were $N = 208$ cases at the beginning of the preliminary analysis. I then sorted the data on the dependent measure, willingness to fly. It became immediately evident that $N = 24$ cases were incomplete cases. In fact, the simple sort revealed that all 24 cases were totally void of any response for demographics, flight experience, and two of the three scales. The OMS-HC scale was the only data collected on these $N = 24$ cases. As a result, these 24 cases were eliminated. This reduced the data set to $N = 184$ cases.

I then reorganized the data table so the dependent variable, willingness to fly, was in the first column, followed by the treatment, the affective domain scales, and then grouped the demographics and flight experience variables to make the analysis easier.

**Missing Data.** Missing data can occur systematically, as was the situation with the 24 cases described above, or randomly such as if a participant forgets to respond to an item. Independent of the 24 cases already mentioned, data were complete on the OMS-HC and the Willingness to fly scale. With respect to personal demographics and flight experiences, and as reported in Table 4.8, of the 184 remaining cases: 4 did not report their gender, 3 did not report their age, 3 did not report their race/ethnicity, 3 did not report their education level, 3 did not report their marital status, 4 did not report their flight rank, 3 did not report their license held, 5 did not report their number of flight ratings, 4 did not report their total flight hours, 4 did not report their flight hours as PIC, 4 did not report their flight hours in a multi-
crew environment, 6 did not report their current flight operations, and 4 did not report whether or not they have military flight experience. To determine and deal with these missing data, I followed Cohen et al.’s (2003) guidelines. A summary of these actions is provided in the Resolution column of Table 4.8.

In addition to the demographics and flight experience factors, data also were missing on the Social Distance scale. Specifically, 60 respondents did not complete all the items: 2 did not respond to item SD1, 3 did not respond to SD2, 3 did not respond to item SD3, 5 did not respond to item SD4, 8 did not respond to item SD5, 13 did not respond to item SD6, 9 did not respond to item SD7, 10 did not respond to SD8, and 7 did not respond to item SD9. Similar to the missing demographic and flight experiences data, I followed Cohen et al.’s (2003) guidelines as reported in Table 4.8.

*Outlier analysis.* Outliers are data that are abnormally different than the remaining data in a sample. Outliers can be a result of rare cases or contaminants. In the current study, one example of a rare case was a pilot who had reported 15,000 PIC hours with 20,000 hours overall. This was a captain who had many years of experience. An example of a contaminant is the case of a pilot who had 220 hours of total flight time and yet reported that 195 of those hours were in a multi-crew environment. FAA rules dictate that 40 hours of flight time be accrued before a person qualifies for an exam to become a private pilot. In this case, it can be surmised that only 25 hours were accrued toward this pilot’s private pilot exam
because a student pilot cannot serve as a crewmember in a multi-crew environment. This is impossible per regulation. For analysis purposes, it makes sense to keep the rare cases and eliminate the contaminants. However, before doing so, I followed Cohen et al.’s (2003) guidelines and ran two simultaneous multiple regression analyses—one each in the presence and absence of the outliers—and compared the results. This reduced the final data set to $N = 170$.

**Multicollinearity.** Multicollinearity describes the instance when one independent variable is highly correlated with another independent variable. When two or more variables are highly correlated, one variable can mask the variance another variable has on the dependent variable. For the first, second, and fourth research questions, multicollinearity was not an issue.

For the third research question, multicollinearity was addressed by starting with the highest variance inflation factor ($VIF$) and working my way through the model until all $VIF$s were below 5. $VIF$s of 5 or more are suspect because this indicates that the standard error is more than twice as much as it would be if the variables were not correlated. Total flight hours, PIC hours, and multi-crew hours all had a $VIF$ value above 5. I ran six separate regression analyses taking one or two of the variables out of each analysis. The analysis that had $X_{15} = $ Total flight hours removed yielded $VIF$s of less than 5 for the other two variables. It was the only combination in which only one variable was removed from the model and yielded acceptable $VIF$s for the other variables. I removed $X_{15} = $ Total flight hours as a result.
There also were high VIFs for the age group $X_2 = 18–29$, age group $X_3 = 30–39$, and $X_4 = 40–49$. Repeating the same procedure I used for Total flight hours, I ran multiple regression analyses to determine if one variable could be removed. Three models yielded a possible solution for multicollinearity. When $X_2 = 18–29$ was removed from the analysis, the resulting model yielded a significant solution, $R^2 = .277$, $F(22, 156) = 2.559$, $p = .0005$. When $X_3 = 30–39$ was removed from the analysis, the resulting model yielded a significant solution, $R^2 = .277$, $F(22, 156) = 2.564$, $p = .0004$. When $X_4 = 40–49$ was removed from the analysis, the resulting model yielded a significant solution, $R^2 = .272$, $F(22, 156) = 2.499$, $p = .0006$. Because removing $X_3 = 30-39$ yielded a more significant model, I removed $X_3 = 30–39$ from the analysis.

**Regression assumptions.** Cohen et al. (2003) described six assumptions that must be met when utilizing multiple regression analyses. These assumptions ensure proper evaluation of the relationship of the independent variables to the dependent variable. Violations of these assumptions can result in biased estimates of the regression coefficients, which means that the sample estimates do not hold in the population. Discussion of these assumptions and the techniques used to confirm compliance with the assumptions follow.

**Linearity.** The first regression assumption is concerned with the proper specification of the form of the relationship between the dependent measure, willingness to fly, and the 24 independent variables. A residual analysis was plotted
using the residuals against the predicted values for each research question data set. The relationship in the scatterplot should be linear and the assumption needs to be met. Violations of this assumption may lead to biases in estimates of the coefficients of the regression equation. The analysis using a fit line indicated there was no discernable pattern in any of the data sets. Adding a Kernel smoother line confirmed the Kernel smoother line nearly matched the fit line in each set. The data sets for each research question were compliant with regard to the linearity assumption.

Correct specification of the independent variables. The second regression assumption concerns the correct specification of the independent variables in the overall regression model. The development of leverage plots comparing each of the independent variables and the leverage residual of willingness to fly allowed me to make a conclusion for each data set. I used a threshold of .25 to determine if a variable was compliant with the assumption. The first research question data set was compliant.

The development of leverage plots for the second research question data set and the comparison of each of the independent variables to the leverage residual of willingness to fly allowed me to make a conclusion that Social Distance scale was not properly specified in the model. The Social Distance scale variable had a relationship with the residuals that was represented by a horizontal line and a \( p = .5894 \), suggesting improper variable specification.
The development of leverage plots for the third research question data set, comparing each of the 24 independent variables and the leverage residual of willingness to fly, allowed me to conclude that the following independent variables were not properly specified in the model: $X_2 = 18–29$, $X_5 = 50–59$, $X_9 = 4$-year degree, $X_{10} = \text{Married}$, $X_{11} = \text{Rank (captain)}$, $X_{12} = \text{CPL}$, $X_{13} = \text{ATP}$, $X_{14} = \text{Number of type ratings}$, $X_{16} = \text{PIC hours}$, $X_{17} = \text{Multi-crew hours}$, $X_{18} = \text{Part 135}$, $X_{19} = \text{Part 121}$, $X_{20} = \text{Military experience}$, and $X_{21} = \text{Social distance scale}$.

These variables had a relationship with the residuals that was represented by a horizontal line and a $p$ value greater than .25, suggesting improper variable specification. I removed them from further analysis because they were not correctly specified. This reduced the overall number of independent variables from 24 to 8.

*Perfect reliability.* The third regression assumption concerns the reliability measurement of the instruments used in the data collection process. This is important because a line that fits data well should have small deviations between what is observed and what is predicted by the fitted model. Violations of this assumption indicate an error that can lead to bias in the estimate of the regression coefficients and their standard errors. Error is detected via a measure of reliability. Cohen et al. (2003) advance a coefficient of .70 as the threshold for reliability of an instrument. A coefficient of .70 or greater is acceptable and regarded as reliable. Reliability coefficients were calculated for each of the instruments in the current study. As
presented in Chapter 3 (Table 3.6), the Cronbach alpha for the combined OMS-HC was .68. The subscales of Attitude, Disclosure, and Social Distance were .45, .52, and .69 respectively. Based on these results, the reliability coefficients of the OMS-HC were slightly below the threshold set by Cohen et al. The Social Distance scale had a split-half reliability coefficient of .68 and the Willingness to Fly scale had a Cronbach alpha of .95. Based on these results, the Willingness to Fly scale was compliant, and the Social Distance scale was accepted as compliant with the third assumption. With these exceptions noted, the data set was determined to be compliant with the perfect reliability assumption.

*Homoscedasticity of the residuals.* The fourth regression assumption concerns homoscedasticity of the residuals. This means that for any value of the independent variable, the variance of the residuals around the regression line in the population is assumed to be constant.

Again, I ran a scatterplot of residual values versus fitted values just as I did in the first regression assumption. I placed a fit line and Kernel smoother line in the scatterplot. There was no systematic pattern detected. The Kernel smoother line did not fit perfectly, but it was close enough to cautiously claim that equal variance. The fourth regression assumption was satisfied.

*Independence of the residuals.* The fifth regression assumption concerns the independence of the residuals from one another. The residuals of the observations must also be independent of one another. In other words, there must be no
relationship among the residuals for any subset of cases in the analysis. To determine if the assumption was met, the plot of residuals by case number was performed. The plot yielded no discernable pattern and this was confirmed by a Kernel smoother line being compared to the fit line. The two lines were nearly coincidental, thus the conclusion was that the fifth assumption was met for each research question’s data set.

*Normality of the residuals.* The sixth regression assumption concerns normality of the residuals. To satisfy this assumption, the residuals should be normally distributed for any value of the independent variables. 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 the normality assumption do not lead to bias in the estimates of the regression coefficients.

To test for this assumption, I performed two analyses for each research question’s data set. In the first analysis, a distribution of residuals was performed with a superimposed normal curve over the distribution. The superimposed curved indicated the distribution was normal. The second analysis involved constructing a $q-q$ plot. The residuals were superimposed with a straight line and a 95% confidence band. Nearly all of the data, for each data set, corresponded with the straight (normal) line and all of the data were within the 95% confidence band. The analysis of the distribution and $q-q$ plot led to the conclusion that the sixth assumption was satisfied.
Summary of preliminary analysis. The preliminary analysis began with 24 independent variables and 208 cases. As a result of the preliminary analyses, the data set for the first research question was reduced by 24 cases, each case being designated a contaminant. The reduced final sample size was $N = 184$. The data set for the first research question was reduced by 24 case to $N = 184$. The data set for the second research question was reduced by 26 case to $N = 182$, with each of the cases being designated a contaminant. The data set for the third and fourth research questions was reduced by 38 cases to $N = 170$, with all 38 of the cases being designated contaminants.

For the third and fourth research questions, of the 24 variables, 16 were removed. All variables except $X_1 =$ Females, $X_4 = 40–49$, $X_6 =$ Non-Caucasian, $X_7 =$ High school degree, and $X_8 =$ 2-year degree were removed from Set A while dealing with multicollinearity and the regression assumptions. All variables were removed from Set B while dealing with multicollinearity and the regression assumptions. The Social Distance scale was removed from Set C. This left a final data set that was used for primary analyses and consisted of eight independent variables.

Primary analysis 1. The first research question was answered using an intervention study with an experimental design. This design was appropriate because participants were randomly assigned to one of the three psychological treatment scenarios and post-assessed on their willingness to fly after the scenario was
presented. The first research question was, “What effect does the different types of psychological treatment a pilot might undergo have on a flight deck crew’s willingness to fly?”

To answer the first research question, a simple regression analysis was completed. The dependent variable was willingness to fly and the independent variables were the treatment types. As reported in Table 4.9, the relationship between willingness to fly and the treatments was, $R^2 = .11, F(2, 183) = 10.99, p < .0001$. The type of treatment explained 11% of the variance in willingness to fly scores. A different perspective is the collective contribution of type of treatment provides 11% of the information needed to perfectly predict a pilot’s willingness to fly with another pilot who is undergoing psychological treatment.

Inspection of each type of treatment revealed that both treatments were significant. The first treatment was significant, $B_1 = 4.81, t(183) = 4.38, p < .0001$. The second treatment was also significant, $B_2 = 3.86, t(183) = 3.56, p = .0009$. More specifically, $B_0 = 0.29$. Pilots in control group scored on average, 0.29 points on the Willingness to Fly scale. Pilots in the first treatment group scored, on average, 4.81 points higher than the control group, or 5.1 on the Willingness to Fly scale. Pilots in the second treatment group scored 3.86 points higher than the control group, or 4.15 on the Willingness to Fly scale.

**Primary analysis 2.** The second research question was answered using an ANCOVA design. This design was appropriate because both stigma theory (Link &
Phelan, 2001) and contact theory (1954) suggest that stigma and the closeness of a relationship can impact how a person perceives someone who is undergoing psychological treatment. The ANCOVA design held these two factors constant so their influence on participants’ willingness to fly could be removed to yield a more accurate representation of the relationship between the types of psychological treatment and willingness to fly. The second research question was, “What effect do flight deck crews’ level of mental illness stigma and the closeness of the crew have on a flight deck crew’s willingness to fly across the different types of psychological treatment?”

A hierarchical analysis of ANCOVA was performed to test the homogeneity of regression assumption. The dependent variable, willingness to fly, was regressed on the targeted sets of independent variables using the set entry order A-B-C, where Set A = OMS-HC scale, Set B = Treatment types, and Set C = the interaction between the covariate and the treatment groups. Table 4.10 contains a summary of the results of the ANCOVA analysis.

**Set A: Covariates.** As reported in Table 4.10, when the covariate, OMS-HC scores entered the model, the contribution they made in explaining variance in willingness to fly scores was significant, $R^2 = .046$, $F(1,180) = 8.75$, $p = .0035$.

**Set B: Treatment.** As reported in Table 4.10, when the two factors of Set B, treatments, entered the model in the presence of Set A, the overall model was significant, $R^2 = .161$, $F(3, 178) = 11.39$, $p < .0001$. The unique contribution the
treatments made in explaining variance in willingness to fly scores also was significant, $sR^2 = .115$, $F(2, 178) = 12.18$, $p < .0001$. The variable in Set A was significant, $B_1 = -0.18$, $t(181) = -3.27$, $p = .0013$. Both of the variables in Set B were also significant. The first treatment was significant, $B_2 = 4.79$, $t(181) = 4.63$, $p < .0001$. The second treatment was also significant, $B_3 = 3.81$, $t(181) = 3.71$, $p = .0003$. Again, pilots in the first treatment group scored, on average, 4.79 points higher than on the Willingness to fly scale and pilots in the second treatment group scored 3.86 points higher on the Willingness to Fly scale.

**Set C: Interactions.** As reported in Table 4.10, when the two factors of Set C, interactions, entered the model in the presence of Set A and Set B, the overall model was significant, $R^2 = .191$, $F(5, 176) = 8.31$, $p < .0001$. The unique contribution the treatments made in explaining variance in willingness to fly scores also was significant, $sR^2 = .03$, $F(2, 176) = 3.26$, $p = .0077$. Both of the variables in Set B were significant and one variable in Set C. The first treatment was significant, $B_2 = 11.06$, $t(181) = 5.59$, $p = .0496$. The second treatment was also significant, $B_3 = 16.92$, $t(181) = 3.22$, $p = .0015$. The interaction between Treatment 2 and the OMS-HC was significant, $B_5 = -0.33$, $t(181) = -2.54$, $p = .0118$ signifying that the OMS-HC is a significant covariate in the model and could not be factored out. That is, a pilot’s level of stigma influences their willingness to fly with flight crew who are undergoing mental health treatment.
Summary of ANCOVA. At this point of the analysis, the homogeneity of regression failed. Due to the significance of the interaction in Set C, the model was determined to be an invalid ANCOVA model.

Attribute treatment interaction. To follow up the ANCOVA, an ATI was performed and reported in Figure 4.1. The analyses started where the ANCOVA left off to determine the interactions between willingness to fly and OMS-HC scores across the different treatments.

The analyses of the interactions between the treatment groups and OMS-HC scores indicated there was a disordinal interaction between the control group and those who were in the second scenario treatment group. Participants who were in the control treatment group who had low OMS-HC scores were less willing to fly with pilots who did not divulge their psychological issues and lack of treatment than participants in the second treatment group who were flying with pilots who divulged their current psychological treatment. When pilots had high scores on the OMS-HC, their willingness to fly scores were reversed. Participants in the control group were more willing to fly with pilots who did not divulge psychological issues and lack of treatment than participants in the second treatment group who were flying with pilots who divulged they were currently receiving psychological treatment.

The analyses of the interactions between the treatment groups and OMS-HC scores also indicated that there was a disordinal interaction between the two treatment groups. Participants in the first treatment group who had low OMS-HC
scores were less willing to fly with pilots who divulged their prior psychological treatment than participants in the second treatment group who were flying with pilots who divulged their current psychological treatment. Participants who had high scores on the OMS-HC, had low willingness to fly scores. Participants in the first treatment group were more willing to fly with pilots who divulged prior psychological treatment than participants in the second treatment group who were flying with pilots who divulged they were currently receiving psychological treatment.

Participants in the first treatment group were more willing to fly with pilots who divulged their prior psychological treatment than participants in the control group who were flying with pilots who did not divulge their psychological issues and lack of treatment across all levels of mental illness stigma.

When looked at from an analysis of variance perspective, the model yielded a main effect for the type of treatment, $F(2, 176) = 12.07, p < .0001$. The main effect of stigma was significant, $F(1, 176) = 13.16, p = .0004$. The interaction effect was significant, $F(2, 176) = 3.25, p = .04$, indicating that stigma did have a statistically significant effect in willingness to fly across the different treatments. To gain more insight into the effect, the Johnson-Neyman technique was employed to calculate the region of significance between stigma and willingness to fly. Pilots from one treatment group who scored 33.45 on the OMS-HC had the same willingness to fly score as pilots from the other treatment group. This indicates that there is no
statistical difference between mean scores from the first treatment group when compared to the second treatment group at the point (33.45) the graphed lines cross.

Based on the results of the Johnson-Neyman technique, an area of insignificance exists within 0.95 points of 33.45, or an area of insignificance exists between the scores of 32.5 and 34.4 on the OMS-HC. Scores outside this range are statistically significant. In other words, pilots were more willing to fly with flight crew undergoing psychological treatment when their OMS-HC scores were below 32.5. Pilots were more willing to fly with flight crew who had undergone psychological treatment when their OMS-HC scores were greater than 34.4.

**Primary analysis 3: A stepwise and hierarchical regression.** A stepwise regression analysis was performed due to the seminal nature of the current study. The results of the stepwise regression analysis are contained in Table 4.11. I employed a forward approach strategy and used a probability of .15. The stepwise model yielded four independent variables, $X_{22} = \text{OMS-HC}, X_4 = \text{age } 40-49$, $X_6 = \text{Non-Caucasian vs. Caucasian}$, and $X_7 = \text{High school degree versus Graduate degree}$ at the 0.15 level. As noted on Table 4.12, the overall stepwise model was statistically significant, $R^2 = .096$, $F(6,165) = 4.36, p = .0022$. These four variables collectively explained 10% of the variance in willingness to fly scores. An examination of the individual factors showed that two factors were significant: $X_4 = \text{Age } 40-49, B_2 = -2.57, t(165) = -2.36, p = .0193$ and $X_{22} = \text{OMS-HC}, B_6 = -0.16, t(165) = -2.52, p = .0127$. Pilots in Age group 40–49 scored on average 2.36 points
lower than pilots in the other age groups. The OMS-HC scale had a negative relationship with willingness to fly; the higher the OMS-HC score the less willing a pilot was to fly.

To further illustrate the relationships, I included a hierarchical regression analysis. I used the results from the stepwise regression to determine the set entry order of C-A, where set C = OMS-HC scores and Set A = Demographics. Table 4.12 contains a summary of the results of these analyses.

**Set C: Stigma.** As reported in Table 4.12, when the OMS-HC scores entered the analysis, the contribution it made in explaining the variance in willingness to fly scores was significant, $R^2 = .040, F(1,168) = 7.06, p = .0086$. The factor was significant, $B_1 = -0.17, t(169) = -2.66, p = .0086$. The OMS-HC scale had a negative relationship with willingness to fly; the higher the OMS-HC score the less willing a pilot was to fly.

**Set A: Demographics.** As reported in Table 4.12, when the five factors of Set A = Demographics entered the model in the presence of Set C, the overall model was significant, $R^2 = .099, F(6,163) = 2.99, p = .0084$. The unique contribution the demographics made in explaining variance in willingness to fly scores also was significant, $sR^2 = .059, F(5,164) = 2.12, p = .0655$. As a result of the insignificant omnibus test, no further analysis of the variables in Set A was completed.

The hierarchical regression analysis supported the results from the stepwise regression analysis. In both strategies, the OMS-HC was significant. Both the
hierarchical and stepwise regression analysis confirmed the impact the stigma scores from the OMS-HC have on willingness to fly.

**Primary analysis 4: Interactions.** The fourth research question needed an ATI study to be answered. This was the appropriate time to perform the ATI to better understand the interaction between the affective domain scales of Set C and willingness to fly, as well as the demographics of Set A and flight experience of Set B. As reported in Figure 4.1, there was a significant disordinal interaction between the OMS-HC and willingness to fly.

As reported in Figure 4.2, the interaction between gender and the different experimental groups indicates that there was an ordinal interaction between the control group and both treatment groups. There also was a disordinal relationship between Treatment 1 and Treatment 2 with females in Treatment 2 scoring higher than males in Treatment 1 on the willingness to fly scale, but with males in Treatment 1 scoring higher than females in Treatment 2. Both treatment groups scored higher than the control group. These results indicate that (a) females were more willing to fly with pilots who underwent psychological treatment than males, and (b) females were more willing to fly with pilots who were currently undergoing psychological treatment than males. Both males and females also were more willing to fly with pilots who underwent or were undergoing psychological treatment than with pilots who did not divulge their psychological issues and were attempting self-help treatment.
An analysis of variance yielded a main effect for the type of treatment, \( F(2, 172) = 10.37, p < .0001 \), such that the average OMS-HC score was significantly higher for females \((M = 3.92, SD = 5.92)\) than for males \((M = 2.83, SD = 6.57)\). The main effect of gender was not significant, \( F(1, 172) = 1.36, p = .25 \). The interaction effect was not significant, \( F(2, 172) = 0.19, p = .83 \), indicating that gender did not have a statistically greater effect in the first treatment scenario than in the second treatment scenario.

As reported in Figure 4.3, the interaction between age and the different experimental groups indicates: (a) there was an ordinal interaction between the control group and Treatment 1, (b) there was an ordinal interaction between the control group and Treatment 2, and (c) both treatment groups scored higher than the control group across all age groups. There also was a disordinal relationship between Treatment 1 and Treatment 2. These results indicate that participants in the 18–29 age group were more willing to fly if they were flying with pilots who were currently undergoing psychological treatment rather than pilots who were coming back to flight duty after receiving psychological treatment. The interaction occurred in the 30–39 age group with all other age groups reporting that they would be more willing to fly with pilots who previously received psychological treatment and were returning to flight duty than pilots who were receiving psychological treatment concurrently.
With respect to Treatment 1, older participants were more willing to fly with pilots who underwent psychological treatment than first officers. In Treatment 2, there was no consistency in willingness to fly across the age groups. For example: (a) the 20–29 age group was more willing to fly with pilots undergoing psychological treatment than the 18–29 age group. (b) the 40–49 age group was less willing to fly with pilots undergoing psychological treatment than the 30–39 and 50–59 age groups, (c) the 50–59 age group was less willing to fly with pilots undergoing psychological treatment than the 30–39 and 60 and older age groups, and (d) the age 60 and older age group was more willing to fly with pilots undergoing psychological treatment than all other age groups.

An analysis of variance yielded a main effect for the type of treatment, \( F(2, 165) = 7.54, p = .0007 \), such that the average OMS-HC score was significantly higher for age group 30–39 (\( M = 4.45, SD = 9.51 \)) than the other age groups. The main effect of age was not significant, \( F(4, 165) = 2.17, p = .07 \). The interaction effect was not significant, \( F(8, 165) = 1.60, p = .13 \), indicating that age did not have a statistically greater effect in the first treatment scenario than in the second treatment scenario.

As reported in Figure 4.4, the interaction between race/ethnicity and the different experimental groups indicates that there was an ordinal and insignificant interaction between the control group and those who are in both treatment groups. There also was an ordinal and insignificant interaction between the two treatment
groups. Participants in Treatment 1 scored higher on the willingness to fly scale than participants in Treatment 2. Both treatment groups also scored higher on the willingness to fly scale than the control group.

These results indicate that: (a) Caucasians were more willing to fly with pilots who underwent psychological treatment than non-Caucasians, (b) Caucasians were more willing to fly with pilots who were currently undergoing psychological treatment than non-Caucasians, and (c) both Caucasians and non-Caucasians were more willing to fly with pilots who underwent or were undergoing psychological treatment than with pilots who did not divulge their psychological issues and were attempting self-help treatment. For those participants in the control group, Caucasians were more willing to fly with pilots who did not divulge their psychological issues and were attempting self-help treatment than non-Caucasians.

As reported in Figure 4.5, an analysis of variance yielded a main effect for the type of treatment, $F(2, 167) = 6.16, p = .0026$, such that the average OMS-HC score was significantly higher for pilots with a high school education ($M = 4.90$, $SD = 5.64$) than the other education levels. The main effect of education level was not significant, $F(3, 167) = 1.19, p = .32$. The interaction effect was not significant, $F(6, 167) = 1.08, p = .38$, indicating that education did not have a statistically greater effect in the first treatment scenario than in the second treatment scenario.

The interaction between education and the different experimental groups indicates that there was an ordinal interaction between the control group and both
treatment groups. Both Treatment 1 and Treatment 2 participants scored higher than the control group. There also was a disordinal interaction between Treatment 1 and Treatment 2 between participants who had a high school degree and those who had a 2-year degree. Participants in with a high school degree scored higher on the Willingness to Fly scale if they were in Treatment 2 than Treatment 1, but participants with a 2-year degree scored higher if they were in Treatment 1 than Treatment 2. There was an ordinal interaction between participants with a 2-year degree vs. a 4-year degree, but there was a disordinal interaction between participants with a 4-year degree vs. those with a graduate degree: Those with a 4-year degree scored higher on the willingness to fly scale if they were in Treatment 1 than Treatment 2, but those with graduate degree scored higher on the Willingness to fly scale if they were in Treatment 2 than Treatment 1.

As reported in Figure 4.6, the interaction between marital status and the different experimental groups indicates there was an insignificant ordinal interaction between the control group and both treatment groups. There also was no interaction between the two treatment groups: Participants in Treatment 2 consistently scored higher on the willingness to fly scale than those in Treatment 2 across both marital status groups. Both treatment groups also scored higher on the willingness to fly scale than the control group. These results indicate that: (a) married participants were less willing to fly with pilots who underwent psychological treatment than participants who were not married, (b) married participants were less willing to fly
with pilots who were currently undergoing psychological treatment than pilots who were not married, and (c) both married and unmarried participants were more willing to fly with pilots who underwent or were undergoing psychological treatment than with pilots who did not divulge their psychological issues and were attempting self-help treatment. For those participants in the control group, married participants were more willing to fly with pilots who did not divulge their psychological issues and pilots who were attempting self-help treatment than participants who were not married.

As reported in Figure 4.7, the interaction between flight rank and the different experimental groups indicate that there is an ordinal interaction between the control group and both treatment groups. Regardless of rank, participants were more willing to fly with pilots who underwent psychological treatment (Treatment 1) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control). Similarly, regardless of rank, participants were more willing to fly with pilots who were undergoing psychological treatment (Treatment 2) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control).

There also was a disordinal, yet insignificant, interaction between Treatment 2 and Treatment 1: captains in Treatment 2 had higher willingness to fly scores than first officers, but first officers had higher willingness to fly scores than captains in Treatment 1.
An analysis of variance yielded a main effect for the type of treatment, $F(2, 169) = 3.57, p = .0302$, such that the average OMS-HC score was significantly higher for first officers ($M = 3.99, SD = 7.39$) than the captains ($M = 2.55, SD = 5.49$). The main effect of flight rank was not significant, $F(2, 169) = 1.83, p = .16$. The interaction effect was not significant, $F(4, 169) = 0.97, p = .43$, indicating that flight rank did not have a statistically greater effect in the first treatment scenario than in the second treatment scenario.

As reported in Figure 4.8, the interaction between the number of type ratings and the different experimental groups indicates that there was an ordinal interaction between Treatment 1 and Treatment 2: As the number of type ratings increased, participants were more willing to fly with pilots in Treatment 1 than pilots in Treatment 2. There also was an ordinal interaction between the control group and Treatment 1. Regardless of the number of ratings, participants were more willing to fly with pilots in Treatment 1 than pilots in the control group. There also was an insignificant disordinal interaction between the control group and Treatment 2. Participants with fewer type ratings were more willing to fly with pilots described in Treatment 2 than pilots in the control group, but as the number of ratings increased, participants were more willing to fly with pilots described in the control group than Treatment 2.

These results indicate that participants with fewer type ratings were more willing to fly with pilots who underwent psychological treatment than pilots with
more type ratings. Participants with fewer type ratings also were more willing to fly with pilots who were currently undergoing psychological treatment than pilots with more type ratings. Regardless of the number of type ratings, participants were more willing to fly with pilots who underwent or were undergoing psychological treatment than with pilots who did not divulge their psychological issues and were attempting self-help treatment. For those participants in the control group with fewer type ratings were less willing to fly with pilots who did not divulge their psychological issues and were attempting self-help treatment than participants with more type ratings.

An analysis of variance yielded a main effect for the type of treatment, $F(2, 176) = 11.31, p < .0001$. The main effect of number of type ratings was not significant, $F(1, 176) = 0.01, p = .92$. The interaction effect was not significant, $F(2, 176) = 0.76, p = .47$, indicating that the number of type ratings a pilot possessed did have a statistically significant effect in willingness to fly across the different treatments. Additionally, the relationship between willingness to fly and the number of type ratings for pilots in either treatment group was negative.

As reported in Figure 4.9, the interaction between total flight hours and the different experimental groups indicates that there was an ordinal and insignificant interaction between both treatment groups and the control group. Regardless of the number of flight hours, participants were more willing to fly with pilots described in both treatment groups than pilots in the control group.
There also was a disordinal interaction between Treatment 1 and Treatment 2. Pilots who underwent psychological treatment (Treatment 1) than pilots who were undergoing psychological treatment (Treatment 2). However, as flight time increased beyond 2000 hours, this was reversed: Participants with more than 2000 hours were more willing to fly with pilots described in Treatment 1 than pilots in Treatment 2.

An analysis of variance yielded a main effect for the type of treatment, $F(2, 176) = 10.54, p < .0001$. The main effect of total flight hours was not significant, $F(1, 176) = 0.18, p = .68$. The interaction effect was not significant, $F(2, 176) = 0.18, p = .84$, indicating that the total flight time a pilot possessed did have a statistically significant effect in willingness to fly across the different treatments. Additionally, the relationship between willingness to fly and total flight hours for pilots in Treatment 1 was positive, while the relationship between willingness to fly and total flight hours in Treatment 2 was negative.

As reported in Figure 4.10, the interaction between total PIC hours and the different experimental groups indicates that there was an ordinal interaction across the board. Regardless of the total number of PIC hours: (a) participants were more willing to fly with pilots who underwent psychological treatment (Treatment 1) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control), (b) participants were more willing to fly with pilots who were
undergoing psychological treatment (Treatment 2) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control), and (c) participants were more willing to fly with pilots who underwent psychological treatment (Treatment 1) than pilots who were undergoing psychological treatment (Treatment 2). Additionally, the relationship between willingness to fly and PIC flight hours for pilots in either treatment group was negative.

As reported in Figure 4.11, the interaction of the total multi-crew hours and the different experimental groups indicates that there was an ordinal and insignificant interaction across the board. Regardless of the total multi-crew hours: (a) participants were more willing to fly with pilots who underwent psychological treatment (Treatment 1) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control), (b) participants were more willing to fly with pilots who were undergoing psychological treatment (Treatment 2) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control), and (c) participants were more willing to fly with pilots who underwent psychological treatment (Treatment 1) than pilots who were undergoing psychological treatment (Treatment 2). Additionally, the relationship between willingness to fly and multi-crew flight hours for pilots in Treatment 1 was positive, while the relationship between willingness to fly and multi-crew hours in Treatment 2 was negative.
As reported in Figure 4.12, the interaction between the type of operation and the different experimental groups indicates that there was an ordinal interaction between Treatment 1 and the control group, and between Treatment 2 and the control group: Regardless of type of operation, participants were more willing to fly with pilots who either underwent psychological treatment (Treatment 1) or were undergoing psychological treatment (Treatment 2) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control). There also was a disordinal interaction between Treatment 1 and Treatment 2. Participants who flew in Part 121 operations or Part 91 operations were more willing to fly pilots who underwent psychological treatment (Treatment 1) than pilots who were undergoing psychological treatment (Treatment 2). However, participants who flew Part 135 operations were more willing to fly with pilots who were undergoing psychological treatment (Treatment 2) than pilots who underwent psychological treatment (Treatment 1).

An analysis of variance yielded a main effect for the type of treatment, $F(2, 167) = 4.01, p = .0199$, such that the average OMS-HC score was significantly higher for pilots who flew under Part 121 operations ($M = 3.46, SD = 6.81$) than other operations. The main effect of operation was not significant, $F(2, 167) = 1.83, p = .16$. The interaction effect was not significant, $F(4, 167) = 2.21, p = .11$, indicating that operation did not have a statistically greater effect in the first treatment scenario than in the second treatment scenario.
As reported in Figure 4.13, the interaction between military flight experience and the experimental groups indicate there was an ordinal interaction between the two treatment groups and the control group. Regardless if participants had military experience or not, they were more willing to fly with pilots who either underwent psychological treatment (Treatment 1) or were undergoing psychological treatment (Treatment 2) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control). There also was a disordinal interaction between the treatments. Participants with no military experience were more willing to fly with pilots who underwent psychological treatment (Treatment 1) than pilots who were undergoing psychological treatment (Treatment 2). This relationship was reversed though for participants with military experience. They were more willing to fly with pilots who were undergoing psychological treatment (Treatment 2) than with pilots who underwent psychological treatment (Treatment 1).

An analysis of variance yielded a main effect for the type of treatment, $F(2, 172) = 7.17, p = .001$, such that the average OMS-HC score was significantly higher for pilots who never flew for the military ($M = 3.35, SD = 6.10$) than those who had military flight experience ($M = 3.07, SD = 6.89$). The main effect of military experience was not significant, $F(1, 172) = 0.53, p = .47$. The interaction effect was not significant, $F(2, 172) = 1.02, p = .36$, indicating that military flight experience did not have a statistically greater effect in the first treatment scenario than in the second treatment scenario.
As reported in Figure 4.14, the interaction between social distance or intimacy pilots had and the different experimental groups indicates there was an ordinal, yet insignificant, interaction across the board. Regardless of participants’ social distance scores: (a) participants were more willing to fly with pilots who underwent psychological treatment (Treatment 1) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control), (b) participants were more willing to fly with pilots who were undergoing psychological treatment (Treatment 2) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control), and (c) participants were more willing to fly with pilots who underwent psychological treatment (Treatment 1) than pilots who were undergoing psychological treatment (Treatment 2). Additionally, the relationship between willingness to fly and social distance for pilots in either treatment group was positive. The relationship between willingness to fly and social distance for pilots in the self-help treatment (Control) group was negative.

**Results of Hypothesis Testing**

The research hypotheses that corresponded to the research questions as presented in Chapter 1 are restated here in null form. Testing of the hypotheses was appropriate because the primary analyses were complete. The decision to reject or fail to reject a null hypothesis was based on the results of the primary analysis reported in this chapter.
Null hypothesis 1: There will be no significant relationship between the type of psychological treatment a pilot undergoes and a flight deck crew’s willingness to fly. As reported earlier in this chapter, when willingness to fly was regressed on the types of treatment, the result was significant, $R^2 = .1084$, $F(2,181) = 10.998$, $p < .0001$. More specifically, psychological treatment does have a significant effect on willingness to fly. As a result, the first null hypothesis was rejected.

Null hypothesis 2: A flight deck crew’s level of mental illness stigma and the closeness of a crew will not have a significant confounding effect on willingness to fly across the levels of psychological treatment. As reported in Table 4.10 and Figure 4.1, the results of the analysis yielded an invalid ANCOVA model. The effects of mental illness stigma and the second treatment had a significant confounding effect, $B_5 = -0.33$, $t(181) = -2.54$, $p = .0118$. Further analysis indicated there was a disordinal relationship between mental illness stigma and willingness to fly across the treatments. More specifically, there was a significant negative interaction between pilots’ willingness to fly with flight crew who were undergoing psychological treatment and the OMS-HC (stigma). As a result, the second null hypothesis was rejected.

Null hypothesis 3: Flight deck crews’ personal demographics, flight experiences, and mental illness stigma will have no significant relationship with willingness to fly. As reported in Table 4.11 and Table 4.12, the OMS-HC (stigma)
scores and age had a significant effect on willingness to fly, $R^2 = .096$, $F(4,165) = 4.36, p = .0022$. As a result, the third null hypothesis was rejected.

**Null hypothesis 4: There will not be any significant disordinal interactions between willingness to fly and any of the targeted variables.** As summarized in the second primary analysis, there was a disordinal interaction between mental illness stigma and willingness to fly. A disordinal interaction also existed in the OMS-HC, gender, education, flight rank, number of type ratings, total flight hours a pilot has, type of flight operation a pilot is flying in, and military flight experience variables. Out of these disordinal interactions, the interaction between the OMS-HC (stigma) and willingness to fly was significant, $F(2, 176) = 3.25, p = .04$. As a result, the fourth null hypothesis was rejected.
Chapter 5
Conclusions, Implications, and Recommendations

Summary of Study

The purpose of the current study was manifold. The purpose was: (a) to determine the effect three different types of psychological treatment pilots might undergo have on a flight deck crew’s willingness to fly with these pilots, (b) to determine the effect a flight deck crew’s level of mental illness stigma and the closeness of the crew have on a flight deck crew’s willingness to fly across the different types of psychological treatment, (c) to determine the relationship a flight deck crew’s personal demographics and flight experiences have with their level of mental illness stigma, and (d) to determine the interaction mental illness stigma, personal demographics, and flight experiences have across the different types of psychological treatment relative to a flight deck crew’s willingness to fly.

The current study targeted 15 factors that were grouped into three functional sets. Set A consisted of five factors related to demographics of pilots: gender, age, race or ethnicity, education level, and marital status. Set B consisted of eight factors related to pilots’ flight experience: flight rank, pilot license, number of ratings, total flight hours, flight hours as PIC, multi-crew flight hours, current flight operation, and military flight experience. Set C consisted of two factors related to measuring pilots’ affective domain: Modgill et al.’s (2014) OMS-HC workers and the Katz and Foley’s

The current study incorporated several different research methodologies. To answer the first research question, a between subjects true experimental design was used. This design was appropriate because participants were randomly assigned to one of the three psychological treatments, presented with the treatment’s corresponding scenario, and then post-assessed on their willingness to fly. To answer the second research questions, an ANCOVA design was used. This design was appropriate because both stigma theory (Link & Phelan, 2001) and contact theory (Allport, 1954) suggested that stigma and the closeness of a relationship can impact how a person perceives someone who is undergoing psychological treatment. The ANCOVA design held these two factors constant so their influence on participants’ willingness to fly could be removed to yield a more accurate representation of the relationship between the types of psychological treatment and willingness to fly. To answer the third research question, an explanatory correlational design was used. This design was appropriate because multiple factors of a single group were examined for their relationship with willingness to fly and level of mental illness stigma. To answer the last research question, an ATI design was used. This design was appropriate because the level of mental illness stigma was examined from an interaction perspective to determine if stigma operated consistently or differently across the three types of psychological treatment relative to willingness to fly.
Similar ATI analyses were also conducted with respect to key demographic and flight experience variables.

The target population consisted of approximately 254,000 professional pilots who hold either a CPL or an ATP operating in the United States. The accessible population consisted of airline pilots who fly for ALPA carriers with an emphasis on pilots who fly for Spirit Airlines, Inc. To enhance the robustness of the sample, the accessible population was further accessed through online pilot forums, airlinepilotforums.com and flightlevel350.com. The primary sampling strategy was convenience sampling and consisted of pilots volunteered to participate in the study. As was noted in Chapter 3, it became clear that snowball sampling occurred as a result of verbal feedback from pilots I knew who had filled out the questionnaire. After preliminary data screening, the final number of participants in the study was $N = 184$. The composition of the sample can be obtained by referencing Chapter 3 in the current study.

The primary data collection instrument consisted of five sections: (a) the researcher-modified version of Modgill et al.’s (2014) OMS-HC, which was used to assess participants’ level of mental illness stigma and consisted of 15 statements measured on a Likert-type scale; (b) the researcher-modified version of Katz and Foley’s (1974), Social Distance scale, which was used to determine the closeness of their relationship and consisted of nine items that describe various social settings; (c) a vignette that corresponds to the three psychological treatments to which
participants were randomly assigned; (d) a researcher-modified version of Rice et al.’s (2015) Willingness to Fly scale and consisted of seven statements and uses a Likert-type scale; and (e) a background section for participants to self-report their personal demographics and flight experiences. The single, multi-section data collection instrument as described in the Instrumentation section of Chapter 3 was made available online via SurveyMonkey. After receiving IRB approval, I requested support from ALPA and the online pilot forums to inform their membership about the study and invited them to participate.

**Summary of Findings**

Preliminary data screening, including outlier and missing data analyses, was accomplished before testing the study’s hypotheses. Compliance with assumptions of regression also was checked and the data set was reduced to $N = 184$ from $N = 208$. Working with this data set, a multiple regression analysis, a stepwise regression analysis, and a hierarchical regression analysis was completed. In addition to these primary analyses, an ANCOVA and an ATI analysis were completed to answer the remaining research questions. A brief summary of the findings follows.

**Primary analysis 1.** The first primary analysis examined the effect specific treatments have on willingness to fly. Scores from Rice et al.’s (2015) Willingness to Fly scale were regressed on the treatments with the control group containing the scenario that described a pilot who has not disclosed a psychological issue and is self-treating while continuing to fly.
The relationship between willingness to fly and the treatments was significant at the alpha level of .05, $R^2 = .11$, $F(2,183) = 10.99$, $p < .0001$. The type of treatment explained nearly 11% of the variance in willingness to fly. The first treatment was significant, $B_1 = 4.81$, $t(183) = 4.38$, $p < .0001$. The second treatment was also significant, $B_2 = 3.86$, $t(183) = 3.56$, $p = .0009$. The control group was not significant at the alpha of .05 level, $B_0 = 0.52$, $t(183) = 0.70$, $p = .4822$. These results indicate that the type of psychological treatment does have a statistically significant effect on willingness to fly.

**Primary analysis 2.** To answer the second research question, an ANCOVA was employed to determine the influence stigma and social distance has on willingness to fly. As reported in Table 4.10 (Chapter 4), a significant relationship was found at the second and third steps of the analysis. In the first step, analyzing the covariate, psychological health stigma was significant.

The second step was introducing the treatments and determining their significance. The overall model at this point was significant. Again, as in the first primary analysis, treatment was found to be significant. Both Treatment 1 and Treatment 2 were significant. At this stage of the analysis, the semi-partial correlation of the second set was significant.

The third step was to determine the significance of the interactions between treatments and psychological health stigma. When the interactions entered the model, the model was significant. The semi-partial correlation of the third set was
significant. One interaction was significant in the model, the interaction between Treatment 2 and the OMS-HC. As a result of this significant interaction, the homogeneity of regression failed for the ANCOVA model. Because the homogeneity of regression failed, the ANCOVA model was invalid. Stigma had a statistically significant confounding effect on willingness to fly scores across the treatments.

Following the invalid ANCOVA model, an ATI study was conducted. A disordinal interaction was found between pilots in Treatment 2 and the control group. A disordinal interaction was found between pilots in Treatment 2 and Treatment 1. An ordinal interaction was found between pilots in Treatment 1 and the control group. When looked at from an analysis of variance perspective, the model yielded a main effect for the type of treatment, $F(2, 176) = 12.07, p < .0001$. The main effect of stigma was significant, $F(1, 176) = 13.16, p = .0004$. The interaction effect was significant, $F(2, 176) = 3.25, p = .04$, indicating that stigma did have a statistically significant effect in willingness to fly across the different treatments.

Further, based on the results of the Johnson-Neyman technique, an area of insignificance exists within 0.95 points of 33.45, or an area of insignificance exists between the scores of 32.5 and 34.4 on the OMS-HC. Scores outside this range are statistically significant. In other words, pilots were more willing to fly with flight crew undergoing psychological treatment when their OMS-HC scores were below 32.5. Pilots were more willing to fly with flight crew who had undergone psychological treatment when their OMS-HC scores were greater than 34.4.
Participants in the self-help (control) group who had low OMS-HC (stigma) scores were less willing to fly with pilots who did not divulge their psychological issues and lack of treatment than participants in the second treatment group who were flying with pilots who divulged current psychological treatment. When participants had high scores on the OMS-HC, their willingness to fly was reversed. Participants in the control group were more willing to fly with pilots who did not divulge psychological issues and lack of treatment than participants in the second treatment group who were flying with pilots who divulged they were currently receiving psychological treatment.

**Primary analysis 3.** The third primary analysis examined the incremental contribution each set made in explaining variance in willingness to fly scores. The third primary analysis was divided into two analyses: a stepwise regression analysis and a hierarchical regression analysis. Both strategies were used because of the seminal nature of the current study. A stepwise analysis was completed first to identify which factors had the greatest effect on variance in the model and to determine set entry order. The hierarchical analysis was then completed to support the findings in the stepwise analysis.

**Stepwise analysis.** As reported in Table 4.11 (Chapter 4), the stepwise analysis yielded a statistically significant model, which included two significant
factors, OMS-HC and age, both of which were demographic factors. There were no significant flight experience factors.

Hierarchical analysis. As reported in Table 4.12 (Chapter 4), the hierarchical analysis yielded a statistically significant model. As determined by the stepwise analysis, the set that had the factors that contributed the greatest to explained variance in willingness to fly scores entered the model first. The set that had the factors that contributed the least entered the model last. The set entry order for the hierarchical regression analysis was Set C = OMS-HC followed by Set A = Demographics. Set B variables of flight experience were eliminated in the preliminary analysis and were not included in either the stepwise and hierarchical regression analyses.

At an alpha level of .05, a significant relationship was found with Set C = OMS-HC and Set A = Demographics. Within Set C, the OMS-HC was significant. Within Set A, the 40–49 age group was significant. The stepwise and the hierarchical regression analysis supported one another in set significance. The results of the two strategies lend support to the significance of the two identified factors.

Primary analysis 4. The final primary analysis, an ATI, was completed to determine the nature of (a) the interaction between the OMS-HC and the treatments and (b) the interactions between the targeted factors and willingness to fly in response to the fourth research question. The interaction between the OMS-HC scores and willingness to fly across the three treatments was discussed in the second
primary analysis section of this chapter, the second primary analysis section of Chapter 4, and Figure 4.1

As reported in Figure 4.2, the interaction between gender and the different experimental groups indicates that there was an ordinal interaction between the control group and both treatment groups. These results indicate that (a) females were more willing to fly with pilots who underwent psychological treatment than males, and (b) females were more willing to fly with pilots who were currently undergoing psychological treatment than males. Both males and females also were more willing to fly with pilots who underwent or were undergoing psychological treatment than with pilots who did not divulge their psychological issues and were attempting self-help treatment. The interaction effect was not significant, $F(2, 172) = 0.19, p = .83$, indicating that gender did not have a statistically greater effect in the first treatment scenario than in the second treatment scenario.

As reported in Figure 4.3, the interaction between age and the different experimental groups indicates: (a) there was an ordinal interaction between the control group and Treatment 1, (b) there was an ordinal interaction between the control group and Treatment 2, and (c) both treatment groups scored higher than the control group across all age groups.

In Treatment 2, there was no consistency in willingness to fly across the age groups. For example: (a) the 20–29 age group was more willing to fly with pilots undergoing psychological treatment than the 18–29 age group, (b) the 40–49 age
group was less willing to fly with pilots undergoing psychological treatment than the 30–39 and 50–59 age groups, (c) the 50–59 age group was less willing to fly with pilots undergoing psychological treatment than the 30–39 and 60 and older age groups, and (d) the age 60 and older age group was more willing to fly with pilots undergoing psychological treatment than all other age groups. The interaction effect was not significant, $F(8, 165) = 1.60, p = .13$, indicating that age did not have a statistically greater effect in the first treatment scenario than in the second treatment scenario.

As reported in Figure 4.4, the interaction between race/ethnicity and the different experimental groups indicates that there was an ordinal and insignificant interaction between the control group and those who are in both treatment groups. These results indicate that: (a) Caucasians were more willing to fly with pilots who underwent psychological treatment than non-Caucasians, (b) Caucasians were more willing to fly with pilots who were currently undergoing psychological treatment than non-Caucasians, and (c) both Caucasians and non-Caucasians were more willing to fly with pilots who underwent or were undergoing psychological treatment than with pilots who did not divulge their psychological issues and were attempting self-help treatment. For those participants in the control group, Caucasians were more willing to fly with pilots who did not divulge their psychological issues and were attempting self-help treatment than non-Caucasians. The interaction effect was not significant, $F(6, 167) = 1.08, p = .38$, indicating that ethnicity did not have a
statistically greater effect in the first treatment scenario than in the second treatment scenario.

The interaction between education and the different experimental groups indicates that there was an ordinal interaction between the control group and both treatment groups. Both Treatment 1 and Treatment 2 participants scored higher than the control group. There also was a disordinal interaction between Treatment 1 and Treatment 2 between participants who had a high school degree and those who had a 2-year degree. Participants in with a high school degree scored higher on the Willingness to Fly scale if they were in Treatment 2 than Treatment 1, but participants with a 2-year degree scored higher if they were in Treatment 1 than Treatment 2. There was an ordinal interaction between participants with a 2-year degree vs. a 4-year degree, but there was a disordinal interaction between participants with a 4-year degree vs. those with a graduate degree: Those with a 4-year degree scored higher on the willingness to fly scale if they were in Treatment 1 than Treatment 2, but those with graduate degree scored higher on the Willingness to fly scale if they were in Treatment 2 than Treatment 1.

As reported in Figure 4.6, the interaction between marital status and the different experimental groups indicates there was an insignificant ordinal interaction between the control group and both treatment groups. There also was no interaction between the two treatment groups: Participants in Treatment 2 consistently scored higher on the willingness to fly scale than those in Treatment 2 across both marital
status groups. Both treatment groups also scored higher on the willingness to fly scale than the control group. These results indicate that: (a) married participants were less willing to fly with pilots who underwent psychological treatment than participants who were not married, (b) married participants were less willing to fly with pilots who were currently undergoing psychological treatment than pilots who were not married, and (c) both married and unmarried participants were more willing to fly with pilots who underwent or were undergoing psychological treatment than with pilots who did not divulge their psychological issues and were attempting self-help treatment. For those participants in the control group, married participants were more willing to fly with pilots who did not divulge their psychological issues and pilots who were attempting self-help treatment than participants who were not married.

As reported in Figure 4.7, the interaction between flight rank and the different experimental groups indicate that there is an ordinal interaction between the control group and both treatment groups. Regardless of rank, participants were more willing to fly with pilots who underwent psychological treatment (Treatment 1) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control). Similarly, regardless of rank, participants were more willing to fly with pilots who were undergoing psychological treatment (Treatment 2) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control).
There also was a disordinal, yet insignificant, interaction between Treatment 2 and Treatment 1: captains in Treatment 2 had higher willingness to fly scores than first officers, but first officers had higher willingness to fly scores than captains in Treatment 1. The interaction effect was not significant, $F(4, 169) = 0.97, p = .43$, indicating that flight rank did not have a statistically greater effect in the first treatment scenario than in the second treatment scenario.

As reported in Figure 4.8, the interaction between the number of type ratings and the different experimental groups indicates that there was an ordinal interaction between Treatment 1 and Treatment 2: As the number of type ratings increased, participants were more willing to fly with pilots in Treatment 1 than pilots in Treatment 2. There also was an ordinal interaction between the control group and Treatment 1. Regardless of the number of ratings, participants were more willing to fly with pilots in Treatment 1 than pilots in the control group. There also was an insignificant disordinal interaction between the control group and Treatment 2. Participants with fewer type ratings were more willing to fly with pilots described in Treatment 2 than pilots in the control group, but as the number of ratings increased, participants were more willing to fly with pilots described in the control group than Treatment 2.

These results indicate that participants with fewer type ratings were more willing to fly with pilots who underwent psychological treatment than pilots with more type ratings. Participants with fewer type ratings also were more willing to fly
with pilots who were currently undergoing psychological treatment than pilots with more type ratings. Regardless of the number of type ratings, participants were more willing to fly with pilots who underwent or were undergoing psychological treatment than with pilots who did not divulge their psychological issues and were attempting self-help treatment.

The interaction effect was not significant, $F(2, 176) = 0.76, p = .47$, indicating that the number of type ratings a pilot possessed did have a statistically significant effect in willingness to fly across the different treatments. Additionally, the relationship between willingness to fly and the number of type ratings for pilots in either treatment group was negative.

As reported in Figure 4.9, the interaction between total flight hours and the different experimental groups indicates that there was an ordinal and insignificant interaction between both treatment groups and the control group. Regardless of the number of flight hours, participants were more willing to fly with pilots described in both treatment groups than pilots in the control group.

There also was a disordinal interaction between Treatment 1 and Treatment 2. Pilots whose flight time was fewer than 2000 hours were less willing to fly with pilots who underwent psychological treatment (Treatment 1) than pilots who were undergoing psychological treatment (Treatment 2). However, as flight time increased beyond 2000 hours, this was reversed: Participants with more than 2000 hours were more willing to fly with pilots described in Treatment 1 than pilots in Treatment 2.
The interaction effect was not significant, $F(2, 176) = 0.18, p = .84$, indicating that the total flight time a pilot possessed did have a statistically significant effect in willingness to fly across the different treatments. Additionally, the relationship between willingness to fly and total flight hours for pilots in Treatment 1 was positive, while the relationship between willingness to fly and total hours in Treatment 2 was negative.

As reported in Figure 4.10, the interaction between total PIC hours and the different experimental groups indicates that there was an ordinal interaction across the board. Regardless of the total number of PIC hours: (a) participants were more willing to fly with pilots who underwent psychological treatment (Treatment 1) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control), (b) participants were more willing to fly with pilots who were undergoing psychological treatment (Treatment 2) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control), and (c) participants were more willing to fly with pilots who underwent psychological treatment (Treatment 1) than pilots who were undergoing psychological treatment (Treatment 2). Additionally, the relationship between willingness to fly and PIC flight hours for pilots in either treatment group was negative.

As reported in Figure 4.11, the interaction of the total multi-crew hours and the different experimental groups indicates that there was an ordinal and insignificant interaction across the board. Regardless of the total multi-crew hours: (a) participants
were more willing to fly with pilots who underwent psychological treatment (Treatment 1) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control), (b) participants were more willing to fly with pilots who were undergoing psychological treatment (Treatment 2) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control), and (c) participants were more willing to fly with pilots who underwent psychological treatment (Treatment 1) than pilots who were undergoing psychological treatment (Treatment 2). Additionally, the relationship between willingness to fly and multi-crew flight hours for pilots in Treatment 1 was positive, while the relationship between willingness to fly and multi-crew hours in Treatment 2 was negative.

As reported in Figure 4.12, the interaction between the type of operation and the different experimental groups indicates that there was an ordinal interaction between Treatment 1 and the control group, and between Treatment 2 and the control group: Regardless of type of operation, participants were more willing to fly with pilots who either underwent psychological treatment (Treatment 1) or were undergoing psychological treatment (Treatment 2) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control). There also was a disordinal interaction between Treatment 1 and Treatment 2. The interaction effect was not significant, \( F(4, 167) = 2.21, p = .11 \), indicating that
operation did not have a statistically greater effect in the first treatment scenario than in the second treatment scenario.

As reported in Figure 4.13, the interaction between military flight experience and the experimental groups indicate there was an ordinal interaction between the two treatment groups and the control group. Regardless if participants had military experience or not, they were more willing to fly with pilots who either underwent psychological treatment (Treatment 1) or were undergoing psychological treatment (Treatment 2) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control). There also was a disordinal interaction between the treatments. Participants with no military experience were more willing to fly with pilots who underwent psychological treatment (Treatment 1) than pilots who were undergoing psychological treatment (Treatment 2). This relationship was reversed though for participants with military experience. They were more willing to fly with pilots who were undergoing psychological treatment (Treatment 2) than with pilots who underwent psychological treatment (Treatment 1). The interaction effect was not significant, $F(2, 172) = 1.02, p = .36$, indicating that military flight experience did not have a statistically greater effect in the first treatment scenario than in the second treatment scenario.

As reported in Figure 4.14, the interaction between social distance or intimacy pilots had and the different experimental groups indicates there was an ordinal, yet insignificant, interaction across the board. Regardless of participants’
social distance scores: (a) participants were more willing to fly with pilots who underwent psychological treatment (Treatment 1) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control), (b) participants were more willing to fly with pilots who were undergoing psychological treatment (Treatment 2) than pilots who did not divulge their psychological issues and were attempting self-help treatment (Control), and (c) participants were more willing to fly with pilots who underwent psychological treatment (Treatment 1) than pilots who were undergoing psychological treatment (Treatment 2). Additionally, the relationship between willingness to fly and social distance for pilots in either treatment group was positive. The relationship between willingness to fly and social distance for pilots in the self-help treatment (Control) group was negative.

Conclusions and Inferences

In this section, I will review the study’s findings with respect to each research question.

Research question 1: What effect does the different types of psychological treatment a pilot might undergo have on a flight deck crew’s willingness to fly?

As reported in Chapter 4, treatment had a significant relationship with scores on the Willingness to fly scale. The results of the regression analysis indicated the model was significant, \( R^2 = .11, F(2,179) = 11.14, p < .0001 \). This means that the relationship between treatment and willingness to fly is unlikely to be due to chance.
Nearly 11% of the variance in Willingness to Fly scores can be explained by the
treatment to which pilots were subjected. Both treatments had a significant
relationship with Willingness to Fly scores.

**Treatment 1.** The results indicate that pilots who were given the scenario
where another crewmember has been removed from flight duty and is returning to
duty after successfully completing treatment was significant, $B_1 = 4.81$, $t(183) =
4.38, p < .0001$. This means, compared to the control group, a pilot who was given
the first treatment scored 4.81 points higher on the Willingness to Fly scale. This was
significant at the alpha of .05 level. The sample was comprised of pilots who were
mostly ATP pilots with multi-crew hours, $N = 167$ or almost 93%. The significant
treatment indicates that career pilots are willing to fly with another crewmember who
has undergone psychological treatment and is returning to flight duty.

**Treatment 2.** The results indicate that pilots who were given the scenario
where another crewmember is concurrently receiving psychological treatment while
flying was significant, $B_2 = 3.86$, $t(183) = 3.56, p = .0009$. This means, compared to
the control group, a pilot who was given the second treatment scored 3.86 points
higher on the Willingness to Fly scale. The significant treatment indicates that pilots
are willing to fly with another flight crew who is undergoing psychological treatment
and is in an active flight duty position.

The inference that could be derived for the effect treatment has on
willingness to fly is that pilots view psychological treatment similarly as a physical
treatment. Pilots who need to go to a doctor for aid in a physical ailment are viewed as a people who are taking care of themselves. They may be viewed as responsible. A responsible person is someone who is dependable when crew coordination is required. A person seeking treatment for a psychological issue may be viewed from the same perspective. Pilots who do not seek medical treatment, psychological or physical, may be viewed as irresponsible and therefore not dependable if an emergency condition presents itself that would necessitate crew coordination.

**Research question 2: What effect do flight deck crews’ level of mental illness stigma and the closeness of the crew have on a flight deck crew’s willingness to fly across the different types of psychological treatment?** As noted in Chapter 4 (Table 4.10), the results of the ANCOVA model yielded a significant interaction. The dependent variable, willingness to fly, was regressed on the targeted sets of independent variables using the set entry order A-B-C, where Set A = OMS-HC scale, Set B = Treatment scenarios, and Set C = the interaction between the covariate, the OMS-HC, and the treatment groups.

When Willingness to Fly scores were regressed on the covariate, the contribution the OMS-HC made in explaining variance in willingness to fly scores was significant, $R^2 = .046$, $F(1,181) = 8.75, p = .0035$. The OMS-HC scale did extract a significant amount of variance from the Willingness to Fly scores. In fact, the explained variance in Willingness to Fly scores was over 4.5%.
When the treatments entered the model, the variance Set A and Set B made in explaining variance in willingness to fly scores was significant, $R^2 = .161$, $F(3,179) = 11.39$, $p < .0001$. The unique contribution Set B made in explaining variance in willingness to fly scores also was significant, $sR^2 = .115$, $F(3,179) = 12.18$, $p < .0001$. The treatments provided an 11.5% predictive gain in explained variance. Both treatments were significant.

When the interactions between the covariates and treatments entered the model, the contribution Set A, Set B, and Set C made in explaining variance in willingness to fly scores was significant, $R^2 = .191$, $F(5,177) = 8.31$, $p < .0001$. The interactions provided a 3% predictive gain over the model with the covariates and treatments in the Willingness to Fly scores, $sR^2 = .03$, $F(5,177) = 3.26$, $p = .0077$. Both treatments were significant as well as the interaction between the second treatment scenario and the OMS-HC. A significant effect at this stage of the ANCOVA indicates an invalid model.

The invalid ANCOVA model indicates there was a significant interaction. What was detected was an interaction that occurred between pilots’ mental illness stigma and a treatment scenario where a pilot is receiving psychological treatment and flying concurrently. A plausible explanation for this finding can be illustrated using the analogy of a pilot who is receiving medical care for a physical issue. Flight crews expect other pilots to be physically well before flying. It is difficult to perform flight duties while suffering through the effects of a broken arm. The same could also
be said of psychological health issues. Flight crew may expect other flight deck crewmembers to psychologically well before flight. When flight crew receive the help they need, whether that is physical medical help or psychiatric help, pilots were supportive of other flight crew.

**Research question 3: What is the relationship among a flight deck crew’s personal demographics, flight experiences, and level of mental illness stigma relative to a flight deck crew’s willingness to fly?** Starting with an examination from a stepwise perspective, a forward approach with a $p = .15$ to enter was used to determine the relationship of the targeted variables and willingness to fly. As reported in Chapter 4 (Table 4.11), the stepwise regression analysis yielded significant factors at $X_{22} = \text{OMS-HC}$ and $X_4 = 40–49$. The interaction is discussed in the following section, but to support the credibility of the stepwise analysis, this factor had a disordinal relationship with willingness to fly across the treatments with the interaction occurring in the factors, $X_{22} = \text{OMS-HC}$ and $X_4 = 40–49$.

The hierarchical regression analysis, as reported in Chapter 4 (Table 4.12), indicated a significant model with the same variables, $X_{22} = \text{OMS-HC}$ and $X_4 = 40–49$ as being significant. This similarity in results does add credibility to the models.

A plausible explanation for age being a significant variable in the model is the same reason Stickney et al.’s (2012) study identified age as an important variable in stigma. As a pilot ages, the amount of responsibility placed on and for our health becomes more internalized. People, as they age take more responsibility for their
health. The internal view of responsibility for our health can be externally placed on others that pilots work with. When compared to the results of the current study, the scores on the Willingness to Fly scale are higher in both treatment scenarios than the control group. The reason Willingness to Fly scores would be disordinal between the treatment scenarios may be the same as in preceding discussion on the second research question. Pilots may expect other flight deck crewmembers to be psychologically well before flight. An older pilot may, to a greater extent, expect other flight deck crewmembers to be physically and psychologically well before arriving at an airplane for the purpose of flight, whether or not treatment has been or is being provided.

**Research question 4:** What is the interaction between key factors of a flight deck crew (i.e., level of mental illness stigma, closeness of relationship, personal demographics, and flight experiences) across the different types of psychological treatment relative to a flight deck crew’s willingness to fly? To complete the analysis after the invalid ANCOVA model, and to answer the fourth research question, an ATI analysis was completed. The analysis attempts to find the answer to “what is best for whom.” The analysis indicated there was a disordinal interaction in the OMS-HC, gender, education, flight rank, number of type ratings, total flight hours a pilot has, type of flight operation a pilot is flying in, and military flight experience variables.
As reported in Chapter 4, of these interactions, only stigma was significant. The reason age was significant was discussed earlier in the third research question section. The reason stigma was significant can be found in prior research into stigma that was reviewed in Chapter 2 of this study.

Another plausible explanation for these result might be related to self-efficacy. Although no formal measure of self-efficacy was taken in the current study, it has been my professional experience as a pilot and flight instructor that pilots have an incredibly high amount of self-efficacy. One of the attributes a successful pilot possesses is an unqualified belief that no matter the circumstance, a successful outcome can and will be achieved. Someone only has to look as far as Captain Sullenberger to see this effect. This belief in one’s ability to affect a successful outcome may confound the significance of the relationship of the targeted variables to willingness to fly.

**Implications**

The results of the current study present implications for theory, prior research, and aviation practice. The results of the current study as they relate to theory, prior research, and aviation practices are presented in the following sections.

**Implications relative to theory.** The current study was based on the theoretical foundations of Link and Phelan’s (2001) conceptual model of stigma and Allport’s (1954) intergroup contact theory. A brief overview of each theory and the implication of the current study’s results follows.
**Link and Phelan’s model of stigma.** As presented in Chapter 2, Link and Phelan’s (2001) model consists of five parts: (a) labeling, (b) stereotyping, (c) separation, (d) status loss, and (e) discrimination. The role stigma has in the model is: (a) pilots seeking or undergoing psychological treatment are labeled as unfit, (b) pilots seeking or undergoing psychological treatment are stereotyped as mentally ill or dangerous, (c) pilots who are considered mentally ill or dangerous will be removed from flight duty because they compromise safety, (d) pilots who held the status of pilot will lose this status, and (e) pilots who have been treated or are being treated for mental illness will be barred from obtaining the status of pilot once again. Willingness to Fly’s role in the model is the measure of unfitness described in the first part of Link and Phelan’s (2001) model. A pilot’s view of another pilot’s fitness for flight duty was measured as a willingness to fly based on a psychological makeup described in the treatment scenarios.

The findings of the current study do not support Link and Phelan’s (2001) model. If the current study supported the model, the finding would suggest that the pilots in the control group would have scored higher on the Willingness to Fly scale. The opposite happened. Across all demographics and flight experiences, participants in the two treatments scored higher than the control group. Pilots participating in the current study did not castigate the pilots in the treatment scenarios, but rather, accepted the pilots from the treatment scenarios.
Allport’s intergroup contact theory. As presented in Chapter 2, Allport’s (1954) theory introduced the concept that contact and social distance will have a diminishing effect on discrimination exhibited towards a stigmatized group. Allport’s (1954) theory describes six criteria that must exist to reduce stigma: (a) is between members of different groups who are of equal status in the situation; (b) supports the realization of a common, valued goal; (c) involves members of higher status within the minority group; (d) is promoted by officials/the social climate; (e) is intimate and pleasurable and (f) occurs by choice. In the context of the current study, (a) was not met because there is a hierarchy within a flight deck, (b) was met because all crew want a successful flight, (c) was not met because I did not specify rank of the pilot in the treatment scenario, (d) was not met because there is very little support for psychological illness within the aviation regulating agencies or airlines, (e) may be met in some situations but was not specified in the treatment scenarios, and (f) was not met because pilots do not have the choice to choose with whom they will fly.

The findings of the current study do not support Allport’s (1954) intergroup contact theory. After running the analyses, there was a correlation coefficient of $r = .036$ between social distance and willingness to fly. The correlation coefficient for the relationship between social distance and stigma was even less, $r = .001$. There was a strong willingness to fly regardless of a pilot’s score on the Social Distance scale even though stigma had a significant effect on willingness to fly.
Implications relative to prior research. The current study was based on prior research including the stigma of psychological illness, self-stigma, structural stigma, social distance, and willingness to fly. The following is a discussion of the prior research, whether or not my study was consistent with the prior research, and plausible reasons for those differences.

Stigma of psychological illness. A review of the results from the current study indicates consistency with the results of Feldman and Crandall’s (2007) study. Feldman and Crandall endeavored to determine if a severe psychological illness had a greater stigmatizing effect than a subtle or common psychological illness. Feldman and Crandall reported that personal responsibility was the largest predictor of stigma. If a person believes that someone with a psychological illness is responsible for his/her illness, stigma is greatest.

As was noted earlier in this chapter, self-efficacy is high among pilots. Although self-efficacy was not measured in the current study, the influence self-efficacy has on the pilot population could be indirectly seen in the results. The results indicate that pilots were accepting of another crewmember who was undergoing or had undergone psychological treatment. They were not as accepting of a pilot who was self-treating.

Feldman and Crandall (2007) also had findings relative to dangerousness. The concept of dangerousness may be considered a measure of social distance. If a person is perceived to be dangerous, it is reasonable to expect distance to be placed
between an individual and the danger. In the current study, there was no relationship between social distance and willingness to fly. This would imply that the participants in the study did not view the pilot in the treatments scenarios as dangerous. Thus, higher scores on the Willingness to Fly scale were observed in the groups that were given the treatment scenarios versus the control group.

**Self-stigma.** A review of the results from the current study indicate that the results do not support the results from Corrigan and Rüsch (2011). Corrigan and Rüsch tried to determine if there was a greater effect on self-stigma by applying a stereotype rather than just being aware of a stereotype. They hypothesized that the application of a stereotype would be responsible for the self-stigma associated with psychological illness. Thus, their study focused on the attitude a person has toward a stigmatized characteristic.

Applying the Corrigan and Rüsch (2011) study to the current study, when pilots are aware of the stigma of psychological treatment, their attitudes towards psychological treatment will be negative. The opposite was found in the results of the current study. Pilots were not negative towards the pilot in the treatment scenarios. They were more willing to fly, or accepting of the pilot undergoing psychological treatment.

A plausible explanation for this discrepancy in findings is the dynamics associated with a flight deck crew. As indicated throughout this dissertation, a flight deck consists of a tightly knit crew, or team, which spends hours engaged in a
professional activity that involves the lives of their passengers as well as themselves. This team also undergoes extensive crew resource management (CRM) training, which espouses a collectivist mindset. This close-knit relationship often carries over into the crew’s personal lives as well. Thus, it is not surprising that participants did not have a negative reaction to pilots who underwent or were currently undergoing psychological treatment.

Link et al.’s (1997) study support the position that the devaluing and discrimination that occurs as a result of disclosing a psychological issue will lead to more psychological stress in the afflicted. Psychological issues cause a pilot to seek treatment. Disclosure of the treatment causes stress due to discrimination. The discrimination causes more stress that exacerbates the psychological issue. The results of the current study indicate that pilots do not have to conceal psychological treatment. Treatment, and revealing a treatment makes a pilot more accepted among flight crew. Thus, the results of this study do not support the findings in Link et al. (1997). A plausible explanation for this inconsistency in results also can be attributed to the uniqueness of the population, namely, airline pilots. As indicated above, the team approach of the flight deck is unique and perhaps has only one parallel, the healthcare industry, which also deals with human lives. Thus, although discrimination related to a psychological issue might be expected in other domains, it is not surprising that such discrimination was not found in the current study due to the elite nature and training of airline pilots.
**Structural stigma.** A review of the results from the current study indicate that the results do not support the results from Link and Phelan (2014). Link and Phelan described three generic goals for the use of stigma, keeping people down, keeping people in, and keeping people away, and examined the relationship between power and stigma, which represents the fourth and fifth components of the conceptual model of stigma. To avoid the stigma, a person would define the boundaries for what passes as normal and stay within those boundaries to appear normal. In these cases, secrecy and withdrawal are the preferred coping mechanisms if it is determined that staying in the boundaries of normal could not be achieved.

Applying the Link and Phelan (2014) study to the current study, when a pilot is aware of the attitude of psychological treatment from other flight crew, the pilot will adapt a behavior that will be inside the norms defined by the flight crew. If the treatment for psychological illness is determined to be outside of norms because of stigma towards psychological treatment, a pilot may employ secrecy and withdrawal. The opposite response from pilot participants was found in the current study. Pilots were not negative towards the pilot in the treatment scenarios. They were more willing to fly, or accepting of the pilot undergoing psychological treatment.

The results from the third question from the OMS-HC, “If I were under treatment for a mental illness I would not disclose this to any of my colleagues,” was $M = 4.22$. This indicates that most pilots in the sample would not reveal their psychological treatment to a colleague. There is a disconnect between what Link and
Phelan (2014) describe, Question 3 results, and the results from the willingness to fly scores in this study. A confounding variable must exist to explain this discrepancy. Although not measured in the current study, structural stigma in the form of regulation from the regulating agency, the FAA, may be a confounding variable that could explain the discrepancy.

Social distance. As the relationship a person has with someone suffering from mental illness increases (i.e., becomes closer or more intimate), the level of stigma is reduced. A review of the results from the current study indicate that the results do not support the results from Link and Phelan (2004). Link and Phelan examined the perception that people with psychological illness are more dangerous than a person without a psychological illness. They defined the construct of perceived threat and threat by measuring responses based on personal contact and impersonal contact. They also reported there was no positive correlation between contact, personal and impersonal, and perceived threat. However, the more time spent with an afflicted person, the perception of danger decreased.

In the current study, social distance also did not play a role in the perceived threat, as measured in willingness to fly. From this perspective, the current study supports the results from Link and Phelan (2004). Link and Phelan reported that 59% of respondents thought, “it’s only natural to be afraid of a person who is mentally ill” (p. 72). Yet, in the current study, pilots were more willing to fly with a pilot undergoing psychological treatment. This willingness to fly does not support the
results from Link and Phelan that it is natural to be afraid of a person with a psychological illness. Once again, a plausible explanation for this discrepancy is grounded in the group/team dynamics associated with airline pilots.

Blundell et al. (2016) examined the effect of contact in the general population on people with intellectual disabilities. Their study indicated that contact explained much of the variance in social distance, which provides support to intergroup contact theory. In the current study, social distance did not have a significant relationship with the Willingness to Fly scores. The current study does not support Blundell et al.’s study. As noted earlier, this could be because of the focus of the study was on airline pilots, which is a unique and elite group of individuals when compared to other professions.

Demographics. A review of the results from the current study indicate that the results supported some of the research on the effects demographics have on stigma. According to Stickney et al. (2012), attribution theory relates to a person’s belief about what factors can be attributed to an event in their life. By identifying attribution as an appropriate theory in which they grounded their study, Stickney et al. explored the relationship gender and ethnicity had in mental illness stigma. Stickney et al. found that all the factors in the study were statistically significant regarding their effect on stigma including gender, ethnicity, and age.

Corrigan and Watson (2007) also assessed the extent to which demographic factors influence mental illness stigma as well as substance abuse disorders.
Grounding their study in attribution theory, Corrigan and Watson targeted gender, ethnicity, and education. All three demographics were statistically significant in their study.

The current study found an interaction between willingness to fly and one demographic variable, age. Gender did not have a significant effect on willingness to fly and neither did ethnicity. The current study supports some of the prior research with respect to age. A plausible explanation for this partial inconsistency is that approximately two thirds of the sample (116 of 180) was male and nearly 90% of the sample (160 of 180) was Caucasian. Thus, the somewhat homogenous nature of the sample relative to these two demographic factors could have impacted the findings.

Lauber et al. (2004) also examined factors that could contribute to social distance. They targeted gender, age, and contact to a person with mental illness. Lauber et al. reported that all three variables had a significant relationship with social distance. In the current study, there was very little, and no significant, relationship with social distance. The current study does not support the prior research of Lauber et al. Once again, this could be because of the nature of the sample with respect to personal demographics as well as the nature of the population (professional airline pilots).

Willingness to fly. A review of the results from the current study indicate that the results do not support the findings of Kraemer et al. (2015). Kraemer et al. examined consumers’ willingness to fly on a flight with a pilot who was taking
prescribed antidepressants compared to a pilot who was not. Kraemer et al. reported that taking medications led to a significant reduction in willingness to fly. The opposite occurred in the current study. Pilots were more willing to fly with someone who was undergoing or had undergone psychological treatment. A plausible explanation for this inconsistency is the focus of the two studies. The current study focused on pilots’ willingness to fly with their colleagues who underwent or were undergoing psychological treatment whereas Kraemer et al. focused on consumers’ willingness to fly. It is one thing to render an opinion about someone you do not know and have had zero personal contact with compared to someone you do know and with whom you have undergone the same training and experiences.

**Implications relative to aviation practice.** The main implication of the study’s results to practice is related to the stigma of psychological treatment: preconceived stigma does not relate to a flight deck crew’s willingness to fly with a pilot who has undergone or is undergoing psychological treatment. Flight deck crews responded in a positive, supportive, and significant way to a pilot who underwent or is undergoing psychological treatment. If a flight deck crew has a welcoming and positive attitude towards other pilots who underwent or are undergoing psychological treatments, then a pilots’ self-image as hardened, unemotional professionals is unwarranted. The idea that pilots must withhold their involvement in psychological treatment from fellow pilots is unnecessary.
The concept of dangerousness may be considered as a measure of social distance. If a person is perceived to be dangerous, it is reasonable to expect distance to be placed between an individual and the danger. Another implication of the current study is the idea of a pilot who either underwent or is undergoing psychological treatment is dangerous. The was no statistical significance in social distance and willingness to fly. It would be presumed that if a pilot were dangerous, then a flight deck crew would be unwilling to fly with that pilot. The opposite was true, however. A flight deck crew was more willing to fly with a pilot undergoing or who underwent psychological treatment than a pilot who was self-treating or concealing self-treatment for these same psychological problems.

Findings from Link et al.’s (1997) study support the position that the devaluing and discrimination that occurs as a result of disclosing a psychological issue will lead to more psychological stress in the afflicted. Pilots who are experiencing psychological issues do not divulge their psychological illness for fear of incriminating themselves to the FAA and their flight deck crew. The current study shows that pilots should not hide their issues or the treatment of their issues. Instead of learning how to cope to pass themselves off as “normal” to avoid stigmatization by their flight deck crew and increasing their psychological stress, pilots would be advised to divulge their treatment as it would speed up the acceptance by their respective flight deck crew and aid them in their overall psychological health.
Generalizability, Limitations, and Delimitations

**Generalizability.** Generalizability refers to the external validity of a study. Generalizability is the extent to which conclusion made in a study can be extended to the larger population (population generalizability), or different situations (ecological generalizability). With respect to the former, the results of the study with respect to gender might be generalized to the target population because female pilots were well represented in the sample. In fact, females were over-represented in the current study compared to the target population. If this had been known before the study began, a focus on differences in willingness to fly, social distance, and psychological health based on gender differences could have been examined. With respect to the license a pilot holds, the sample was not representative as nearly all pilots in the current study were ATPs.

It also is difficult to determine the extent to which the sample is representative of the target population because the FAA does not collect or report information on marital status, education, total flight hours, multi-crew flight hours, PIC flight hours, military flight experience, flight rank, or number of type ratings. Given that most of the sample came from Spirit Airlines pilots, the results of the current study are limited to this airline’s pilots. Finally, although some of the pilot participants were from airlinepilotforums.com and flightlevel350.com and this aided in overall generalizability of the current study, the number of pilots who responded
from these websites was unmeasurable. So the impact of these website towards generalizability is unknown.

As reported in Table 3.1 and Table 3.5 in Chapter 3, 92% of pilots were ATP rated and 77% flew in Part 121 operations. As a result, the ecological external validity is restricted to ATPs who fly Part 121 operations. Furthermore, as noted earlier, nearly 90% of the sample was Caucasian, thus the results of the study are restricted to Caucasian airline pilots.

**Study Limitations and delimitations.** To make it easier for the reader, the current study’s limitations and the delimitations are replicated here from Chapter 1. This replication also serves as a transition to the final section of the chapter, recommendations for future research relative to these limitations and delimitations.

**Limitations.** Limitations of a study are conditions, events, or circumstances beyond the control of the researcher. These limitations affect the generalizability of a study. Though it is not possible to avoid all limitations, they must be acknowledged. The reader is advised to consider any conclusions or inferences from the study’s results with respect to these limitations. The limitations of the current study are as follows.

1. **Sample size.** I did not have any control over the sample size because the participants volunteered for the study. Thus, a similar study with a higher or lower response rate might get different results.
2. Sample demographics. I did not have any control over the personal demographics and flight experiences of the study participants and therefore the volunteer sample was not representative of the parent population. If a similar study is conducted with different demographics/experiences, then the results might be different.

3. Authenticity of pilots’ responses. It is conceivable that pilots might have been reluctant to acknowledge their “true” beliefs or attitudes when responding to the items on the stigma and willingness to fly scales, and inaccurate responses from pilots limited the inferences and conclusions that were drawn from the study results. Although safeguards were incorporated into the manner in which the data were collected to ensure confidentiality and anonymity, it is still possible that participants did not respond to the items truthfully.

4. Type and source of study. The current study was a non-funded Ph.D. dissertation research study. Therefore, if a similar study were to be conducted that had the support of a funding agency such as the FAA or a pilot group association such as ALPA, where the sample could be larger, then the results might be different.

Delimitations. Delimitations are conditions, events, or circumstances that a researcher imposes on a study to make the study feasible to implement. These delimitations further limit the generalizability of the study. The reader is advised to consider any conclusions or inferences from the study’s results with respect to these delimitations. The delimitations associated with the current study are outlined below.
1. *Data collection instruments*. The current study employed five data collection instruments packaged into a single, multi-section instrument. The first section consisted of the researcher-modified version of Modgill et al.’s (2014) OMS-HC, which was used to measure level of mental illness stigma. The second section consisted of the researcher-modified version of Katz and Foley’s (1974) Social Distance scale, which was used to measure the closeness of relationship. The third section consisted of the researcher-developed psychological treatment vignettes that provided participants with a stress–related scenario and three different psychological treatments. The fourth section consisted of the researcher-modified version of Rice et al.’s (2015) Willingness to Fly scale. The fifth section consisted of a researcher-prepared background questionnaire for participants to self-report their personal demographics and flight experiences. Thus, similar studies that use different instruments might not get the same results.

2. *Sampling sources*. The Spirit Airlines ALPA was used as the primary source of volunteers who made up the sample. I anticipated this to be the case because I am a member of ALPA and requested ALPA’s support. Secondary sources included two pilot forums, airlinepilotforums.com and flightlevel350.com. As a result, similar studies that use different sampling sources might get different results.

3. *Study design*. Several different research designs were incorporated into the current study. These included a between groups true experimental design, an ANCOVA design, an explanatory correlation design, and an ATI. Therefore,
replication studies that use a different experimental design (e.g., quasiexperimental or repeated measures) or use mediation analyses instead of ANCOVA might get different results.

4. **Flight deck crew.** The current study limited the location of flight deck crews to the U.S. and will restrict participation to civilian multi-crew flight deck crewmembers. Thus, similar studies that include participants from outside the U.S. and Canada, or include military flight deck crews and single pilot flight deck crewmembers might get different results.

5. **Data collection strategy.** Data were collected electronically by making the data collection instrument accessible via the web-hosting site, SurveyMonkey. As a result, similar studies that use a different data collection strategy might get different results.

6. **Study period.** The current study’s data collection period was between May 1, 2017 and August 13, 2017. As a result, similar studies conducted during a different time period, or for a longer or shorter time period, might get different results.

7. **Preexisting experiences with psychological health issues.** The current study did not collect any data that captured participants’ previous experiences dealing with psychological health and/or mental illness issues. Thus, it is possible that the results could be a function of preexisting experiences participants brought to the current study and not due to any of the study protocols. As a result, if similar
studies are conducted that capture this information, it is possible that the results will be different.

**Recommendations for Future Research and Practice**

**Recommendations for research relative to study limitations.**

1. Sample size of the current study was $N = 208$. This sample was based on pilots who volunteered to participate. Of the 208 pilots who responded to the online questionnaire, 184 completed it. A minimum sample of $N = 159$ was needed to obtain the required power. Although the minimum sample size was obtained, a larger random sample size would be beneficial for increased power and population representation. A recommendation for future research would be to (a) use a longer data collection window, (b) offer an incentive for participation, and (c) engage in a purposeful sampling strategy at corporate aviation departments, fixed base operators with multi-crew aircraft operations, and airline training centers.

2. The current study’s sample consisted of pilots with multi-crew flight experience. The current study was comprised of mostly Caucasian, ATP rated pilots who had an average of 7,122 hours of flight experience. A recommendation for future research is to replicate the study using the same methods and instrumentation, but with a sample that is more representative of the pilot population. For example, the study could target corporate flight centers and fixed base operators to provide a more representative population of ATPs, commercial pilots, and private pilots.
with multi-crew flight experience. A larger, random sample size would yield a more representative sample.

3. The authenticity of pilots’ responses to the questionnaire in the current study was not measured and therefore could not be substantiated. A recommendation for future research is to develop methods that further strengthen the genuineness and truthfulness of pilots’ responses.

4. The current study was a non-funded Ph.D. dissertation research study. The current study did not benefit from any funding, internally from Florida Institute of Technology or externally from any source. A recommendation for future research would be to partner with the FAA, an independent pilot advocacy group, or an aviation research institute to expand the scope of the study.

Recommendations for research relative to study delimitations.

1. The current study employed four data collection instruments packaged into a single, multi-section questionnaire. The first section consisted of the researcher-modified version of Modgill et al.’s (2014) OMS-HC. The second section consisted of the researcher-modified version of Katz and Foley’s (1974) Social Distance scale. The third instrument consisted of the researcher-modified version of Rice et al.’s (2015) Willingness to Fly scale. The fourth instrument consisted of a set of researcher-prepared background items for participants to self-report their personal demographics and flight experiences. The Social Distance scale and the Willingness to Fly scale both had a high reliability coefficients. The
subscales of the OMS-HC did not meet the high reliability coefficient suggested by Cohen et al. (2003). Overall the OMS-HC did meet Cohen et al.’s standard, and the scale was reported as reliable. A recommendation for future research would be to have a larger sample. A larger sample would aid in strengthening the reliability coefficients found in this study.

2. The current study’s sample consisted of mostly Spirit Airlines ALPA pilots. Therefore, a recommendation for future research would be to replicate the study with a broader target population.

3. The current study incorporated several different research methodologies including an intervention (between groups true experimental design), an ANCOVA, an explanatory correlational design, and an ATI design. A recommendation for future research is to replicate the study by positing a hypothetical model generated from the results of the current study and testing this model using structural equation modeling (SEM).

4. The current study’s focus on Spirit Airlines ALPA flight crew does not lend itself to generalizability. Therefore, a recommendation for future research is to replicate the current study with focus on broadening the target population.

5. The current study collected data electronically from volunteers. Therefore, a recommendation for future research is to conduct a study using a different sampling strategy. An example would be to collect data via personal interviews or randomly selecting participants from a cooperating airline. Results could be
compared to the results from the current study to determine authenticity of pilot responses.

6. The current study was implemented in May of 2017 and ended in August of 2017. A sample taken at a different time may yield different results. Therefore, a recommendation for future research is to make the questionnaire available at a different time of year and for a longer period of time.

7. The current study did not collect any data that sought to capture participants’ previous experiences dealing with psychological health and/or mental illness issues. Thus, it is possible that the results could be a function of preexisting experiences participants brought to the current study and not due to any of the study protocols. Therefore, a recommendation for future research is to conduct a study that is designed to measure a participant’s past experience with psychological health issues so the variable can be treated as a covariate and removed as a confounding variable in willingness to fly. One suggestion is to incorporate Goldberg and Williams’ (1988) General Health Questionnaire (GHQ).

**Recommendations for future research relative to implications.**

The following is a set of recommendations for future research relative to theory and prior research.

1. In regards to Link and Phelan’s (2001) model of stigma, one of the reasons for the inconsistency between the model and the current study was because the
current study did not assess the role self-efficacy and locus of control play in willingness to fly. As was noted earlier in this chapter, self-efficacy is high among pilots and this could influence a pilot’s decision to fly with someone else who is undergoing or has undergone psychological treatment. This also corresponds to Feldman and Crandall’s (2007) study on personal responsibility. Therefore, a recommendation for future research is to measure pilots’ self-efficacy and locus of control to determine the extent to which these constructs relate to willingness to fly among pilots.

2. In regards to Link and Phelan’s (2008) and Feldman and Crandall’s (2007) study about the description of stigma and prejudice, dangerousness does not relate to willingness to fly. Regardless of mental illness stigma, a pilot did not correlate that stigma with a sense of dangerousness. To understand the effect stigma has on a pilot’s decision to divulge psychological treatment to an flight crew, structural stigma must be examined closer. Stigma and prejudice are related and Link and Phelan concluded that stigma and prejudice are nearly identical constructs. The current study did not address the role structural stigma has on willingness to fly. A recommendation for future research is to determine the role structural stigma has in willingness to fly among flight crew.

3. Corrigan and Rüschi (2011) and Link et al., (1997) advanced that prejudice is agreeing with a negative stereotype. In the current study, the pilots’ psychological health makeup was not collected. The effect of self-stigma and its
effect on willingness to fly was not measured. A recommendation for future research is to measure stigma from a perspective of individuals suffering with a stigmatized psychological health issue to determine the effect self-stigma has on willingness to fly.

4. In regards to Link and Phelan (2014), the current study did not address the role structural stigma has on willingness to fly. A recommendation for future research is to determine the role structural stigma has on the stigma of psychological treatment and the effect it has on willingness to fly among flight crew.

5. In regards to Allport’s (1954) theory of intergroup contact theory, regardless of mental illness stigma, a pilot did not correlate that stigma with social distance. The same correlation occurs with Link and Phelan’s (2004) and Blundell et al.’s (2016) studies. As stated earlier in this chapter, a pilots’ previous experience with someone with mental health issues was not measured. The effect those experiences had on willingness to fly were therefore not measured. It is recommended for future research to examine participants’ past contact with people with psychological health issues and willingness to fly.

6. With regards to Corrigan and Watson’s (2007), Lauber et al.’s (2004), and Stickney et al.’s (2012) respective studies, the current study found age as a significant factor. This may be because an older group has a higher level of self-efficacy. Therefore, a continued recommendation is to replicate the current study
with a measure for self-efficacy to determine the relationship between self-efficacy, age, and willingness to fly.

**Recommendations for practice relative to implications.**

The following is a set of recommendations for practice that corresponds to the study’s implications.

1. Applying the Corrigan and Rüsch (2011) study to the current study, when pilots are aware of the stigma of psychological treatment, their attitudes towards psychological treatment should have been negative. The opposite was found in the results of the current study. Pilots were not negative towards the pilot in the treatment scenarios. They were more willing to fly, or accept the pilot undergoing psychological treatment. Pilots should be encouraged to report their psychological health without fear of incriminating themselves. This will aid in the well-being of pilots and lead to a safer environment for pilots.

2. The results of the current study do not support the Link and Phelan (2001) model of stigma. The current study does support the recommendations from Link and Phelan’s (1997) study that the stress incurred as a result of not disclosing a psychological issue will increase the psychological distress of those that have a stigmatized condition. Pilots should be encouraged to report their psychological health without fear of incriminating themselves. This will aid in the well-being of pilots and lead to a safer environment for pilots.
3. The FAA continues to foster an environment whereby stigma is allowed to continue and even propagate. The results of the current study are inconsistent with the Link and Phelan (2008) inference, yet the more restrictive FAA policy continues. A pilot with a medical issue is grounded by the FAA until that pilot is healthy again. If a pilot suffers from a psychological illness, receives treatment, and then returns to flight duty, the FAA usually has restrictions on the pilot in the form of additional medical certification, provided the FAA decides to allow the pilot to return to flight duty at all (FAA, 2017). The results of the current study indicate that flight crews are willing to fly with pilots who have undergone or are undergoing psychological treatment. The FAA should revisit the policy position of encouraging pilots who are suffering from psychological health issues to reveal their conditions instead of concealing the conditions.

4. Female pilots were more willing to fly (Figure 4.2) with pilots who underwent or were undergoing psychological treatment and were returning to duty than male pilots. Therefore, with respect to concern for psychological issues, airlines need to be encouraged to hire female pilots.

5. Level of education has relatively little bearing on willingness to fly relative to Treatments 1 and 2 (Figure 4.5). Therefore, with respect to concern for psychological issues, airlines do not need to invest funding support to increase the level of education of their pilots.
6. Based on the interaction results between number of type ratings and treatment (Figure 4.8), it appears that as the number of ratings increased, willingness to fly scores decreased across both treatment scenarios. Therefore, airlines should not be too concerned about hiring pilots with multiple ratings relative to psychological health matters.

7. Based on the interaction results between total flight hours and treatment (Figure 4.9), it appears that as the amount of total flight hours increased, willingness to fly scores increased in Treatment 1 and decreased in treatment 2. Therefore, airlines should try to pair pilots with a high amount of total flight time with flight crew returning from leave for mental treatment and pair lower time pilots with flight crew who are currently undergoing mental treatment.

8. Based on the interaction results between PIC flight hours and treatment (Figure 4.10), it appears that as the amount of total flight hours increased, willingness to fly scores decreased in both treatment scenarios. Therefore, airlines should try to hire pilots with low amounts of PIC flight time relative to mental health matters.

9. Based on the interaction results between multi-crew flight hours and treatment (Figure 4.11), it appears that as the amount of multi-crew flight hours increased, willingness to fly scores increased in Treatment 1 and decreased in treatment 2. Therefore, airlines should try to pair pilots with a high amount of multi-crew flight time with flight crew returning from leave for mental treatment and pair
lower multi-crew time pilots with flight crew who are currently undergoing psychological treatment.

10. Given the results of the interaction between military flight experience and treatment (Figure 4.13), pilots with no military experience were more willing to fly with pilots who underwent psychological treatment and were returning to duty than with pilots who were currently undergoing psychological treatment. This relationship was reversed, though, for pilots with military experience. As a result, an airline should try to assign a flight deck crew that consists of pilots with no military experience to work with pilots who are returning to duty after psychological treatment, and assign a flight deck crew that consists of pilots with military experience to work with pilots who are currently undergoing psychological treatment.
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https://www.faa.gov/data_research/aviation_data_statistics/civil_airmen_statistics/

https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/standards/


Rice, S., & Winter, S. R. (2015). Pilots who are perceived as unsociable are perceived as more likely to have a mental illness: An affective perspective. *Aviation Psychology and Applied Human Factors, 5*(1), 36-44.


Appendix A

Tables
Table 3.1

Summary of Target Population Demographics

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Sample&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Population&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>64</td>
<td>35.6%</td>
</tr>
<tr>
<td>Male</td>
<td>116</td>
<td>65.4%</td>
</tr>
<tr>
<td>Overall</td>
<td>180</td>
<td>100%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–20</td>
<td>1</td>
<td>0.6%</td>
</tr>
<tr>
<td>21–29</td>
<td>31</td>
<td>17.1%</td>
</tr>
<tr>
<td>30–39</td>
<td>73</td>
<td>40.3%</td>
</tr>
<tr>
<td>40–49</td>
<td>52</td>
<td>28.7%</td>
</tr>
<tr>
<td>50–59</td>
<td>17</td>
<td>9.4%</td>
</tr>
<tr>
<td>60 or older</td>
<td>7</td>
<td>3.9%</td>
</tr>
<tr>
<td>Overall</td>
<td>181</td>
<td>100%</td>
</tr>
<tr>
<td>Pilot License</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATP</td>
<td>167</td>
<td>92.3%</td>
</tr>
<tr>
<td>Commercial Pilot</td>
<td>12</td>
<td>6.6%</td>
</tr>
<tr>
<td>Private Pilot</td>
<td>2</td>
<td>1.1%</td>
</tr>
<tr>
<td>Overall</td>
<td>181</td>
<td>100%</td>
</tr>
</tbody>
</table>

Note. N = 184.

<sup>a</sup>Not every pilot reported gender, age, and pilot license. <sup>b</sup>Includes pilots with an airplane and/or a helicopter and/or a glider and/or a gyroplane certificate. Prior to 1995, these pilots were categorized as private, commercial, or airline transport, based on their airplane certificate. In 1995 and after, they are categorized based on their highest certificate. For example, if a pilot holds a private airplane certificate and a commercial helicopter certificate, prior 1995, the pilot would be categorized as private; 1995 and after as commercial.
Table 3.2
Summary of Participants’ Race/Ethnicity and Marital Status by Gender and Overall

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Caucasian</th>
<th>Not Caucasian</th>
<th>Marital Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>N</td>
<td>%</td>
<td>M</td>
</tr>
<tr>
<td>Female</td>
<td>64</td>
<td>58</td>
<td>32.2%</td>
<td>6</td>
</tr>
<tr>
<td>Male</td>
<td>116</td>
<td>102</td>
<td>56.7%</td>
<td>14</td>
</tr>
<tr>
<td>Overall</td>
<td>180</td>
<td>160</td>
<td>88.9%</td>
<td>20</td>
</tr>
</tbody>
</table>

Note. N = 184.

aFour participants did not report their gender. bThis factor initially consisted of African American (n = 3), Asian American (n = 3), Hispanic (n = 9), Native American (n = 2), and Other (n = 3). Because of the small sample sizes, race/ethnicity was partitioned into the two categories of Caucasian and not Caucasian. cM = Married and NM = Not Married, which includes Single (n = 52), Divorced (n = 7), Widowed (n = 2), Separated (n = 2), and Other (n = 7). dOverall percentages are relative to a base of 180.
Table 3.3

*Summary of Participants’ Education Level by Gender*

<table>
<thead>
<tr>
<th>Education Levela</th>
<th>High Schoolb</th>
<th>2-Year</th>
<th>4-Year</th>
<th>Graduatec</th>
<th>Overalld</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>N</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Female</td>
<td>64</td>
<td>8</td>
<td>40.0%</td>
<td>3</td>
<td>21.4%</td>
</tr>
<tr>
<td>Male</td>
<td>116</td>
<td>12</td>
<td>60.0%</td>
<td>11</td>
<td>78.6%</td>
</tr>
<tr>
<td>Overalld</td>
<td>180</td>
<td>20</td>
<td>11.1%</td>
<td>14</td>
<td>7.8%</td>
</tr>
</tbody>
</table>

*Note.* N = 184.

aThree participants did not report their education level. bHigh school = high school and some college but no degree. cGraduate = master’s and doctoral degrees. dOverall percentages are relative to a base of 180.
Table 3.4
Summary of Participants’ Flight Experience

<table>
<thead>
<tr>
<th>Factor</th>
<th>N</th>
<th>M</th>
<th>Mdn</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Type Ratings</td>
<td>179</td>
<td>2.9</td>
<td>3</td>
<td>1.7</td>
<td>1–9</td>
</tr>
<tr>
<td>Total Flight Hours</td>
<td>180</td>
<td>7224.4</td>
<td>6050.0</td>
<td>4814.5</td>
<td>4–23000</td>
</tr>
<tr>
<td>PIC Hours</td>
<td>180</td>
<td>3612.3</td>
<td>2500</td>
<td>3261.2</td>
<td>0–17000</td>
</tr>
<tr>
<td>Multi-Crew Hours</td>
<td>180</td>
<td>5490.8</td>
<td>5000</td>
<td>4522.6</td>
<td>0–20500</td>
</tr>
</tbody>
</table>

Note. N = 184.

a N = Number of participants who responded to the respective item.
Table 3.5
Summary of Participants’ Flight Operation by Flight Rank

<table>
<thead>
<tr>
<th>Group</th>
<th>Part 121</th>
<th>Part 135</th>
<th>Part 91</th>
<th>Military</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Captain</td>
<td>85</td>
<td>59</td>
<td>69.4%</td>
<td>14</td>
</tr>
<tr>
<td>First Officer</td>
<td>82</td>
<td>75</td>
<td>91.4%</td>
<td>4</td>
</tr>
<tr>
<td>Otherb</td>
<td>13</td>
<td>4</td>
<td>30.8%</td>
<td>0</td>
</tr>
<tr>
<td>Overallc</td>
<td>180</td>
<td>138</td>
<td>76.7%</td>
<td>28</td>
</tr>
</tbody>
</table>

Note. N = 184.

aFour participants did not report their Flight Rank. bOther includes CFI (n = 5), retired captain (n = 1), student pilot (n = 1), private pilot (n = 1), previous captain (n = 1), military captain (n = 1), military (n = 2), and no rank (n = 1). cOverall percentages are relative to a base of 180.
### Table 3.6

*Power Analysis and Calculated Powers for $\alpha = .05$*

<table>
<thead>
<tr>
<th>Model</th>
<th>Actual Value</th>
<th>Actual ES</th>
<th>Number of Predictors ($k$)</th>
<th>Approx. Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Overall Model)$^a$</td>
<td>$R^2 = .268$</td>
<td>.23</td>
<td>24</td>
<td>.98</td>
</tr>
<tr>
<td>Set A = Demographics$^b$</td>
<td>$sR^2 = .078$</td>
<td>.11</td>
<td>10</td>
<td>.86</td>
</tr>
<tr>
<td>Set B = Flight Experiences$^c$</td>
<td>$sR^2 = .052$</td>
<td>.07</td>
<td>10</td>
<td>.66</td>
</tr>
<tr>
<td>Set C = Affective Domain$^d$</td>
<td>$sR^2 = .037$</td>
<td>.05</td>
<td>2</td>
<td>.78</td>
</tr>
</tbody>
</table>

*Note. $N = 184$. The overall model consisted of 24 predictors that included two predictors, Treatment 1 and Treatment 2, which were not included in a functional set.*

*The overall model consisted of 15 independent variables that were partitioned in three functional sets A, B, and C. $^a$Set A= Demographics consisted of Gender, Marital status (Divorced vs. Married), Age (18-29, 30-39, 40-49, 50-59, and 60 and older), Race/Ethnicity (Other vs. White/Caucasian), Education (high school, 2-year, 4-year, and Graduate). $^b$Flight Experience consisted of Flight Rank (Captain vs. First officer), License (Private, Commercial, and ATP), Number of type ratings, Total flight hours, PIC hours, Multi-crew hours, Current flight operation (Part 91, Part 121, and Part 135), and Military flight experience. $^c$Affective domain consisted of the OMS-HC scores and Social Distance scores.*
Table 3.7  
*Instrument Reliability Information*

<table>
<thead>
<tr>
<th>Instrument</th>
<th>$N$</th>
<th>$M$</th>
<th>$SD$</th>
<th>Current Study Reliability Coefficient</th>
<th>Reported Reliability Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>OMS-HC&lt;sup&gt;a&lt;/sup&gt;</td>
<td>184</td>
<td>40.15</td>
<td>7.62</td>
<td>.68</td>
<td>.79</td>
</tr>
<tr>
<td>Combined</td>
<td>184</td>
<td>40.15</td>
<td>7.62</td>
<td>.68</td>
<td>.79</td>
</tr>
<tr>
<td>Attitude</td>
<td>184</td>
<td>14.37</td>
<td>3.47</td>
<td>.45</td>
<td>.68</td>
</tr>
<tr>
<td>Disclosure</td>
<td>184</td>
<td>13.79</td>
<td>3.28</td>
<td>.52</td>
<td>.67</td>
</tr>
<tr>
<td>Social Distance</td>
<td>184</td>
<td>11.99</td>
<td>3.97</td>
<td>.69</td>
<td>.68</td>
</tr>
<tr>
<td>Social Distance scale&lt;sup&gt;b&lt;/sup&gt;</td>
<td>184</td>
<td>31.73</td>
<td>9.91</td>
<td>.68</td>
<td>.97</td>
</tr>
<tr>
<td>Willingness to Fly scale&lt;sup&gt;c&lt;/sup&gt;</td>
<td>184</td>
<td>3.09</td>
<td>6.38</td>
<td>.95</td>
<td>.72</td>
</tr>
</tbody>
</table>

*Note.* Current study alphas are relative to the current study’s data whereas the reported alphas reflect what was reported in the literature for the respective instrument.

<sup>a</sup>Stigma was measured using the researcher-modified version of Modgill et al.’s (2014) OMS-HC, which was designed to measure stigmatizing attitudes in the health care profession. The OMS-HC consists of 15 statements measured on a Likert-type scale ranging from Strongly Disagree (1) to Strongly Agree (5). Scores could range from 15 to 75 with higher scores indicating a more negative attitude toward mental health, or in the context of the study, a higher level of mental illness stigma. Overall scores ranged from 23 to 61, thus the midrange was $(23 + 61) / 2 = 42$. The reliability coefficient was reported as a Cronbach’s alpha.<br>

<sup>b</sup>Social distance was measured using a researcher-modified version of the scale developed by Katz and Foley (1974), which is a modified version of Bogardus’ scale. Participants are asked to assess how personal or impersonal they believe each statement describes based on a continuum ranging from 1 to 9, where 1 represents extremely high degree of personal interaction or closeness and 9 represents Extremely high impersonal interaction and no closeness. Thus, higher scores reflect greater social distance and the less willingness to engage in social contact so scores could range from 9 to 81. Overall scores ranged from 12 to 81, thus the midrange was $(81 + 12) / 2 = 46.5$. Although a Cronbach’s alpha was not reported, based on a factor analysis the authors confirmed that the instrument was unidimensional, and they reported a split-half reliability coefficient of .97. In the current study, the reliability coefficient is reported as a split half reliability coefficient.<br>

<sup>c</sup>The Willingness to Fly scale consists of seven statements and uses a Likert-type scale ranging from Strongly Disagree (-2) to Strongly Agree (+2) with a choice of neutral (0). Thus, higher scores reflect a greater willingness to fly. Overall scores ranged from -14 to 14, thus the midrange was $(-14 + 14) / 2 = 0$. The reliability coefficient was reported as a Cronbach’s alpha.
<table>
<thead>
<tr>
<th>Sets/Variables</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Set A = Demographics</strong></td>
<td></td>
</tr>
<tr>
<td>$X_1 = \text{Gender}$</td>
<td>$X_1$ was categorical and represented two levels of gender, which was dummy coded with males as the reference group.</td>
</tr>
<tr>
<td>$X_2, X_3, X_4, X_5 = \text{Age}$</td>
<td>$X_2, X_3, X_4, \text{ and } X_5$ were categorical and represented five levels of pilot license, which was dummy coded with 60 and older as the reference group, and $X_2, X_3, X_4, \text{ and } X_5$ are representing 18-29, 30-39, 40-49, and 50-59, respectively.</td>
</tr>
<tr>
<td>$X_6 = \text{Race/Ethnicity}$</td>
<td>$X_6$ was categorical and represented two levels of race/ethnicity, which was dummy coded with Caucasian as the reference group and $X_6$ representing non-Caucasian.</td>
</tr>
<tr>
<td>$X_7, X_8, X_9 = \text{Education level}$</td>
<td>$X_7, X_8, \text{ and } X_9$ were categorical and represented four levels of education, which was dummy coded with graduate degree as the reference group, and $X_7, X_8, \text{ and } X_9$ representing high school, 2-year, 4-year degrees, respectively.</td>
</tr>
<tr>
<td>$X_{10} = \text{Marital status}$</td>
<td>$X_{10}$ was categorical and represented two levels of marital status, which was dummy coded with not married as the reference group and $X_{10}$ representing married pilots.</td>
</tr>
<tr>
<td><strong>Set B = Flight Experiences</strong></td>
<td></td>
</tr>
<tr>
<td>$X_{11} = \text{Flight rank}$</td>
<td>$X_{11}$ was categorical and represented two levels of flight rank, which was dummy coded with first officer as the reference group and $X_{11}$ representing captains.</td>
</tr>
<tr>
<td>$X_{12}, X_{13} = \text{Pilot license}$</td>
<td>$X_{12}$ and $X_{13}$ were categorical and represented three levels of pilot license, which was dummy coded with private pilot license as the reference group, and $X_{12}$ and $X_{13}$ representing commercial pilot license and ATP rating, respectively.</td>
</tr>
<tr>
<td>$X_{14} = \text{Number of ratings}$</td>
<td>$X_{14}$ was continuous.</td>
</tr>
<tr>
<td>$X_{15} = \text{Total flight hours}$</td>
<td>$X_{15}$ was continuous and was measured in hours.</td>
</tr>
<tr>
<td>$X_{16} = \text{Flight hours as PIC}$</td>
<td>$X_{16}$ was continuous and was measured in hours.</td>
</tr>
<tr>
<td>$X_{17} = \text{Multi-crew flight hours}$</td>
<td>$X_{17}$ was continuous and was measured in hours.</td>
</tr>
<tr>
<td>$X_{18}, X_{19} = \text{Current flight operation}$</td>
<td>$X_{18}$ and $X_{19}$ were categorical and represented three levels of flight operations, which was dummy coded with Part 91 flight operations as the reference group, and $X_{18}$ and $X_{19}$ representing Part 135 air charter and Part 121 airline operations, respectively.</td>
</tr>
<tr>
<td>$X_{20} = \text{Military flight experience}$</td>
<td>$X_{20}$ was categorical and represented two levels of military flight experience, which was dummy coded with no military experience as the reference group and $X_{20}$ representing pilots with military flight experience.</td>
</tr>
</tbody>
</table>
Table 3.8 (Continued)
Summary and Description of Independent and Dependent Variables

<table>
<thead>
<tr>
<th>Sets/Variables</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Set C = Affective Domain</strong></td>
<td></td>
</tr>
<tr>
<td>$X_{21} = \text{Social distance scale scores}$</td>
<td>$X_{21}$ was continuous and represented scores on the researcher-modified version of Katz and Foley’s (1974) Social Distance scale.</td>
</tr>
<tr>
<td>$X_{22} = \text{OMS-HC scores (Stigma)}$</td>
<td>$X_{22}$ was continuous and represented scores on Modgill et al.’s (2014) OMS-HC.</td>
</tr>
<tr>
<td><strong>Set D = Dependent Variable</strong></td>
<td></td>
</tr>
<tr>
<td>$Y = \text{Willingness to fly scores}$</td>
<td>Set E was a single-variable set that is continuous and represented scores on the researcher-modified version of Rice et al.’s (2015) Willingness to Fly scale.</td>
</tr>
</tbody>
</table>
Table 4.1
Summary of Pilots’ Scores by Gender, Age, and Overall

<table>
<thead>
<tr>
<th>Demographic</th>
<th>N</th>
<th>OMS-HC</th>
<th>Social Distance</th>
<th>Willingness to Fly</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>64</td>
<td>38.99</td>
<td>7.71</td>
<td>31.28</td>
</tr>
<tr>
<td>Male</td>
<td>116</td>
<td>40.70</td>
<td>7.65</td>
<td>32.38</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–29</td>
<td>32</td>
<td>38.53</td>
<td>6.50</td>
<td>28.93</td>
</tr>
<tr>
<td>30–39</td>
<td>73</td>
<td>40.01</td>
<td>7.92</td>
<td>32.47</td>
</tr>
<tr>
<td>40–49</td>
<td>52</td>
<td>40.44</td>
<td>8.24</td>
<td>32.81</td>
</tr>
<tr>
<td>50–59</td>
<td>17</td>
<td>41.41</td>
<td>6.97</td>
<td>31.82</td>
</tr>
<tr>
<td>60 or older</td>
<td>7</td>
<td>41.43</td>
<td>8.30</td>
<td>35.57</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td>184</td>
<td>39.77</td>
<td>7.67</td>
<td>31.94</td>
</tr>
</tbody>
</table>

Note. \( N = 184 \). Three participants did not report their age. Four participants did not report their gender.

\( ^a \)Stigma was measured using the researcher-modified version of Modgill et al.’s (2014) OMS-HC, which was designed to measure stigmatizing attitudes in the health care profession. The OMS-HC consists of 15 statements measured on a Likert-type scale ranging from Strongly Disagree (1) to Strongly Agree (5). Scores could range from 15 to 75 with higher scores indicating a more negative attitude toward mental health, or in the context of the study, a higher level of mental illness stigma. Overall scores ranged from 23 to 61, thus the midrange was \((23 + 61) / 2 = 42\).

\( ^b \)Social distance was measured using a researcher-modified version of the scale developed by Katz and Foley (1974), which is a modified version of Bogardus’ scale. Participants are asked to assess how personal or impersonal they believe each statement describes based on a continuum ranging from 1 to 9, where 1 represents extremely high degree of personal interaction or closeness and 9 represents Extremely high impersonal interaction and no closeness. Thus, higher scores reflect greater social distance and the less willingness to engage in social contact so scores could range from 9 to 81. Overall scores ranged from 12 to 81, thus the midrange was \((81 + 12) / 2 = 46.5\). Although a Cronbach’s alpha was not reported, based on a factor analysis the authors confirmed that the instrument was unidimensional, and they reported a split-half reliability coefficient of .97.

\( ^c \)The Willingness to Fly scale consists of seven statements and uses a Likert-type scale ranging from Strongly Disagree (-2) to Strongly Agree (+2) with a choice of neutral (0). Thus, higher scores reflect a greater willingness to fly. Overall scores ranged from -14 to 14, thus the midrange was \((-14 + 14) / 2 = 0\).
Table 4.2
Summary of Pilots’ Scores by Education, Marital Status, and Overall

<table>
<thead>
<tr>
<th>Demographic</th>
<th>N</th>
<th>OMS-HC(^a)</th>
<th>Social Distance(^b)</th>
<th>Willingness to Fly(^c)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School</td>
<td>20</td>
<td>39.40</td>
<td>7.96</td>
<td>34.69</td>
</tr>
<tr>
<td>2-year</td>
<td>14</td>
<td>38.93</td>
<td>7.88</td>
<td>36.00</td>
</tr>
<tr>
<td>4-year</td>
<td>117</td>
<td>39.73</td>
<td>7.86</td>
<td>31.00</td>
</tr>
<tr>
<td>Graduate</td>
<td>30</td>
<td>42.33</td>
<td>6.53</td>
<td>32.22</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>118</td>
<td>39.98</td>
<td>7.58</td>
<td>31.33</td>
</tr>
<tr>
<td>Not-Married</td>
<td>63</td>
<td>40.21</td>
<td>7.92</td>
<td>33.25</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td>184</td>
<td>39.77</td>
<td>7.67</td>
<td>31.94</td>
</tr>
</tbody>
</table>

Note. \(N = 184\). Three participants did not report their education level. Four participants did not report their marital status.

\(^a\)Stigma was measured using the researcher-modified version of Modgill et al.’s (2014) OMS-HC, which was designed to measure stigmatizing attitudes in the health care profession. The OMS-HC consists of 15 statements measured on a Likert-type scale ranging from Strongly Disagree (1) to Strongly Agree (5). Scores could range from 15 to 75 with higher scores indicating a more negative attitude toward mental health, or in the context of the study, a higher level of mental illness stigma. Overall scores ranged from 23 to 61, thus the midrange was \((23 + 61) / 2 = 42\).

\(^b\)Social distance was measured using a researcher-modified version of the scale developed by Katz and Foley (1974), which is a modified version of Bogardus’ scale. Participants are asked to assess how personal or impersonal they believe each statement describes based on a continuum ranging from 1 to 9, where 1 represents extremely high degree of personal interaction or closeness and 9 represents Extremely high impersonal interaction and no closeness. Thus, higher scores reflect greater social distance and the less willingness to engage in social contact so scores could range from 9 to 81. Overall scores ranged from 12 to 81, thus the midrange was \((81 + 12) / 2 = 46.5\). Although a Cronbach’s alpha was not reported, based on a factor analysis the authors confirmed that the instrument was unidimensional, and they reported a split-half reliability coefficient of .97. \(^c\)The Willingness to Fly scale consists of seven statements and uses a Likert-type scale ranging from Strongly Disagree (-2) to Strongly Agree (+2) with a choice of neutral (0). Thus, higher scores reflect a greater willingness to fly. Overall scores ranged from -14 to 14, thus the midrange was \((-14 + 14) / 2 = 0\).
<table>
<thead>
<tr>
<th>Flight Experience</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flight Rank</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Captain</td>
<td>85</td>
<td>39.87</td>
<td>8.03</td>
<td>31.98</td>
<td>10.07</td>
<td>2.55</td>
<td>5.49</td>
</tr>
<tr>
<td>First Officer</td>
<td>82</td>
<td>39.82</td>
<td>7.26</td>
<td>32.74</td>
<td>10.88</td>
<td>3.99</td>
<td>7.39</td>
</tr>
<tr>
<td>Other</td>
<td>13</td>
<td>42.62</td>
<td>8.22</td>
<td>28.68</td>
<td>9.41</td>
<td>1.92</td>
<td>5.39</td>
</tr>
<tr>
<td>License</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>2</td>
<td>40.00</td>
<td>5.66</td>
<td>20.0</td>
<td>0.0</td>
<td>4.5</td>
<td>2.12</td>
</tr>
<tr>
<td>Commercial</td>
<td>12</td>
<td>39.75</td>
<td>8.27</td>
<td>31.32</td>
<td>6.99</td>
<td>1.33</td>
<td>6.18</td>
</tr>
<tr>
<td>ATP</td>
<td>167</td>
<td>40.08</td>
<td>7.69</td>
<td>32.19</td>
<td>10.63</td>
<td>3.25</td>
<td>6.47</td>
</tr>
<tr>
<td>Overall</td>
<td>184</td>
<td>39.77</td>
<td>7.67</td>
<td>31.94</td>
<td>10.40</td>
<td>3.09</td>
<td>6.40</td>
</tr>
</tbody>
</table>

Note. N = 184. Four participants did not report their flight rank. Three participants did not report their current pilot license.

*a Stigma was measured using the researcher-modified version of Modgill et al.’s (2014) OMS-HC, which was designed to measure stigmatizing attitudes in the health care profession. The OMS-HC consists of 15 statements measured on a Likert-type scale ranging from Strongly Disagree (1) to Strongly Agree (5). Scores could range from 15 to 75 with higher scores indicating a more negative attitude toward mental health, or in the context of the study, a higher level of mental illness stigma. Overall scores ranged from 23 to 61, thus the midrange was (23 + 61) / 2 = 42. *b Social distance was measured using a researcher-modified version of the scale developed by Katz and Foley (1974), which is a modified version of Bogardus’ scale. Participants are asked to assess how personal or impersonal they believe each statement describes based on a continuum ranging from 1 to 9, where 1 represents extremely high degree of personal interaction or closeness and 9 represents Extremely high impersonal interaction and no closeness. Thus, higher scores reflect greater social distance and the less willingness to engage in social contact so scores could range from 9 to 81. Overall scores ranged from 12 to 81, thus the midrange was (81 + 12) / 2 = 46.5. Although a Cronbach’s alpha was not reported, based on a factor analysis the authors confirmed that the instrument was unidimensional, and they reported a split-half reliability coefficient of .97. *c The Willingness to Fly scale consists of seven statements and uses a Likert-type scale ranging from Strongly Disagree (-2) to Strongly Agree (+2) with a choice of neutral (0). Thus, higher scores reflect a greater willingness to fly. Overall scores ranged from -14 to 14, thus the midrange was (-14 + 14) / 2 = 0. *d Other includes CFI (n = 5), retired captain (n = 1), student pilot (n = 1), private pilot (n = 1), previous captain (n = 1), military captain (n = 1), military (n = 2), and no rank (n = 1).
**Table 4.4**  
*Summary of Pilots’ Scores by Operation and Overall*

<table>
<thead>
<tr>
<th>Flight Operation</th>
<th>N</th>
<th>OMS-HC&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Social Distance&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Willingness to Fly&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td><strong>Civilian</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part 91</td>
<td>21</td>
<td>41.67</td>
<td>6.23</td>
<td>30.87</td>
</tr>
<tr>
<td>Part 121</td>
<td>139</td>
<td>40.19</td>
<td>7.97</td>
<td>32.16</td>
</tr>
<tr>
<td>Part 135</td>
<td>18</td>
<td>37.44</td>
<td>7.01</td>
<td>31.78</td>
</tr>
<tr>
<td><strong>Military</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Military</td>
<td>27</td>
<td>41.78</td>
<td>6.01</td>
<td>32.38</td>
</tr>
<tr>
<td>No Military</td>
<td>153</td>
<td>39.70</td>
<td>7.96</td>
<td>31.70</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td>184</td>
<td>39.77</td>
<td>7.67</td>
<td>31.94</td>
</tr>
</tbody>
</table>

Note. *N* = 184. Four participants did not respond to the flight operation item. Four participants did not respond to the military experience item.

<sup>a</sup>Stigma was measured using the researcher-modified version of Modgill et al.’s (2014) OMS-HC, which was designed to measure stigmatizing attitudes in the health care profession. The OMS-HC consists of 15 statements measured on a Likert-type scale ranging from Strongly Disagree (1) to Strongly Agree (5). Scores could range from 15 to 75 with higher scores indicating a more negative attitude toward mental health, or in the context of the study, a higher level of mental illness stigma. Overall scores ranged from 23 to 61, thus the midrange was (23 + 61) / 2 = 42.  
<sup>b</sup>Social distance was measured using a researcher-modified version of the scale developed by Katz and Foley (1974), which is a modified version of Bogardus’ scale. Participants are asked to assess how personal or impersonal they believe each statement describes based on a continuum ranging from 1 to 9, where 1 represents extremely high degree of personal interaction or closeness and 9 represents Extremely high impersonal interaction and no closeness. Thus, higher scores reflect greater social distance and the less willingness to engage in social contact so scores could range from 9 to 81. Overall scores ranged from 12 to 81, thus the midrange was (81 + 12) / 2 = 46.5. Although a Cronbach’s alpha was not reported, based on a factor analysis the authors confirmed that the instrument was unidimensional, and they reported a split-half reliability coefficient of .97.  
<sup>c</sup>The Willingness to Fly scale consists of seven statements and uses a Likert-type scale ranging from Strongly Disagree (-2) to Strongly Agree (+2) with a choice of neutral (0). Thus, higher scores reflect a greater willingness to fly. Overall scores ranged from -14 to 14, thus the midrange was (-14 + 14) / 2 = 0.
Table 4.5  
**Item Analysis of the Opening Minds Scale for Health Care workers (OMS-HC)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Statement</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>MH1</td>
<td>I am more comfortable helping a person who has a physical illness than I am helping a person who has a mental illness. (A)</td>
<td>3.19</td>
<td>1.20</td>
</tr>
<tr>
<td>MH2a</td>
<td>If a colleague with whom I work told me they had a managed mental illness, I would be just as willing to work with him/her. (SD)</td>
<td>2.43</td>
<td>1.18</td>
</tr>
<tr>
<td>MH3</td>
<td>If I were under treatment for a mental illness I would not disclose this to any of my colleagues. (D)</td>
<td>4.22</td>
<td>0.99</td>
</tr>
<tr>
<td>MH4</td>
<td>I would see myself as weak if I had a mental illness and could not fix it myself. (D)</td>
<td>2.80</td>
<td>1.43</td>
</tr>
<tr>
<td>MH5</td>
<td>I would be reluctant to seek help if I had a mental illness. (D)</td>
<td>3.04</td>
<td>1.44</td>
</tr>
<tr>
<td>MH6a</td>
<td>Employers should hire a person with a managed mental illness if he/she is the best person for the job. (SD)</td>
<td>2.29</td>
<td>1.16</td>
</tr>
<tr>
<td>MH7a</td>
<td>I would still go to a physician if I knew that the physician had been treated for a mental illness. (SD)</td>
<td>2.70</td>
<td>1.17</td>
</tr>
<tr>
<td>MH8a</td>
<td>If I had a mental illness, I would tell my friends. (D)</td>
<td>3.67</td>
<td>1.28</td>
</tr>
<tr>
<td>MH9</td>
<td>Despite my professional beliefs, I have negative reactions towards people who have mental illness. (A)</td>
<td>2.94</td>
<td>1.41</td>
</tr>
<tr>
<td>MH10</td>
<td>There is little I can do to help people with mental illness. (A)</td>
<td>2.33</td>
<td>1.27</td>
</tr>
<tr>
<td>MH11</td>
<td>More than half of people with mental illness don’t try hard enough to get better. (A)</td>
<td>2.15</td>
<td>1.09</td>
</tr>
<tr>
<td>MH12</td>
<td>I would not want a person with a mental illness, even if it were appropriately managed, to work with children. (SD)</td>
<td>2.26</td>
<td>1.29</td>
</tr>
<tr>
<td>MH13</td>
<td>Healthcare providers do not need to be advocates for people with mental illness. (A)</td>
<td>1.83</td>
<td>0.84</td>
</tr>
<tr>
<td>MH14a</td>
<td>I would not mind if a person with a mental illness lived next door to me. (SD)</td>
<td>2.27</td>
<td>1.05</td>
</tr>
<tr>
<td>MH15</td>
<td>I struggle to feel compassion for a person with mental illness. (A)</td>
<td>1.72</td>
<td>0.86</td>
</tr>
</tbody>
</table>

**Note.** N = 184. Stigma was measured using the researcher-modified version of Modgill et al.’s (2014) OMS-HC, which was designed to measure stigmatizing attitudes in the health care profession. The OMS-HC consists of 15 statements measured on a Likert-type scale ranging from Strongly Disagree (1) to Strongly Agree (5). Item scores could range from 1 to 5 with higher scores indicating a more negative attitude toward mental health, or in the context of the study, a higher level of mental illness stigma. See also Table 3.6.  
*aReverse scored.*
Table 4.6

*Item Analysis of the Social Distance Scale*

<table>
<thead>
<tr>
<th>Item</th>
<th>Statement</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD1</td>
<td>To perform a service for a member of my flight crew as part of my job.</td>
<td>5.02</td>
<td>2.36</td>
</tr>
<tr>
<td>SD2</td>
<td>To do business with a member of my flight crew.</td>
<td>4.48</td>
<td>2.29</td>
</tr>
<tr>
<td>SD3</td>
<td>To accept a member of my flight crew as my supervisor.</td>
<td>5.47</td>
<td>2.53</td>
</tr>
<tr>
<td>SD4</td>
<td>To attend a sports activity with a member of my flight crew.</td>
<td>3.62</td>
<td>1.91</td>
</tr>
<tr>
<td>SD5</td>
<td>To have my children be close friends with the children of a member of my flight crew.</td>
<td>2.55</td>
<td>1.86</td>
</tr>
<tr>
<td>SD6</td>
<td>To have my daughter date the son of a member of my flight crew.</td>
<td>2.37</td>
<td>2.04</td>
</tr>
<tr>
<td>SD7</td>
<td>To accept a member of my flight crew as a roommate.</td>
<td>2.76</td>
<td>1.96</td>
</tr>
<tr>
<td>SD8</td>
<td>To invite a member of my flight crew to my home for Thanksgiving dinner.</td>
<td>2.72</td>
<td>1.77</td>
</tr>
<tr>
<td>SD9</td>
<td>To openly converse and disclose my personal feelings to a member of my flight crew.</td>
<td>2.74</td>
<td>1.88</td>
</tr>
</tbody>
</table>

Note. N = 184. Social distance was measured using a researcher-modified version of the scale developed by Katz and Foley (1974), which is a modified version of Bogardus’ scale. Participants are asked to assess how personal or impersonal they believe each statement describes based on a continuum ranging from 1 to 9, where 1 represents extremely high degree of personal interaction or closeness and 9 represents Extremely high impersonal interaction and no closeness. Thus, higher scores reflect greater social distance and the less willingness to engage in social contact so scores could range from 9 to 81. Overall scores ranged from 12 to 81, thus the midrange was \((81 + 12) / 2 = 46.5\).
### Table 4.7

*Item Analysis of the Willingness to Fly Scale*

<table>
<thead>
<tr>
<th>Item</th>
<th>Statement</th>
<th>$M$</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>WF1</td>
<td>I would be <em>willing</em> to fly with this pilot.</td>
<td>0.99</td>
<td>0.89</td>
</tr>
<tr>
<td>WF2</td>
<td>I would be <em>comfortable</em> flying with this pilot.</td>
<td>0.55</td>
<td>1.00</td>
</tr>
<tr>
<td>WF3</td>
<td>I would have <em>no problem</em> flying with this pilot.</td>
<td>0.44</td>
<td>1.12</td>
</tr>
<tr>
<td>WF4</td>
<td>I would be <em>happy</em> to fly with this pilot.</td>
<td>0.19</td>
<td>0.99</td>
</tr>
<tr>
<td>WF5</td>
<td>I would <em>feel safe</em> flying with this pilot.</td>
<td>0.40</td>
<td>1.03</td>
</tr>
<tr>
<td>WF6</td>
<td>I have <em>no fear</em> of flying with this pilot.</td>
<td>0.23</td>
<td>1.13</td>
</tr>
<tr>
<td>WF7</td>
<td>I feel <em>confident</em> flying with this pilot.</td>
<td>0.29</td>
<td>1.13</td>
</tr>
</tbody>
</table>

*Note. N = 184. The Willingness to Fly scale consists of seven statements and uses a Likert-type scale ranging from Strongly Disagree (-2) to Strongly Agree (+2) with a choice of neutral (0). Thus, higher scores reflect a greater willingness to fly. Overall scores ranged from -14 to 14, thus the midrange was $(-14 + 14) / 2 = 0.$*
<table>
<thead>
<tr>
<th>IV&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Variable Type</th>
<th>Coding Strategy</th>
<th>N Missing</th>
<th>%</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>X&lt;sub&gt;1&lt;/sub&gt;</td>
<td>Nominal</td>
<td>Dummy</td>
<td>4</td>
<td>2.2%</td>
<td>Plugged w/mean (M = 0.356)</td>
</tr>
<tr>
<td>X&lt;sub&gt;2&lt;/sub&gt;, X&lt;sub&gt;3&lt;/sub&gt;, X&lt;sub&gt;4&lt;/sub&gt;, X&lt;sub&gt;5&lt;/sub&gt;</td>
<td>Nominal</td>
<td>Dummy</td>
<td>3</td>
<td>1.7%</td>
<td>Recoded with age 60 and older as the reference group</td>
</tr>
<tr>
<td>X&lt;sub&gt;6&lt;/sub&gt;</td>
<td>Nominal</td>
<td>Dummy</td>
<td>3</td>
<td>1.7%</td>
<td>Recoded with Caucasian as the reference group</td>
</tr>
<tr>
<td>X&lt;sub&gt;7&lt;/sub&gt;, X&lt;sub&gt;8&lt;/sub&gt;, X&lt;sub&gt;9&lt;/sub&gt;</td>
<td>Nominal</td>
<td>Dummy</td>
<td>3</td>
<td>1.7%</td>
<td>Recoded with graduate as the reference group</td>
</tr>
<tr>
<td>X&lt;sub&gt;10&lt;/sub&gt;</td>
<td>Nominal</td>
<td>Dummy</td>
<td>3</td>
<td>1.7%</td>
<td>Plugged w/mean (M = 0.652)</td>
</tr>
<tr>
<td>X&lt;sub&gt;11&lt;/sub&gt;</td>
<td>Nominal</td>
<td>Dummy</td>
<td>4</td>
<td>2.2%</td>
<td>Plugged w/mean (M = 0.514)</td>
</tr>
<tr>
<td>X&lt;sub&gt;12&lt;/sub&gt;, X&lt;sub&gt;13&lt;/sub&gt;</td>
<td>Nominal</td>
<td>Dummy</td>
<td>3</td>
<td>1.7%</td>
<td>Recoded with Private Pilot as the reference group</td>
</tr>
<tr>
<td>X&lt;sub&gt;14&lt;/sub&gt;</td>
<td>Continuous</td>
<td></td>
<td>5</td>
<td>2.8%</td>
<td>Plugged w/mean (M = 2.92)</td>
</tr>
<tr>
<td>X&lt;sub&gt;15&lt;/sub&gt;</td>
<td>Continuous</td>
<td></td>
<td>4</td>
<td>2.2%</td>
<td>Plugged w/mean (M = 7224.43)</td>
</tr>
<tr>
<td>X&lt;sub&gt;16&lt;/sub&gt;</td>
<td>Continuous</td>
<td></td>
<td>4</td>
<td>2.2%</td>
<td>Plugged w/mean (M = 3612.34)</td>
</tr>
<tr>
<td>X&lt;sub&gt;17&lt;/sub&gt;</td>
<td>Continuous</td>
<td></td>
<td>4</td>
<td>2.2%</td>
<td>Plugged w/mean (M = 5490.77)</td>
</tr>
<tr>
<td>X&lt;sub&gt;18&lt;/sub&gt;, X&lt;sub&gt;19&lt;/sub&gt;</td>
<td>Nominal</td>
<td>Dummy</td>
<td>6</td>
<td>3.4%</td>
<td>Recoded with Part 91 operations as the reference group</td>
</tr>
<tr>
<td>X&lt;sub&gt;20&lt;/sub&gt;</td>
<td>Nominal</td>
<td>Dummy</td>
<td>4</td>
<td>2.2%</td>
<td>Plugged w/mean (M = 0.14)</td>
</tr>
<tr>
<td>X&lt;sub&gt;21&lt;/sub&gt;</td>
<td>Continuous</td>
<td></td>
<td>60</td>
<td>3.6%</td>
<td>Plugged w/mean per question</td>
</tr>
<tr>
<td>Y</td>
<td>Continuous</td>
<td></td>
<td>24</td>
<td>11.5%</td>
<td>Eliminated cases</td>
</tr>
</tbody>
</table>

Note. One participant did not respond to any question on the survey. 23 participants did not respond to anything after the first scale, the OMS-HC scale. The Social Distance scale, Willingness to Fly scale, demographics, and flight experience factors were left blank. These cases were eliminated from the data set. N decreased from 208 to 184 total participants. X<sub>1</sub> = Gender; X<sub>2</sub>, X<sub>3</sub>, X<sub>4</sub>, X<sub>5</sub> = Age; X<sub>6</sub> = Race/Ethnicity; X<sub>7</sub>, X<sub>8</sub>, X<sub>9</sub> = Education level; X<sub>10</sub> = Marital status; X<sub>11</sub> = Flight rank; X<sub>12</sub>, X<sub>13</sub> = Pilot license; X<sub>14</sub> = Number of ratings; X<sub>15</sub> = Total flight hours; X<sub>16</sub> = Flight hours as PIC; X<sub>17</sub> = Multi-crew flight hours; X<sub>18</sub>, X<sub>19</sub> = Current flight operation; X<sub>20</sub> = Military Flight Experience; X<sub>21</sub> = Social distance scale scores; and Y = Dependent measure, willingness to fly. See also Table 3.8. Not applicable is blank.
<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>$B_i$</th>
<th>$SE$</th>
<th>$t(181)$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.29</td>
<td>0.75</td>
<td>0.39</td>
<td>.6986</td>
</tr>
<tr>
<td>$T_1$</td>
<td>4.81</td>
<td>1.10</td>
<td>4.38</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td>$T_2$</td>
<td>3.86</td>
<td>1.08</td>
<td>3.56</td>
<td>.0005</td>
</tr>
</tbody>
</table>

Note. $N = 184$, Overall $R^2 = .11$, $F(2, 183) = 10.99$, $p < .0001$.

*p < .05. **p < .01. ***p < .001.
### Table 4.10

**Summary of Hierarchical Multiple Regression of Analysis of Covariance**

<table>
<thead>
<tr>
<th></th>
<th>Model 1 $B^a$</th>
<th>Model 2 $B^b$</th>
<th>Model 3 $^c$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>10.22</td>
<td>7.78**</td>
<td>2.15</td>
</tr>
<tr>
<td>$X_{22} =$ OMS-HC Scale</td>
<td>-0.17**</td>
<td>-0.18**</td>
<td>-0.04</td>
</tr>
<tr>
<td>$T_1 =$ Treatment 1</td>
<td>4.79***</td>
<td>11.06*</td>
<td>[0.02, 22.10]</td>
</tr>
<tr>
<td>$T_2 =$ Treatment 2</td>
<td>3.81***</td>
<td>16.92**</td>
<td>[6.55, 27.28]</td>
</tr>
<tr>
<td>Interaction $T_1X_{22}$</td>
<td>-0.16</td>
<td></td>
<td>[-0.42, 0.11]</td>
</tr>
<tr>
<td>Interaction $T_2X_{22}$</td>
<td>-0.33*</td>
<td></td>
<td>[-0.59, -0.07]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Statistical Results</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$R^2$</td>
<td>.046</td>
<td>.161</td>
<td>.191</td>
</tr>
<tr>
<td>$F$</td>
<td>8.75**</td>
<td>11.39***</td>
<td>8.31***</td>
</tr>
<tr>
<td>$\Delta R^2$</td>
<td>.115</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>$\Delta F$</td>
<td>12.18***</td>
<td>3.26**</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* $N = 182$.

$^a$Model 1 corresponds to the first stage of the hierarchical regression analysis when willingness to fly was regressed on Set A = covariates. $^b$Model 2 corresponds to the second stage of the hierarchical regression analysis when willingness to fly was regressed on Set B = Treatment in the presence of Set A. $^c$Model 3 corresponds to the third stage of the hierarchical regression analysis when willingness to fly was regressed on Set C = Interaction in the presence of both Set A and Set B.

*p < .05. **p < .01. ***p < .001.
Table 4.11
Summary of Results from Stepwise Regression

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>$b$</th>
<th>$SE$</th>
<th>$T_{(169)}$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>10.45</td>
<td>2.64</td>
<td>3.95</td>
<td>$&lt;.0001^{**}$</td>
</tr>
<tr>
<td>$X_{22} = \text{OMS-HC}$</td>
<td>-0.16</td>
<td>0.06</td>
<td>-2.52</td>
<td>.0127*</td>
</tr>
<tr>
<td>$X_4 = \text{age 40–49 versus 60 and older}$</td>
<td>-2.57</td>
<td>1.09</td>
<td>-2.36</td>
<td>.0193*</td>
</tr>
<tr>
<td>$X_6 = \text{Non-Caucasian versus Caucasian}$</td>
<td>-2.64</td>
<td>1.47</td>
<td>-1.80</td>
<td>.0731</td>
</tr>
<tr>
<td>$X_7 = \text{High School versus Graduate}$</td>
<td>2.38</td>
<td>1.58</td>
<td>1.58</td>
<td>.1325</td>
</tr>
</tbody>
</table>


*aThe order in which the independent variables are listed is based on the strength of their association with willingness to fly.

* $p < .05$. ** $p < .001$. 

211
Table 4.12
Summary of Hierarchical Multiple Regression

<table>
<thead>
<tr>
<th></th>
<th>Willingness to Fly</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1 $B^a$</td>
</tr>
<tr>
<td>Constant</td>
<td>10.1***</td>
</tr>
<tr>
<td>$X_{22}$ = OMS-HC</td>
<td>-0.17**</td>
</tr>
<tr>
<td>$X_1$ = Gender (female vs. male)</td>
<td>0.77</td>
</tr>
<tr>
<td>$X_4$ = 40–49 vs 60 and older</td>
<td>-2.60*</td>
</tr>
<tr>
<td>$X_6$ = Non-Caucasian vs Caucasian</td>
<td>-2.56</td>
</tr>
<tr>
<td>$X_7$ = High School vs. Graduate</td>
<td>2.43</td>
</tr>
<tr>
<td>$X_8$ = 2-year Degree vs Graduate</td>
<td>0.75</td>
</tr>
</tbody>
</table>

Statistical Results

<table>
<thead>
<tr>
<th></th>
<th>Model 1 $R^2$</th>
<th>Model 2 $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F$</td>
<td>7.06**</td>
<td>2.99**</td>
</tr>
<tr>
<td>$\Delta R^2$</td>
<td>.059</td>
<td></td>
</tr>
<tr>
<td>$\Delta F$</td>
<td>2.12</td>
<td></td>
</tr>
</tbody>
</table>

Note. $N = 170$.

*aModel 1 corresponds to the first stage of the hierarchical regression analysis when willingness to fly was regressed on Set C = affective domain. *bModel 2 corresponds to the second stage of the hierarchical regression analysis when willingness to fly was regressed on Set A = Demographics in the presence of Set C. *$p < .05$. **$p < .01$. ***$p < .001$. 
Table 5.1  
*Summary of the Results of Hypothesis Testing*

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>$H_1$: When willingness to fly was examined based on type of treatment a pilot undergoes, there will be no relationship in an flight crew’s willingness to fly.</td>
<td>Rejected</td>
</tr>
<tr>
<td>$H_2$: When examined from an ANCOVA perspective, flight deck crew’s level of mental illness stigma and closeness of crew will not have a confounding effect on willingness to fly.</td>
<td>Rejected</td>
</tr>
<tr>
<td>$H_3$: When examined from a stepwise and hierarchical regression analysis perspective, the set of variables comprising a flight deck crew’s personal demographics and flight experiences will have a nonzero relationship with level of mental illness stigma.</td>
<td>Rejected</td>
</tr>
<tr>
<td>$H_4$: When examined from an attribute treatment interaction perspective, there will not be any disordinal interaction between willingness to fly and any of the targeted variables.</td>
<td>Rejected</td>
</tr>
</tbody>
</table>

*Note. N = 184. Set A= Demographics consisted of Gender, ethnicity (Divorced vs. Married), Age (18-29, 30-39, 40-49, 50-59, and 60 and older), Race/Ethnicity (Other vs. White/Caucasian), Education (high school, 2-year, 4-year, and Graduate). Set B = Flight Experience consisted of Flight Rank (Captain vs. First officer), License (Private, Commercial, and ATP), Number of type ratings, Total flight hours, Pilot-in-command hours, Multi-crew hours, Current flight operation (Part 91, Part, 121, and Part 135), and Military flight experience. Set C = Affective domain consisted of the OMS-HC scores and Social Distance scores.*
Appendix B

Figures
Figure 4.1
Summary of ATI for the OMS-HC
Figure 4.2
Summary of ATI for Gender

![Graph showing ATI for Gender]

- Scenario:
  - Control
  - T1
  - T2

Y = WP Total

Gender (Female, Gender, Male)
Figure 4.3
Summary of ATI for Age

![Graph showing ATI for different age groups and scenarios.](image-url)
Figure 4.4
Summary of ATI for Race/Ethnicity
Figure 4.5
Summary of ATI for Education Level
Figure 4.6
Summary of ATI for Marital Status

- Control
- T1
- T2

Marital Status: Married, Separated

Y = WF Total
Figure 4.7
Summary of ATI for Flight Rank
Figure 4.8
Summary of ATI for Number of Type Ratings
Figure 4.9
Summary of ATI for Total Flight Hours
Figure 4.10
Summary of ATI for Total PIC Flight Hours
Figure 4.11
Summary of ATI for Multi-Crew Flight Hours

Scenario
- Control
- T1
- T2

Y = WF Total
X17 - Multi-Crew hours
Figure 4.12
Summary of ATI for Type of Operations Flown
Figure 4.13
Summary of ATI for Military Flight Experience

![Graph showing the relationship between military flight experience and Y (WF_Total). The graph includes lines for different scenarios: Control, T1, and T2. The x-axis represents military flight experience (No, Yes), and the y-axis represents Y (WF_Total).]
Figure 4.14
Summary of ATI for Social Distance
Appendix C

Instrument
Section A: Opening Minds Scale for Health Care Providers (OMS-HC)

Directions
Please respond how strongly you agree or disagree with each statement using the following scale: 
1 = Strongly Disagree, 2 = Disagree, 3 = Neither disagree nor agree, 4 = Agree, 5 = Strongly Agree

<table>
<thead>
<tr>
<th>Statement</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am more comfortable helping a person who has a physical illness than</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>I am helping a person who has a mental illness.</td>
<td></td>
</tr>
<tr>
<td>2. Despite my professional beliefs, I have negative reactions towards</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>people who have mental illness.</td>
<td></td>
</tr>
<tr>
<td>3. There is little I can do to help people with mental illness.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4. More than half of people with mental illness don’t try hard enough to</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>get better.</td>
<td></td>
</tr>
<tr>
<td>5. I struggle to feel compassion for a person with a mental illness.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6. If I were under treatment for a mental illness I would not disclose</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>this to any of my colleagues.</td>
<td></td>
</tr>
<tr>
<td>7. I would see myself as weak if I had a mental illness and could not</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>fix it myself.</td>
<td></td>
</tr>
<tr>
<td>8. I would be reluctant to seek help if I had a mental illness.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>9. If I had a mental illness, I would tell my friends.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>10. If a colleague with whom I work told me he/she had a managed mental</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>illness, I would be as willing to work with him/her.</td>
<td></td>
</tr>
<tr>
<td>11. Employers should hire a person with a managed mental illness if he/</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>she is the best person for the job.</td>
<td></td>
</tr>
<tr>
<td>12. I would still go to physician if I knew that the physician had been</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>treated for a mental illness.</td>
<td></td>
</tr>
<tr>
<td>13. I would not want a person with a mental illness, even if it were</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>appropriately managed, to work with children.</td>
<td></td>
</tr>
<tr>
<td>14. I would not mind if a person with a mental illness lived next door</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>to me.</td>
<td></td>
</tr>
</tbody>
</table>
Section B: Social Distance (SD) Scale

Directions
The items listed below describe various social situations in which you might or might not have taken part with a member of your flight crew. Your task is to indicate in your own opinion how personal or impersonal you perceive each description to be using the scale given below. For example, if you perceive a situation to be extremely personal or close, then you would score it 1. If you perceive a situation to be somewhat personal or close but not as personal or close as a statement that you scored 1, then you would score it higher than 1. If you perceive a situation to be extremely impersonal or no closeness, then you would score it 9. Thus, statements with lower scores should describe situations you believe reflect a high degree of personal interaction or closeness than those statements you believe describe situations that are impersonal or no closeness.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To perform a service for a member of my flight crew as part of my job.</td>
<td>1 ————&gt; 9</td>
</tr>
<tr>
<td>2. To do business with a member of my flight crew.</td>
<td>1 ————&gt; 9</td>
</tr>
<tr>
<td>3. To accept a member of my flight crew as my supervisor.</td>
<td>1 ————&gt; 9</td>
</tr>
<tr>
<td>4. To attend a sports activity with a member of my flight crew.</td>
<td>1 ————&gt; 9</td>
</tr>
<tr>
<td>5. To have my children be close friends with the children of a member of my flight crew.</td>
<td>1 ————&gt; 9</td>
</tr>
<tr>
<td>6. To have my daughter date the son of a member of my flight crew.</td>
<td>1 ————&gt; 9</td>
</tr>
<tr>
<td>7. To accept a member of my flight crew as a roommate.</td>
<td>1 ————&gt; 9</td>
</tr>
<tr>
<td>8. To invite a member of my flight crew to my home for Thanksgiving dinner.</td>
<td>1 ————&gt; 9</td>
</tr>
<tr>
<td>9. To openly converse and disclose my personal feelings to a member of my flight crew.</td>
<td>1 ————&gt; 9</td>
</tr>
</tbody>
</table>
Sections C and D: The Vignette and Willingness to Fly Scale

Directions
In this section you will be presented with a scenario that involves an 8-year airline captain followed by a set of items for you to consider. Please read the scenario and then carefully consider your responses to each of the given statements. Please base your responses relative to your interpersonal relationship with the pilot you identified in the previous section.

Scenario 1
An 8-year airline captain is self-referred to a psychologist because of his phobic concerns over thunderstorms. He reported he had constant fear of thunderstorms. The pilot presented with possible symptoms of Post-Traumatic Stress Disorder (PTSD) after an incident that occurred as a result of flying in the vicinity of thunderstorms.

As a result, the pilot was taken off-line for psychological treatment. The pilot responded to psychological treatments in the form of therapy. The therapy ended and the pilot returned to flight duties after being cleared by his FAA Medical Examiner and the company. This is now the pilot's first flight after treatment and you have been assigned to fly with this pilot.

Please respond how strongly you agree or disagree with each statement using the following scale:
1 = Strongly Disagree, 2 = Disagree, 3 = Neither disagree nor agree, 4 = Agree, 5 = Strongly Agree

<table>
<thead>
<tr>
<th>Statement</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I would be willing to fly with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2. I would be comfortable flying with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3. I would have no problem flying with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4. I would be happy to fly with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5. I would feel safe flying with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6. I have no fear of flying with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7. I feel confident flying with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

8. Please feel free to add any additional comments or thoughts you might have with respect to this scenario and your presumed relationship with the pilot.
Scenario 2
An 8-year airline captain is self-referred to a psychologist because of his phobic concerns over thunderstorms. He reported he had constant fear of thunderstorms. The pilot presented with possible symptoms of Post-Traumatic Stress Disorder (PTSD) after an incident that occurred as a result of flying in the vicinity of thunderstorms.

Although the pilot exhibited symptoms consistent with PTSD, the pilot was not taken off-line for psychological treatment. Instead, the pilot concurrently is receiving psychological treatment in the form of therapy while continuing to fly. The psychologist in charge of the therapy is pleased with the progress of treatment, and the psychologist has deemed the treatment as being successful. This is now the pilot's first flight after treatment and you have been assigned to fly with this pilot.

Please respond how strongly you agree or disagree with each statement using the following scale:
1 = Strongly Disagree, 2 = Disagree, 3 = Neither disagree nor agree, 4 = Agree, 5 = Strongly Agree

<table>
<thead>
<tr>
<th>Statement</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I would be <strong>willing</strong> to fly with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2. I would be <strong>comfortable</strong> flying with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3. I would have <strong>no problem</strong> flying with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4. I would be <strong>happy</strong> to fly with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5. I would <strong>feel safe</strong> flying with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6. I have <strong>no fear</strong> of flying with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7. I feel <strong>confident</strong> flying with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

8. Please feel free to add any additional comments or thoughts you might have with respect to this scenario and your presumed relationship with the pilot.
Scenario 3 (Control)
An 8-year airline captain is self-referred to a psychologist because of his phobic concerns over thunderstorms. He reported he has a constant fear of thunderstorms. The pilot presented with possible symptoms of Post-Traumatic Stress Disorder (PTSD) after an incident that occurred as a result of flying in the vicinity of thunderstorms.

Although the pilot exhibited symptoms consistent with PTSD, the pilot was not taken off-line for psychological treatment because he has not admitted to his company or the FAA of his fear of thunderstorms. Instead, the pilot is using self-help books on stress management and coping mechanisms and feels he is improving as a result. This is now the pilot's first flight following self-treatment and you have been assigned to fly with this pilot.

Please respond how strongly you agree or disagree with each statement using the following scale:
1 = Strongly Disagree, 2 = Disagree, 3 = Neither disagree nor agree, 4 = Agree, 5 = Strongly Agree

<table>
<thead>
<tr>
<th>Statement</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I would be willing to fly with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2. I would be comfortable flying with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3. I would have no problem flying with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4. I would be happy to fly with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5. I would feel safe flying with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6. I have no fear of flying with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7. I feel confident flying with this pilot.</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

8. Please feel free to add any additional comments or thoughts you might have with respect to this scenario and your presumed relationship with the pilot.
Section E: Background Information

Directions
Please provide the following information:

<table>
<thead>
<tr>
<th>Item</th>
<th>Personal Demographics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Gender:  □ Male □ Female</td>
</tr>
<tr>
<td>2.</td>
<td>Age __________</td>
</tr>
<tr>
<td>3.</td>
<td>Race/Ethnicity: □ Caucasian □ Not Caucasian</td>
</tr>
</tbody>
</table>
      □ 2-year/Associate’s Degree  
      □ 4-year/Undergraduate Degree  
      □ Graduate Degree            |
| 5.   | Marital status: □ Married □ Not Married |

<table>
<thead>
<tr>
<th>Flight Experiences</th>
</tr>
</thead>
</table>
| 6.     | Flight rank:  □ Captain □ First officer  
          □ Flight engineer □ Relief crew |
| 7.     | License type: □ ATP □ Commercial  
          □ PPL                       |
| 8.     | Number of ratings __________   |
| 9.     | Total flight hours __________|
| 10.    | Total flight hours as PIC __________ |
| 11.    | Total multi-crew hours __________ |
| 12.    | Current flight operation: □ Part 121 □ Part 135 □ Part 91 |
| 13.    | Prior military flight experience: □ Yes □ No |
Appendix D:

IRB Documentation
Notice of Exempt Review Status
Certificate of Clearance for Human Participants Research

Principal Investigator: Jason Herkimer
Date: May 16, 2017
IRB Number: 17-081
Study Title: Perception of pilot psychological health and its effects on willingness to fly

Your research protocol was reviewed and approved by the IRB Chairperson. Per federal regulations, 45 CFR 46.101, your study has been determined to be minimal risk for human subjects and exempt from 45 CFR46 federal regulations and further IRB review or renewal unless you change the protocol or add the use of participant identifiers.

All data, which may include signed consent form documents, must be retained in a secure location for a minimum of three years (six if HIPAA applies) past the completion of this research. Any links to the identification of participants should be maintained on a password-protected computer if electronic information is used. Access to data is limited to authorized individuals listed as key study personnel.

The category for which exempt status has been determined for this protocol is as follows:

2. Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior so long as confidentiality is maintained.
   a. Information is recorded in such a manner that the subject cannot be identified, directly or through identifiers linked to the participant and/or
   b. Subject’s responses, if known outside the research would not reasonably place the subject at risk of criminal or civil liability or be damaging to the subject’s financial standing, employability, or reputation.
RESEARCH INVOLVING HUMAN PARTICIPANTS
Exempt Application

This form shall be used if there is minimal risk to human subjects: one of the categories on the next page applies to the research. If there is more than minimal risk associated with the research (none of the conditions apply) or if the research utilizes a special population (children, prisoners, institutionalized individuals, etc.), please use the expedited/full application form found on the IRB website.

You should consult the university's document "Principles, Policy, and Applicability for Research Involving Human Subjects" and instructions on the IRB Committee website prior to completion of this form.

http://www.fit.edu/research/committees/irb/

IRB Contact Information:
Dr. Lisa Steelman, IRB Chairperson
lstelman@fit.edu 674-7316

Investigator Information:

<table>
<thead>
<tr>
<th>Title of Project:</th>
<th>Perception of Pilot Psychological Health and its Effect on Willingness to Fly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of Submission:</td>
<td>05/5/2017</td>
</tr>
<tr>
<td>Expected Project Start Date:</td>
<td>05/15/2017</td>
</tr>
<tr>
<td>Expected Project Duration:</td>
<td>3 months; 08/15/2018</td>
</tr>
</tbody>
</table>

Principal Investigator: Jason C. Herklimer
Title: Student
Academic Unit: College of Aeronautics
Phone: 520-907-7932
Email: jherklimer2015@my.fit.edu

Co Investigator: Dr. Deborah Carstens
Title: Graduate Program Chair
Academic Unit: College of Aeronautics
Phone: 674-8820
Email: carstens@fit.edu

Co Investigator: Dr. Michael Gallo
Title: Professor
Academic Unit: College of Aeronautics
Phone: 674-7634
Email: gallo@fit.edu
Categories of Exempt Research

Researcher must choose one:

☐ 1) Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as:
   a. research on regular and special education instruction strategies, or
   b. research on the effectiveness of or the comparison among instruction techniques, curricula, or classroom management methods.

☒ 2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior unless:
   a. the subjects can be identified, directly or through identifiers linked to the subjects and
   b. any disclosure of subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.
   Note: This exemption does not apply to survey procedures or interviews involving minors.

☐ 3) Research involving the use of educational tests, survey or interview procedures, or observation of public behavior if:
   a. the subjects are elected or appointed public officials or candidates for public office or
   b. the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.

☐ 4) Research involving the collection or study of existing data, documents, records, or specimens if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, indirectly or through identifiers linked to the subjects.

☐ 5) Research and demonstration projects that are conducted by or subject to the approval of Department or Agency heads and that are designed to study, evaluate, or otherwise examine:
   a. public benefit or service programs,
   b. procedures for obtaining benefits or services under those programs,
   c. possible changes in or alternatives to those programs or procedures, or
   d. possible changes in methods or levels of payment for benefits or services under those programs.

☐ 6) Taste and food quality evaluation and consumer acceptance studies if:
   a. wholesome foods without additives are consumed or
   b. food is consumed that contains food ingredients found to be safe by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture.

If any part of this study will be funded by an external funding source, you must note the funding source and award/solicitation number below:

There will be no funding for this study.
1. List the objectives of the proposed project.

The aim of the study is to investigate the effects psychological health stigma has on an aircrew’s willingness to fly with pilots who may have a psychological health issue.

RQ1. What effect does the different types of psychological treatment a pilot might undergo have on a flight deck crew’s willingness to fly?
RQ2. What effect do a flight deck crew’s level of mental illness stigma and the closeness of the crew have on a flight deck crew’s willingness to fly across the different types of psychological treatment?
RQ3: What is the relationship among a flight deck crew’s personal demographics, flight experiences, and level of mental illness stigma?
RQ4. What is the interaction between key factors of a flight deck crew (i.e., level of mental illness stigma, closeness of relationship, personal demographics, and flight experiences) across the different types of psychological treatment relative to a flight deck crew’s willingness to fly?

Hypothesis 1. The type of psychological treatment a pilot undergoes will have a nonzero relationship with a flight deck crew’s willingness to fly.
Hypothesis 2. A flight deck crew’s level of mental illness stigma and the closeness of the crew will have a confounding effect across the three levels of psychological treatment relative to a flight deck crew’s willingness to fly.
Hypothesis 3. The set of variables comprising a flight deck crew’s personal demographics and flight experiences will have a nonzero relationship with level of mental illness stigma.
Hypothesis 4. There will be at least one disordinal interaction between the type of psychological treatment a pilot undergoes and a flight deck crew’s level of mental illness stigma, closeness of relationship, personal demographics, and flight experiences with respect to the crew’s willingness to fly.

2. Describe the research project design/methodology. Discuss how you will conduct your study, and what measurement instruments you are using. Attach all research materials to this application. Please describe your study in enough detail so the IRB can identify what you are doing and why.

The first research question will be answered using an intervention study with an experimental design.
The second research question will be answered using an analysis of covariance (ANCOVA) design.
The third research question will be answered using an explanatory correlational design.
The last research question will be answered using an attribute-treatment interaction (ATI) design.

Study participants first will be randomly assigned to one of the three treatment scenarios. Once this assignment is made, they will complete the researcher-modified version of Modgil et al.’s (2014) OMS-HC to determine their level of mental illness stigma. They will then complete the researcher-modified version of Katz and Foley’s (1974) Social Distance Scale to determine the closeness of their relationship. After these instruments have been administered, participants will be presented with the vignette that corresponds to the psychological treatment to which they were assigned. After reviewing the vignette, participants’ willingness to fly will be assessed using the researcher-modified version of Rice et al.’s (2015) Willingness to Fly scale. Lastly, participants will complete a researcher-prepared background questionnaire to self-report their personal demographics and flight experiences. These instruments will be packaged into a single multi-section data collection instrument and made available electronically via SurveyMonkey.
3. Describe the characteristics of the participant population, including number, age, sex, and recruitment strategy (attach actual recruitment email text, recruitment flyers etc).

The required number of participants is 159. The accessible population will be any pilot who serves as a member of an aircrew in a multi-crew operation. The study will include all genders, adult ages, and ethnic backgrounds. The targeted population will be pilots who are part of the Air Line Pilots Association, International (ALPA). Convenience sampling will be used. Participants will be recruited via e-mail through ALPA email newsletters.

The email letter will state:

Hello,

You are receiving this message as a courtesy to Captain Jason C. Herkimer, a Ph.D. candidate at Florida Institute of Technology's doctoral program in Aviation Sciences. This is a one of a kind study investigating the effect stigma of psychological treatment has on a pilots' willingness to seek treatment for benign psychological issues such as anxiety or stress. He is seeking your assistance to complete an online survey, which would take 10-15 minutes to complete. To date, there have been no published studies that examine the effect stigma of psychological treatment has on crew resource management between crew members on a flight deck. The study is targeting those who currently fly an airplane that requires two or more pilots, regardless if you are currently working as a pilot or not. To participate in this study, pilots may access the online questionnaire at http://jherkimer2015@my.fit.edu. This is research for the safety and well-being of pilots by a current airline pilot! By supporting the research of one of our own pilots and donating your time and input to this research, you will be active in ensuring the safety and well-being of all pilots in the future.

If you have any questions, you can contact Jason Herkimer at jherkimer2015@my.fit.edu. Thank you for your assistance.

4. Describe any potential risks to the participants (physical, psychological, social, legal, etc.) and assess their likelihood and seriousness. Describe steps that will be taken to mitigate each risk.

The risk level of completing the online questionnaire is no more than the risk involved with using a personal computer.

5. Describe the procedures you will use to maintain the confidentiality and privacy of your research participants and project data. If video or audio recordings will be made, you must review the video/audio recording policy found on the IRB website and address precautions you will take in this section.

The online questionnaire will be the only location for the participant responses to be recorded and the investigators of the study will be the only people to have access to the online platform. The participants will be anonymous. The data will have no identifying information.
6. Describe your plan for informed consent (attach proposed form).

I will include an informed consent with my online survey. It will be:

Hello,

You are invited to participate in a completely anonymous research project that is being conducted as part of a doctoral dissertation research study by Jason C. Herkimer at Florida Institute of Technology (FIT), College of Aeronautics. The primary purpose of the study is to examine the effect mental health stigma has on an aircrew’s willingness to fly with a pilot who is undergoing psychological treatment. Mental health stigma can lead to labeling, stereotyping, separation, discrimination, and status loss. As part of the study we are requesting respondents complete this questionnaire, which contains a set of questions, a vignette, and then followed by another set of questions. Finally, you will be asked to answer a set of professional/personal demographic items. To help us accomplish our purpose, we are asking that you provide as much detailed information as possible when responding to the interview questions. Please note the research study has been approved by the university’s Institutional Review Board (IRB).

Before clicking on the link to begin responding to the questions, it is important for you to understand the following:

1. Your responses will be treated as strictly confidential and will be accessible only by my advisor and me.

2. Your responses will remain completely anonymous and no identifying information will be collected from your questionnaire.

3. No reference will be made in oral or written reports that could connect 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 responding to the questionnaire and opt not to continue, you may simply close your browser’s window to close your session. This action will delete your responses and eliminate you as a participant.

6. By clicking on the link below, you are indicating that you are at least 18 years old and have agreed to voluntarily participate in the study.

If you have any questions, please contact Jason C. Herkimer at Florida Institute of Technology (jherkimer2015@my.fit.edu).

7. Discuss the importance of the knowledge that will result from your study (benefits to the field and to society) and what benefits will accrue to your participants (if any). Include information about participant compensation if appropriate.

The significance of the proposed study is that it will be one of the first to systematically examine the relationship between mental illness stigma and psychological treatment with respect to a flight deck crew’s willingness to fly on a flight with a pilot who is experiencing psychological health problems. The results from the study could be used to re-evaluate the current stance of the FAA on medical certification of pilots with benign psychological issues to reduce risk to the safety of the aviation system. The results from the study also could provide suggestions for improving the mindset of pilots with respect to their psychological health and subsequent treatment.

If the convenience sampling strategy does not yield enough participants, a snowball sampling strategy will be used. I will compensate participants with snacks for their participation.
8. Explain how your proposed study meets criteria for exemption from Institutional Review Board review (as outlined on page 2 of this form).

This study poses no more risk than what people may encounter every day. Using a laptop or tablet is an activity that is common to most pilots in flight operations. This study's data collection involves the participants accessing the website of the instrument, reading instructions and a vignette, and answering a questionnaire. This study meets the standard for exempt status per category 2.

Signature Assurances
I understand Florida Institute of Technology's policy concerning research involving human participants and I agree:

1. to accept responsibility for the scientific and ethical conduct of this research study,
2. to obtain prior approval from the Institutional Review Board before amending or altering the research protocol or implementing changes in the approved consent form,
3. to immediately report to the IRB any serious adverse reactions and/or unanticipated effects on participants which may occur as a result of this study.

PI Signature ___________________________ Date 5/5/17

Advisor Assurance: If primary investigator is a student
This is to certify that I have reviewed this research protocol and that I attest to the scientific merit of the study, the necessity for the use of human subjects in the study to the student's academic program, and the competency of the student to conduct the project.

Major Advisor ___________________________ Date 5/5/17
Major Advisor (print) Deborah S. Carstens

Academic Unit Head: It is the PI’s responsibility to obtain this signature
This is to certify that I have reviewed this research protocol and that I attest to the scientific merit of this study and the competency of the investigator(s) to conduct the study.

Academic Unit Head ___________________________ Date 5/5/17
Appendix E:

Correspondence
Stuart,

I am writing to request your assistance in helping me implement my dissertation research by allowing me to forward this e-mail to ALPA members here at Spirit Airlines and all ALPA carriers and asking them to complete the corresponding online questionnaire. I have developed a dissertation with an emphasis on human factors on the flight deck. I have been in contact with Jasen Cleary, Communications Chair, about the possibility of distributing a survey link for our member pilots to provide feedback on this research topic. I do not want to overstep my bounds, and instead would like your assistance in my endeavor to provide our community more knowledge in human factors, thereby making our profession safer.

My target group is a pilot who flies a multi-pilot aircraft like our Airbus 320. The primary purpose of my study is to examine the effect of stigma of psychological treatment has on a pilots’ willingness to seek treatment for benign psychological issues such as anxiety or stress. A recent study (December 2016) has indicated that many pilots may be flying when they have an emotional or psychological issues. The past study illustrates that our current system is not helpful or supportive for a pilot. I want to know why pilots do not get the help they need. If it is a systemic problem based on current regulation, we can change that through data collection and recommendations for change.

I am now working on my data collection and I am seeking your help in distributing a (10-15 minute) survey to our pilots at Spirit, as well as all ALPA carriers via online communications at the national level. I am seeking your permission and generosity for distribution of the survey link because I will need a large number of participants. For ease of distribution, I have prepared the following text and survey link.

Hello, you are receiving this message as a courtesy to Captain Jason C. Herkimer, a Ph.D. candidate at Florida Institute of Technology’s doctoral program in Aviation Sciences. This is a one of a kind study investigating the effect stigma of psychological treatment has on a pilots’ willingness to seek treatment for benign psychological issues such as anxiety or stress. He is seeking your assistance to complete an online survey, which would take 10-15 minutes to complete. To date, there have been no published studies that examine the effect stigma of psychological treatment has on crew resource management between crew members on a flight deck. The study is targeting those who currently fly an airplane that requires two or more pilots, regardless if you are currently working as a pilot or not. To participate
in this study, pilots may access the online questionnaire at:  
https://www.surveymonkey.com/r/RQ3QTPV?T1=[T1_value]&T2=[T2_value]&C1=[C1_value]

This is research for the safety and well-being of pilots by a current airline pilot! By supporting the research of one of our own pilots and donating your time and input to this research, you will be active in ensuring the safety and well-being of all pilots in the future.

Sincerely,

Jason C. Herkimer
Jason,

I don't have a problem with any of this. If ALPA at the National level is willing to assist and they just need my permission than you have it.

Let me know what you need.

Stuart
Do you remember a few months ago, Jasen, when I told you I was getting my Doctorate and would be asking for some help in recruiting pilots to take a survey? Well, I have completed my dissertation proposal, and it is just about time to recruit.

I was wondering if I could still count on you guys to get an email out asking pilots to click on a link to SurveyMonkey to take a survey on mental illness stigma and its effect on our willingness to fly with a pilot undergoing psychological treatment. My goal is to try to ascertain the level of stigma we have for our fellow pilots based on pre-conceived notions of mental health. If there was a high level of stigma, my goal would be to advocate for education so pilots who need help for minor issues are not dissuaded from that help.

I am waiting for permission from our Institutional Review Board (IRB). The IRB is a committee that reviews all research to verify all research is conducted ethically. I should have permission this week to start this data collection process.

I contacted Stuart a couple of months ago to get his permission. It is located below.

I was hoping we could get a fast read out to Spirit pilots every week until I get my 159 required participants for statistical power. I was also hoping to get this to ALPA national to be included in their weekly fastread (or whatever they call it).

Here is how the web request will look. You can change it as you see fit.

Fly safe!

Jason Herkimer

One of our own needs pilots for a research project. Spirit Airline Captain Jason Herkimer needs 159 pilots to help him complete his dissertation and earn his doctorate. Captain Herkimer is performing research on the effect mental illness stigma has on flight crews in fulfillment of the requirements for a Doctor in Philosophy (Ph.D.) from the Florida Institute of Technology.

This is a one of a kind study investigating the effect of the stigma of psychological treatment and its effect on a pilots’ willingness to seek treatment for benign psychological issues such as anxiety or stress. He is seeking your assistance to complete an online survey, which would take 5-10 minutes to complete. To date, there have been no published studies that examine the effect stigma of psychological treatment has on crew resource management between crew members on a flight deck. The study is targeting those who currently fly an airplane that requires two or more pilots. Pilots may access the online questionnaire
at https://www.surveymonkey.com/r/RQ3QTPV?T1=[T1_value]&T2=[T2_value]&C1=[C1_value] to participate in the survey.

This is research for the safety and well-being of pilots by a current airline pilot! By supporting the research of one of our own pilots and donating your time and input to this research, you will be active in helping one of our own reach an important goal and ensuring the safety and well-being of all pilots in the future. Please take the five minutes to follow the link and fill out the short survey.
I'll get it in the next hotline.

Jasen Cleary
SPA MEC Communications Committee
Appendix F:

Raw Data
### Table E.1

**Raw Data**

| Case | Y | T | S | A  | R  | E  | M  | FR | L  | R1 | TF | PF | MF | O  | Ml | D  | SS |
|------|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|
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| 3    |  4|   1|   M|   4|   C|   G|   M|   C|   A|    2|   8000|  5000|  6000|  121|   N|   49|  53|
| 4    | -1|   1|   M|   3|   C|   B|   S|   C|   A|    3|  10000|  4700|  9700|  121|   N|   39|  38|
| 5    |  5|   3|   M|   3|   C|   B|   M|   C|   A|    2|   8000|  2000|  7000|  121|   N|   24|  35|
| 6    |  7|   2|   M|   3|   N|   A|   M|   F|   A|    1|  2356 |  1230|  720 |  121|   N|   47|  38|
| 7    | 14|   1|   M|   3|   C|   B|   M|   F|   A|    3|   8000|  5000|  6500|  121|   N|   38|  29|
| 8    |  5|   1|   M|   3|   C|   B|   S|   F|   A|    3|  2900  |  700 |  2000|  121|   N|   29|  31|
| 9    |  0|   1|   C|   M|   2|   C|   H|   M|   F|   A|    3|   3000|  500 |  2000|  121|   N|   38|  36|
| 10   | -13|   C|   M|   2|   N|   B|   M|   F|   A|    3|   5000 |  1600|  4500|  121|   N|   16|  47|
| 11   |  4|   C|   M|   3|   C|   H|   M|   C|   A|    3|   7500 |  4000|  5500|  121|   N|   35|  35|
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| 16   | -7|   C|   M|   3|   C|   B|   S|   F|   A|    4|  2700 |  700 |  1700|  121|   N|   40|  40|
| 17   | -10|  C|   M|   5|   C|   G|   M|   F|   A|    3|  12000 | 9000 |  6000|  121|   Y|   28|  47|
| 18   |  9|   1|   M|   3|   C|   B|   M|   C|   A|    2|  8000 |  800 |  7500|  121|   N|   31|  37|
| 19   |  4|   C|   M|   4|   C|   B|   M|   C|   A|    3|  14000 | 10000| 12000|  121|   N|   37|  29|
| 20   |  6|   1|   M|   4|   C|   B|   S|   F|   A|    2|  2300 |  15000| 1000 |  121|   N|   66|  47|
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| 24   |  1|   C|   M|   3|   C|   B|   M|   C|   A|    3|  13000 |  5000| 10000|  121|   N|   26|  36|

Note. The overall model consisted of 22 variables that consisted of consisted of T = Treatment (Treatment 1 = 1, Treatment 2 = 2, and Control = C), S = Gender (M = male and F = Female), A = Age (18-29 = 2, 30-39 = 3, 40-49 = 4, 50-59 = 5, and 60 and older = 6), R = Race/Ethnicity (Other = N and White/Caucasian = C), E = Education level (High school = H, 2-year = A, 4-year = B, and Graduate = G), M = Marital status (Divorced = D and Married = M), FR = Flight rank (Captain = C and First officer = F), L = Pilot license (Private = P, Commercial = C, and ATP = A), R1 = Number of ratings, TF = Total flight hours, PF = Flight hours as PIC, MF = Multi-crew flight hours, O = Current flight operation (Part 91, Part, 121, and Part 135), Ml = Military flight experience, D = Social distance scale scores, and SS = OMS-HC scores (Stigma). The dependent variable was Y = Willingness to fly scores and T = Treatment scenario.
Table E.1
Raw Data (continued)

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Note. The overall model consisted of 22 variables that consisted of consisted of T = Treatment (Treatment 1 = 1, Treatment 2 = 2, and Control = C), S = Gender (M = male and F = Female), A = Age (18-29 = 2, 30-39 = 3, 40-49 = 4, 50-59 = 5, and 60 and older = 6), R = Race/Ethnicity (Other = N and White/Caucasian = C), E = Education level (High school = H, 2-year = A, 4-year = B, and Graduate = G), M = Marital status (Divorced = D and Married = M), FR = Flight rank (Captain = C and First officer = F), L = Pilot license (Private = P, Commercial = C, and ATP = A), R1 = Number of ratings, TF = Total flight hours, PF = Flight hours as PIC, MF = Multi-crew flight hours, O = Current flight operation (Part 91, Part 121, and Part 135), Mj = Military flight experience, D = Social distance scale scores, and SS = OMS-HC scores (Stigma). The dependent variable was Y = Willingness to fly scores and T = Treatment scenario.
Table E.1
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Note. The overall model consisted of 22 variables that consisted of consisted of T = Treatment (Treatment 1 = 1, Treatment 2 = 2, and Control = C), S = Gender (M = male and F = Female), A = Age (18-29 = 2, 30-39 = 3, 40-49 = 4, 50-59 = 5, and 60 and older = 6), R = Race/Ethnicity (Other = N and White/Caucasian = C), E = Education level (High school = H, 2-year = A, 4-year = B, and Graduate = G), M = Marital status (Divorced = D and Married = M), FR = Flight rank (Captain = C and First officer = F), L = Pilot license (Private = P, Commercial = C, and ATP = A), R1 = Number of ratings, TF = Total flight hours, PF = Flight hours as PIC, MF = Multi-crew flight hours, O = Current flight operation (Part 91, Part, 121, and Part 135), M1 = Military flight experience, D = Social distance scale scores, and SS = OMS-HC scores (Stigma). The dependent variable was Y = Willingness to fly scores and T = Treatment scenario.
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Note. The overall model consisted of 22 variables that consisted of consisted of T = Treatment (Treatment 1 = 1, Treatment 2 = 2, and Control = C), S = Gender (M = male and F = Female), A = Age (18-29 = 2, 30-39 = 3, 40-49 = 4, 50-59 = 5, and 60 and older = 6), R = Race/Ethnicity (Other = N and White/Caucasian = C), E = Education level (High school = H, 2-year = A, 4-year = B, and Graduate = G), M = Marital status (Divorced = D and Married = M), FR = Flight rank (Captain = C and First officer = F), L = Pilot license (Private = P, Commercial = C, and ATP = A), Rₜ = Number of ratings, TF = Total flight hours, PF = Flight hours as PIC, MF = Multi-crew flight hours, O = Current flight operation (Part 91, Part 121, and Part 135), M₁ = Military flight experience, D = Social distance scale scores, and SS = OMS-HC scores (Stigma). The dependent variable was Y = Willingness to fly scores and T = Treatment scenario.
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Note. The overall model consisted of 22 variables that consisted of: T = Treatment (Treatment 1 = 1, Treatment 2 = 2, and Control = C), S = Gender (M = male and F = Female), A = Age (18-29 = 2, 30-39 = 3, 40-49 = 4, 50-59 = 5, and 60 and older = 6), R = Race/Ethnicity (Other = N and White/Caucasian = C), E = Education level (High school = H, 2-year = A, 4-year = B, and Graduate = G), M = Marital status (Divorced = D and Married = M), FR = Flight rank (Captain = C and First officer = F), L = Pilot license (Private = P, Commercial = C, and ATP = A), R1 = Number of ratings, TF = Total flight hours, PF = Flight hours as PIC, MF = Multi-crew flight hours, O = Current flight operation (Part 91, Part, 121, and Part 135), Mf = Military flight experience, D = Social distance scale scores, and SS = OMS-HC scores (Stigma). The dependent variable was Y = Willingness to fly scores and T = Treatment scenario.
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Note. The overall model consisted of 22 variables that consisted of T = Treatment (Treatment 1 = 1, Treatment 2 = 2, and Control = C), S = Gender (M = male and F = Female), A = Age (18-29 = 2, 30-39 = 3, 40-49 = 4, 50-59 = 5, and 60 and older = 6), R = Race/Ethnicity (Other = N and White/Caucasian = C), E = Education level (High school = H, 2-year = A, 4-year = B, and Graduate = G), M = Marital status (Divorced = D and Married = M), FR = Flight rank (Captain = C and First officer = F), L = Pilot license (Private = P, Commercial = C, and ATP = A), R1 = Number of ratings, TF = Total flight hours, PF = Flight hours as PIC, MF = Multi-crew flight hours, O = Current flight operation (Part 91, Part, 121, and Part 135), M1 = Military flight experience, D = Social distance scale scores, and SS = OMS-HC scores (Stigma). The dependent variable was Y = Willingness to fly scores and T = Treatment scenario.
Table E.1

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Note. The overall model consisted of 22 variables that consisted of consisted of T = Treatment (Treatment 1 = 1, Treatment 2 = 2, and Control = C), S = Gender (M = male and F = Female), A = Age (18-29 = 2, 30-39 = 3, 40-49 = 4, 50-59 = 5, and 60 and older = 6), R = Race/Ethnicity (Other = N and White/Caucasian = C), E = Education level (High school = H, 2-year = A, 4-year = B, and Graduate = G), M = Marital status (Divorced = D and Married = M), FR = Flight rank (Captain = C and First officer = F), L = Pilot license (Private = P, Commercial = C, and ATP = A), R1 = Number of ratings, TF = Total flight hours, PF = Flight hours as PIC, MF = Multi-crew flight hours, O = Current flight operation (Part 91, Part, 121, and Part 135), M1 = Military flight experience, D = Social distance scale scores, and SS = OMS-HC scores (Stigma). The dependent variable was Y = Willingness to fly scores and T = Treatment scenario.
Table E.1

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Note. The overall model consisted of 22 variables that consisted of consisted of T = Treatment (Treatment 1 = 1, Treatment 2 = 2, and Control = C), S = Gender (M = male and F = Female), A = Age (18-29 = 2, 30-39 = 3, 40-49 = 4, 50-59 = 5, and 60 and older = 6), R = Race/Ethnicity (Other = N and White/Caucasian = C), E = Education level (High school = H, 2-year = A, 4-year = B, and Graduate = G), M = Marital status (Divorced = D and Married = M), FR = Flight rank (Captain = C and First officer = F), L = Pilot license (Private = P, Commercial = C, and ATP = A), R1 = Number of ratings, TF = Total flight hours, PF = Flight hours as PIC, MF = Multi-crew flight hours, O = Current flight operation (Part 91, Part 121, and Part 135), M1 = Military flight experience, D = Social distance scale scores, and SS = OMS-HC scores (Stigma). The dependent variable was Y = Willingness to fly scores and T = Treatment scenario.
Table E.1
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