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Regional Airline Pilot Commute: How Commuting by Air Affects Pilots' Satisfaction with Life

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REGIONAL AIRLINE PILOT COMMUTE: HOW COMMUTING BY AIR AFFECTS PILOTS' SATISFACTION WITH LIFE

By

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This thesis, submitted by Andrew Kleinfehn in partial fulfillment of the requirements for the Degree of Master of Science from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done, and is hereby approved.

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To my loving wife Eva.

ABSTRACT

At a time of increased use and competitiveness amongst U.S. regional airlines, and the growing pilot shortage, regional air carriers and pilots alike lack proper understanding how pilot commutes by airplane affect satisfaction with life. There are numerous studies on how commuting by vehicle, bicycle, mass transit system, or walking (traditional commute) to and from work affects one's satisfaction with life. There are no identified studies which investigate regional airline pilots' commute by airplane and its affect on satisfaction with life.

The purpose of this study was to gain knowledge on regional airline pilot commutes, how commuting affects regional pilots' satisfaction with life, and to explore why regional airline pilots choose to commute. This study used both qualitative and quantitative measures to accomplish this task by imploring a mixed methods exploratory sequential design. The two research questions were what is the variation in the Satisfaction With Life Scale scores between different groups of regional pilots and what aspects of pilot commuting are related to traditional commuting?

This study used previous related research and regional airline pilot qualitative interviews to build a quantitative survey to measure satisfaction with life. The survey was distributed to a large regional airline to get a representative pilot population sample response. Statistical analysis was conducted on the responses which looked for significance between different groups of regional airline pilots.

Results from a t-test indicated that there is a significant difference in Satisfaction With Life Scores for regional pilots that are able to traditionally commute to their domicile vs. regional pilots who commute by airplane to their domicile. Further t-test results indicated that there is a significant difference in satisfaction with life for airplane commute captains vs. traditional commute captains, and airplane commute captains vs. traditional commute first officers. When only airplane commute pilots were analyzed, there are significant differences in satisfaction with life for pilots that commute over 43.33 hours a month (equivalent to one hour, one way traditional commute), and a one way airplane commute of two or more legs. A Between-Groups ANOVA indicated that commuting the day before a trip begins and commuting the day after a trip ends (un-commutable trip) produces a less satisfied pilot compared to trips that are commutable at the beginning, end or both ends.

CHAPTER I

INTRODUCTION

Commuting

Each day, most Americans travel to and from work by vehicle, mass transit system, bicycle or walk (referred to as "traditional commuters"). In contrast, over half of all airline pilots in 2010 left their home and arrived at their domicile – the airport where a pilot begins and ends each duty assignment – by airplane (referred to as "commuting") (National Research Council, 2011b). The length, time, and distance that the majority of airline pilots commute to and from their home to their domicile compared to traditional commuters is very different. Most of the airline pilots' commutes would be considered a mega commute – traveling 90 or more minutes and 50 or more miles – by the U.S. Census Bureau (Brown & Whitehurst, 2011; Rapino & Fields, 2012). Despite the vast amount of published studies completed on traditional commuting, there were no scientific studies found on pilot commuting that involved a representative pilot population.

Traditionally, the daily commute to work is something most Americans can relate to and understand. Anybody that works outside their home has to get to and from work using some form of transportation. Studies have compared a person's vehicle drive, mass transit ride, bicycle or walk to and from work against each other (Gatersleben & Uzzell, 2007; Olsson, Gärling, Ettema, Friman, & Fujii, 2013). Other studies have looked at marital satisfaction on traditional commutes to work (Casinowsky, 2013; Roehling &

Bultman, 2002). Further studies have reviewed the costs and benefits of traditional commutes to work (Lyons & Chatterjee, 2008), the stress related with traditional work commutes (Stutzer & Frey, 2008), and have tried to pinpoint the ideal traditional work commute time in minutes (Redmond & Mokhtarian, 2001). These studies, when combined, created an adequate field of research on a traditional commute to work. However, there is a gap in studying pilot commuting, specifically regional airline pilot commuting. Although there have been two studies completed on pilot commuting and fatigue (Brown & Whitehurst, 2011; National Research Council, 2011b), no studies were found that used a representative pilot population. Furthermore, this research was conducted on pilot commuting and fatigue; no research was found that studied regional airline pilot satisfaction with life.

Regional Airlines in the United States

In 2013, regional airlines – which operate aircraft with fewer than 90 seats – carried almost 160 million passengers, or approximately one of four U.S. domestic travelers (Regional Airline Association, 2014). These passengers were carried using a combined fleet of over 2,300 aircraft that serviced 614 U.S. airports, of which 431 airports were serviced only by regional airlines (Regional Airline Association, 2014). In viewing only the contiguous U.S., 60% of the airports that regional airlines flew into in 2013 were only serviced by them (Regional Airline Association, 2014). In 2003, over 99% of seats on regional airline airplanes were bought through codeshare agreements with major airlines (National Research Council, 2011a). Since 1980, regional airline service has increased steadily. With the growing dependency for major airlines to

outsource flying on certain routes to regional airlines, there is a corresponding increase in the need to find out more information on regional airlines and their pilot populations.

Between 2016 - 2021, there will be over 11,000 mandatory pilot retirements by the major airlines – airplanes operated with 90 and more seats – including cargo carriers FedEx and UPS (Airline Pilot Central, 2015). The need to replace major airline pilots will have a drastic effect on the professional pilot aviation industry. Major airlines will fill their pilot ranks from regional airlines, the military, and various smaller pilot populations such as cargo operations and charter pilots. This will put a large strain on the regional airline industry. A better understanding of why regional airline pilots choose to commute and how a commute affects pilots' satisfaction with life would benefit regional airline management and hiring managers to improve their hiring practices and policies. These policies may help regional airline pilot metrics (e.g. percentage of canceled flight, on-time arrival) that major airlines look to meet in their outsourced regional flying contractual agreements.

Purpose and Goal of This Study

The purpose of this study was to gain knowledge on regional airline pilot commutes, how commuting affects regional pilots' satisfaction with life, and to explore why regional airline pilots choose to commute. Knowledge in the study was gained using a representative pilot population from a regional airline headquartered and based within the U.S. A review of the literature revealed that although there were a vast number of studies completed on traditional commuting, no studies were identified which sampled a representative pilot population on why regional airline pilots choose to commute and how that commute affects pilots' satisfaction with life (Brown & Whitehurst, 2011; National

Research Council, 2011b). Secondly, the literature review identified how traditional commuting by vehicle, mass transit system, bicycle or walking to and from work affected one's satisfaction with life. Therefore, the goals of this study were:

1. Determine why regional airline pilots choose to commute to their domicile.
2. Analyze the differences in globalized Satisfaction with Life Scale (SWLS) scores between different demographics of regional pilots, to include commuting and non-commuting pilots.
3. Identify what areas of pilots' lives are affected by commuting.
4. Confirm or deny previous research done on descriptions for pilot commutes (percentage of pilot that commute, length of commute, etc).
5. Assist regional airline management and hiring departments to better understand the regional pilot population.

Research Questions

The following research questions were selected to look specifically at regional airline pilots who commute, as well as those who do not commute. The intent was to inform regional pilots, prospective future professional pilots and airline management about pilot commuting. The study will validate two research questions selected for this study:

1. What is the variation in a globalized SWLS scores between different groups of regional pilots?
2. What aspects of pilot commuting are related to traditional commuting?

Key Terms

Commuter – Pilots who arrive at their domicile by the combination of a traditional commute and riding on a commercial airplane (National Research Council, 2011b). See figure 1 (National Research Council, 2011b).

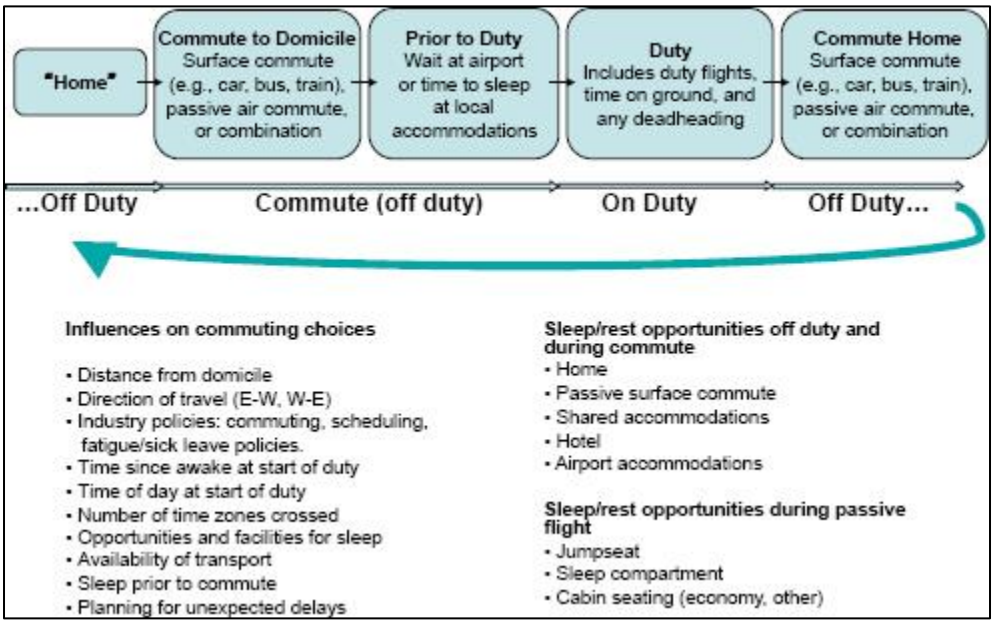

Figure 1: Visual Representation of Pilot Commuting in Relation to Duty.

Domicile – The airport where a pilot begins and ends each trip or duty assignment (National Research Council, 2011b).

Home – The residence of a pilot (National Research Council, 2011b).

Traditional Commuter – Anyone who traveled to and from work by vehicle, mass transit system, bicycle or walk.

Literature Review

A literature review of the previous work related to this study was conducted, and no articles were identified that used representative pilot populations to address why regional airline pilots choose to commute, or how a commute affects pilots' satisfaction

with life. Two articles did explain the confounding process of pilot commuting. There were many articles concerning traditional commutes. The literature review digressed upon themes found in traditional commuting as it related to pilot commutes. Due to the importance of the globalized SWLS score and the term, "subjective well-being", the literature review defined these terms and described how it related to satisfaction with life. All articles were taken from a wide range of peer reviewed sources and government bodies by researchers and teams who have added to their field of study.

Indirect Study of Why Pilots Commute

In the summer of 2010, the U.S. Congress directed the Federal Aviation Administration (FAA) to update the federal regulations that govern pilot flight and duty time. The FAA was required to take into account recent research related to sleep and fatigue. Congress also instructed the FAA to have the National Academy of Sciences (through the National Research Council) to conduct a study on the effects of commuting on pilot fatigue (National Research Council, 2011b). The study, "The Effects of Commuting on Pilot Fatigue," was the foundation for the updated flight crew rest requirements of U.S. scheduled passenger airline operators – commonly referred to as F.A.R 117 – which took effect in 2013 (14 C.F.R. § 117, 2013; National Research Council, 2011b).

In September 2010 the FAA issued the Notice of Proposed Rulemaking (NPRM) on Flightcrew Member Duty and Rest Requirements (Notice of Proposed Rulemaking: 14 C.F.R. Parts 117 and 121, 2010). In the NPRM process, comments were accepted for 60 days to inform final authorities on the new proposed rule (Notice of Proposed Rulemaking: 14 C.F.R. Parts 117 and 121, 2010). The National Research Council

committee also issued a call for comments to stakeholders – pilot associations, airline associations, and passenger groups. See figure 2 (National Research Council, 2011b).

Figure 2: Organizations Contacted for Input on NPRM for FAR 117 and 121.

The National Research Council's call for input included an invitation to respond to a set of questions specific to the types of information the committee was asked to review (National Research Council, 2011b). Two specific questions related to pilot commuting were:

1) What is the prevalence of pilots commuting in the commercial air carrier industry, including the number and percentage of pilots who commute greater than 2 hours each way to work?
2) What are the characteristics of commuting by pilots, including distances traveled, time zones crossed, time spent, and methods used?

Any person who wished to provide input to the FAA's NPRM was afforded the opportunity. A total of 2,419 public comments were received. Relevant comments related to pilot commutes were identified using a word search of words "commut, commute, and commuting." After a reduction, a total of 176 comments remained, of which 85 were further assessed to be relevant and selected for qualitative analysis on pilot commuting (National Research Council, 2011b).

It is important to note that the 85 public comments and stakeholder responses to the National Research Council call did not use a representative sample of pilots (National Research Council, 2011b). The response sample from both public comments and the specific stakeholder questionnaire were self-selected by the National Research Council.

> The views reflected in these analyses represent those individuals and organizations that were motivated to provide input to the committee or feedback in response to the NPRM. Thus, it is difficult to know, or even estimate, the extent to which different results would have been obtained from a larger and more representative sample of the stakeholder population. For those that responded to the requests, it is difficult to know whether each respondent understood each question or request as intended (National Research Council, 2011b).

The National Research Council did find a wide range of factors that influenced a pilot's commute from their unrepresentative pilot population sample (National Research Council, 2011b). In the order of reported frequency from high to low, they were:

1. The high cost of living near the domicile location.
2. Frequent domicile closings and future unpredictability of the airline industry.
3. Cost and availability of adjunct sleep accommodations.
4. The desire to maintain family stability.
5. Low pay, especially for regional carriers.
6. Lifestyle preferences (e.g., for good weather and outdoor living).
7. The absence of adequate coverage for costly moving expenses.

Differences in Pilot Commutes

Commuting in commercial aviation is different than most other industries around the world. Pilots can live long distances from their domicile, which is not uncommon. Studies conducted by the National Research Council found more than 50 percent of pilots leave home and commute by airplane to their domicile, but the exact number was unknown (2011a; 2011b). As part of the study, "The Effects of Commuting on Pilot Fatigue" by the National Research Council, the committee was given zip codes and domicile assignments of pilots by 24 different U.S. airlines across many types of operations within aviation (2011b). From the data, straight line distance was calculated to get an estimated distance needed to commute by each pilot. Admittedly, this distance was less than the actual traveled distance due to being a straight line number. It was a number of convenience and baseline for the volunteered data. When analyzed, the National Research Council estimated percentages of pilots who most likely traditionally commuted to work versus what percentage of pilots most likely commuted by air:

> Mainline airlines were defined as those that predominately operate scheduled passenger operations in jet aircraft with more than 90 seats

(under Part 121 rules). Zip code data were provided by four airlines for 17,519 pilots in this segment. Regional airlines were defined as those that predominately operate scheduled service in aircraft, both jet and turboprop, with 90 or fewer seats (under Part 121 rules). Zip code data were provided by 11 airlines for 7,533 pilots in this segment. Cargo airlines defined as those that conduct scheduled or nonscheduled cargo operations (under Part 121 supplemental rules). Zip code data were provided by four airlines for 4,488 pilots in this segment. Charter airlines were defined as those that conduct nonscheduled passenger operations (under Part 121 supplemental rules). Zip code data were provided by five airlines for 631 pilots in this segment. (National Research Council, 2011, p. 3-17).

Table 1: Distribution of Pilots from Home to Domicile by Operation.

Most Likely Commute Type	Traditional Commute	Long Traditional Commute		Commute by Air	
Operation	Less Than 30 Miles	31 - 90 Miles	91 - 150 Miles	151 - 750 Miles	750 Miles and Greater
Mainline	31%	14%	4%	29%	22%
Regional	31%	9%	4%	34%	22%
Cargo	37%	4%	1%	32%	26%
Charter	29%	9%	4%	28%	30 %

The column of "Less Than 30 Miles" represented pilots who most likely traditionally commuted to their domicile. Pilots in the following two columns of "31 – 90 Miles" and "91 – 150 Miles" range represented the pilot population who experience longer commutes to work, but most likely also traditionally commuted as well. Finally the last two columns with distances "151 – 750 Miles" and "750 and Greater" represented the

population of pilots who most likely commuted by air to their domicile. Although this collection of data was unscientific and only based on straight line distance of residence zip code to domicile assignment of 30,171 pilots, all operators had approximately the same percentages of pilots who most likely traditionally commuted versus most likely commuted by air (National Research Council, 2011b).

For most regional pilots, their commute to work for their duty assignment was not a daily occurrence taking part on Monday through Friday, but a weekly one on any given day of the week. Regional pilots' duty assignments (i.e., trips) are generally over many days at a time, which keep them away from their domicile multiple days in a row (National Research Council, 2011b). There are scheduled duty periods that allow pilots to fly single day trips, but those are most likely flown by pilots who traditionally commute to their domicile (National Research Council, 2011b).

Different Ways a Pilot Commutes

Standby Listing (Nonrevenue Travel) and Jump Seat Listing

Regional pilots are not guaranteed a seat on an airplane when they commute. Regional pilots have to list as standby passengers – sometimes called nonrevenue travel – who are only given a seat in the back of an airplane only if a seat is available (National Research Council, 2011b). There is no single standby listing tool for regional pilots to list for all airlines. Pilots are restricted to standby listing for their airline or major airline partner for which their regional airline flies for (National Research Council, 2011b). Furthermore, most airline employees, such as baggage handlers and ticket agents, can list for standby travel as well. The standby passenger order priority for a flight changes often, and is not set until the final boarding. Obtaining a seat on an airplane through a standby

listing has become harder over the years due to higher percentages of flight loads being filled by revenue passengers. See Figure 3 (Bureau of Transportation Statistics, 2011).

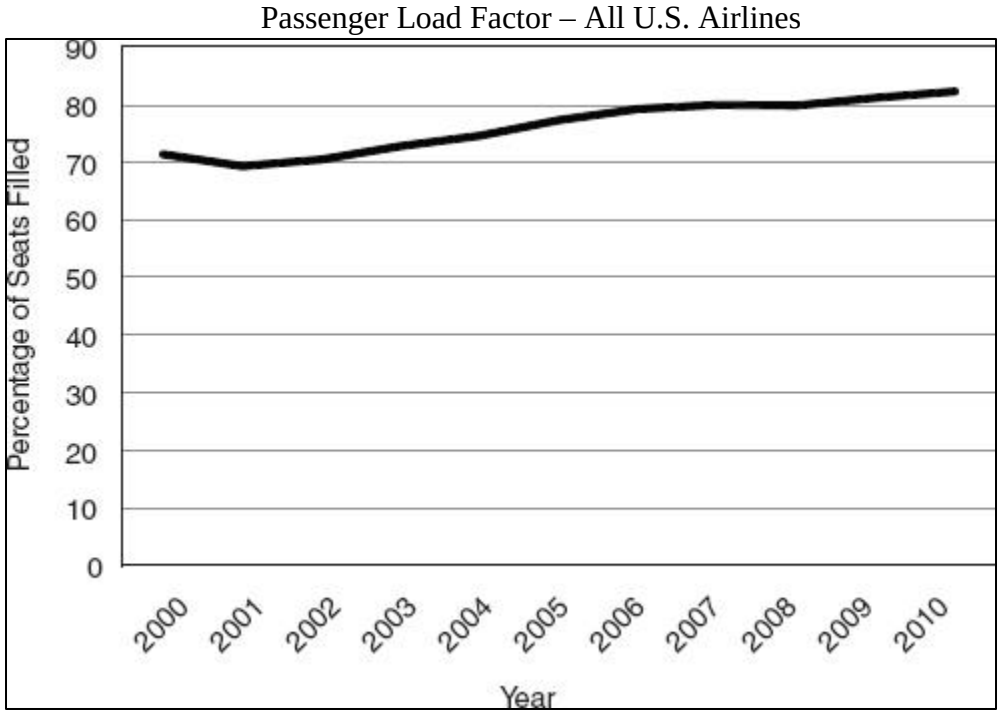

Figure 3: Passenger Load Factor (Passenger-Miles as a Proportion of Available Seat Miles) for All U.S. Airlines.

In 2000, the passenger load factor for all U.S. airlines was 72%. In 2010, that percentage increased to 82% (Bureau of Transportation Statistics, 2011). During the more popular travel times – Friday evenings, Sunday afternoons, and holidays – load factors increase, making standby travel more difficult (National Research Council, 2011b).

Another option to commute to work for regional pilots is to obtain permission to use the airplane jump seat from the Pilot In Command (PIC) of a flight. The jump seat is an additional crew member seat used for observations of flight crews by the FAA or internal company safety assurance programs such as line observations. Regional pilots can list for the jump seat in the flight deck of most airlines. In certain major airliners, there are two jump seats. By Federal Aviation Regulations, the PIC of the flight holds

control over the jump seat (14 C.F.R. §121.547, 2009). However, the Airline Pilots Association's (ALPA) stance is no pilot should be left behind if the jump seat is available on a flight. In general, pilots can list for the jump seat no more than a few hours before the time of departure for a flight. The jump seat is awarded approximately 30 minutes before departure (National Research Council, 2011b). Each airline does have different policies and procedures for pilots to list for the jump seat and may vary slightly.

For most airlines, pilots request access to the jump seat at the departure gate with the gate agent for the specific flight. The gate agent verifies a pilot's identity, employee number, passport number and expiration date, as well as a digital photo of the pilot through an electronic record called Cockpit Access Security System (CASS). The system provides real-time information as to the employment status and eligibility of a pilot for the jump seat (Rockwell Collins, 2015). If more than one pilot lists for the jump seat, and all the seats in the back of the airplane are occupied, the airline operating the flight has an "order of merit" list for the PIC to follow to decide who gets the remaining jump seat(s). Order of merit lists are based on the airline the listing pilot is employed by and was created due to the vast number of major airlines and regional airlines which fly for major partners. The goal of an order of merit list for awarding a pilot the jump seat is to expedite the process when a flight is due out in a few minutes. If both pilots are considered equal in the order of merit list based on their employer for the jump seat, then the seat is determined by the time each pilot signed up for the jump seat with the gate agent – the pilot who signed up first is awarded the jump seat. Different airlines do not outwardly share their order of merit lists with other airlines. At times, this can be a point of confusion between jump seating pilots, specifically when a flight is about to depart,

and there is a limited amount of time to consult company policies and company jump seat managers for guidance. FAA personnel, airline management executives, dispatchers, and mechanics are also given priority on the jump seat order of merit list.

All of the knowledge on standby listings and the jump seating procedures do not guarantee regional pilots a successful commute to or from their domicile. When flights cancel or revenue passengers miss their connection flights, most airline policies place revenue passengers on a confirmed seat on the next available flight; however, if the flight is full, revenue passengers are at the highest priority of standby on the next available flight to their destination (American Airlines, Delta Airlines, & United Airlines, 2015). In turn, this lowers all pilots on their standby listings for these future flights. Also, some revenue passengers are placed on confirmed seats along alternate routes to their destination, which fills all flights out of some airports when the weather deteriorates.

Commuter Policies

Most airlines have some form of a pilot "Commuter Policy." The Commuter Policy is a published agreement between an airline management group and their pilot group. Although each airline's policy is different, most require pilots to have made a standby listings for at least two flights that would get pilots in their domicile one hour before the first scheduled flight departure in the duty week (National Research Council, 2011b). Both pilots and the airline benefit by having commuting policies. If pilots do not show up for assigned flying due to failed commutes, the airline has to notify a reserve pilot who is on call to take the missed flights. The call out time for a reserve pilot could be anywhere from 15 minutes – airport ready reserve status – to three or more hours – short call or long call reserve status (National Research Council, 2011b). When

commuting pilots miss their first flight to get to their domicile, they must let their schedulers know so that the reserve pilot notification process can begin. The ultimate goal is to get the originally scheduled flight to depart on time.

Fitness for Flight

Regulations require pilots to assess their fitness for flying before each flight and requires pilots to decline to fly when they are unable to meet medical certification requirements (14 C.F.R. § 117, 2013). Most airlines provide sick time as a benefit to its pilots. Sick time, which can sometimes be a multipurpose use time bank of vacation hours and sick hours, are earned by pilots to use to avoid loss of pay when a trip is missed due to illness. Normally, one hour of a pilot's earned sick leave bank is used to substitute for each hour of scheduled flying time missed (National Research Council, 2011b). It is not uncommon for pilots to call in sick when they know a commute will be unsuccessful. Unsuccessful commute sick calls are done even when airline policy manuals strictly forbid this procedure (National Research Council, 2011b). Abuse of this policy has led most airlines to track pilot attendance records. Pilots who miss significant amounts of time due to illness may be called upon by their Chief Pilot – their airline manager – to provide documentation of their illness, and treatment by a medical doctor. These pilots could also be interviewed, or be subject to disciplinary actions to include termination (National Research Council, 2011b).

Airline Factors that Influence a Pilot to Commute

Seniority

Almost every U.S. airline who offers scheduled air passenger service has a seniority based system for its pilots (National Research Council, 2011b). Seniority is how

many facets of pilots' jobs are assigned: Seat (Captain or First Officer), domiciles, schedules, vacation time and much more. Pilots who live in a domicile for their airline, but do not have the seniority to hold a position there must commute to a less senior domicile, or move to a less senior domicile. This process takes place until a position in the preferred domicile becomes available to a pilot's respective seniority. The timeline for this to happen could be as fast as a month to as long as years.

Domicile Changes

The airline industry is a constantly changing environment due to the evolution and demands of its airline passengers and competitors. Each airline, especially regional airlines have to adapt to stay competitive. This dynamic structure sometimes changes the domiciles of pilot bases for regional airlines (National Research Council, 2011b). Regional pilots may initially live in their domicile when hired, and be able to hold a position in the domicile based on seniority. This equates to not having to commute. Over time, pilots' assigned domicile size may change due to industry changes. The pilots' domicile may increase, decrease or even close for a magnitude of reasons. If the latter two options happen, pilots have to commute to a new domicile or choose to move their families to a newly assigned domicile. The National Research Council was unable to determine any systematic information on how frequently pilot domiciles changed or how this influenced pilot commuting (2011b). The closest, but still unscientific analysis to find changes in pilot domiciles was to study the number of changes in aircraft departures, by city and by the airline, in the cities most frequently served by that airline. Thus, one could determine the cities that most likely served as domiciles for pilots and their

effective change over years (National Research Council, 2011b). See figure 4 as an example (National Research Council, 2011b).

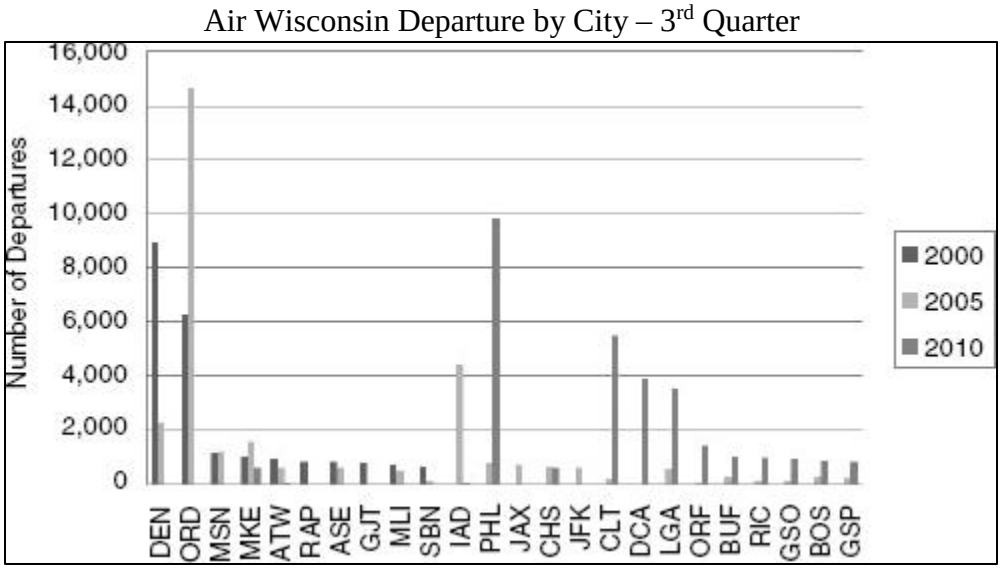

Figure 4: Air Wisconsin Departures by City – 3rd Quarter.

Regional airline Air Wisconsin saw multiple pilot domicile changes since 2000. Only one city found in Air Wisconsin's top 10 in 2000 – Milwaukee (MKE) – continued to receive service in 2010.

> The Air Wisconsin experience illustrates how changes in contracts between the regional airlines and the mainline airlines can result in large changes in regional operations at specific airports, with associated changes in regional pilot domicile assignment. Air Wisconsin effectively moved its entire operation to a different part of the country so that virtually all of its pilot's experienced changes in their domiciles (National Research Council, 2011b. p. 2-12).

Pilot Careers

Even in good times for the airlines, there are regional pilot domicile changes which cause pilots to commute. Normally, a pilot starts out at as a first officer with a

regional airline and gains seniority as a first officer. Once the pilot's seniority can hold an upgrade to captain, the pilot's seniority then starts at the bottom as a captain on the captain seniority list. When a first officer accepts an upgrade to captain, it may not be in the domicile the pilot currently lives. The upgrade causes the new captain to make a choice: Move to the newly assigned domicile or commute to the newly assigned domicile until the proper seniority is obtained to hold a captain position in the current domicile. Some first officers delay their upgrade to captain until they can hold, by seniority, their preferred domicile and not have to commute. This delay causes first officers to accept lower pay, less responsibility and most likely delays career progression to a major airline.

Subjective Well-Being

In 1967, Warner Watson defined avowed happiness for subjective well-being as anybody who was, "young, healthy, well-educated, well-paid, extroverted, optimistic, worry-free, religious, married a person with high self-esteem, job morale, modest aspirations, of either sex and of a wide range of intelligence" (Wilson, p. 294). Since then, the term subjective well-being has evolved. It is now not a strict term defined by absolute measures, and is a broad category of phenomena that includes people's emotional responses, domain satisfactions, and judgments of life satisfaction (Diener, Suh, Lucas, & Smith, 1999). Table 2 represented the major division and subdivision within subjective well-being (Diener et al., 1999).

Table 2. Components of Subjective Well-Being

Pleasant Affect	Unpleasant Affect	Life Satisfaction	Domain Satisfaction
Joy	Guilt & Shame	Desire to Change Life	Work
Elation	Sadness	Satisfaction with Current Life	Family
Contentment Pride	Anxiety, Worry & Anger	Satisfaction with Past	Leisure Health
Affection	Stress	Satisfaction with Future	Finances
Happiness	Depression	Significant Others' Views of One's Life	Self
Ecstasy	Envy	N/A	One's Group

When each category of "Life Satisfaction" is combined, they correlate to the global SWLS score (Lucas, Diener, & Suh, 1996). Furthermore, as time passed, Diener & Emmons found that long-term pleasant and unpleasant effects become separated from each other, which enabled researchers to isolate the two from each other (1984). The isolation of long-term pleasant and unpleasant effects is an important concept; although a participant's current mood is relevant to investigations of subjective well-being, the goal is find out how one felt over the past month or year (Diener et al., 1999). In normal testing situations, the component of life satisfaction measured using subjective well-being was a stable measure and overshadowed the influence of one's current mood (Eid & Diener, 2004). The SWLS used in the quantitative survey portion of this study is considered a valid and reliable scale for measuring life satisfaction based on one's subjective well-being within a domain satisfaction (Pavot & Diener, 1993).

Traditional Commuters

Stress, Compensation, and Housing

Economists (Stutzer & Frey, 2008) studied traditional commuters' added stress in life and the additional compensation in income or more affordable housing available due to living further from work. Specifically, they found longer traditional commutes made people have a lower overall subjective well-being in their SWLS score. The equilibrium of higher pay or more affordable housing did not outweigh the factors involved in a longer traditional commute to work. The study was a quantitative survey design using the German Socio-economic Panel Study (GSOEP) data source. The GSOEP is one of the most valuable data sets for studying individual well-being over time (Stutzer & Frey, 2008). It began in 1984, was primarily used in eight waves of data from 1985 – 2003, and its use still continues today. In correlating this study to pilot commuting, it could be assumed that pilots who commute a longer distance also experience these same effects of lower subjective well-being on the SWLS through their air commute.

Time and Costs

Traditional commuting is an activity in a person's life that demands a significant portion of their valuable and limited time. In 2013, the average traditional one way commute time in the U.S. was 25.5 minutes (U.S. Census Bureau, 2014). An average round trip commute equated to 51 minutes or 3.5 percent of a person's day. Traditional commute times are not decreasing. From 2002 – 2014, the average traditional commute time increased by 4.3 percent in the U.S. (U.S. Census Bureau, 2014). Traditional commuting also requires out of pocket expenses, which are approximately 20 percent more than expected by individuals (Stutzer & Frey, 2008). Traditional commuting has

been proven to be the daily activity that brings large negative effects to a person's life. It creates the lowest positive affect in one's day (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004). So why did traditional commuters choose to drive, ride mass transit, walk or bicycle to work, especially over long distances or great spans of time?

An extensive survey in 1992 sought to find the amount of gross income needed to offset the additional commute time when a person had to decide between two jobs. It stated that the additional income needed was 50 percent of one's gross wage of the old job, times the difference in commute time between the two jobs. Still, the gross income could vary drastically depending upon city location and population subgroup (Small & Verhoef, 1992). Although this was an argument to find a monetary amount needed to balance the additional cost of traditional commuting, it was most likely not being met due to the lower subjective well-being reported by individuals (Stutzer & Frey, 2008).

Location Theory

In 1826, an economist named Johann Heinrich von Thünen's defined the Location Theory, and it helped define how people should traditionally commute to work. The intent of the Location Theory stated that a person would maximize their utility based on where one lives; much like how a business will try to maximize profit based on location (Hall, 1966). Over the centuries, the Location Theory had been further studied, and researchers have found that people are not following the Location Theory to maximize their utility (Stutzer & Frey, 2008). People are doing the opposite. People are bringing lower life satisfaction upon themselves by traditionally commuting long distances of an hour or more to and from work. The net effect of one's utility for traditional commuting

is not at equilibrium when balanced against better housing prices, higher paying jobs and commute time (Stutzer & Frey, 2008).

Health

The Commute Impedance Model – proposed by Stokolos and his colleagues (Novaco, Stokols, Campbell, & Stokols, 1979; Schaeffer, Street, Singer, & Baum, 1988; Stokols, Novaco, Stokols, & Campbell, 1978) first stated that commuting induced stress and that this stress was a function of the degree of commute impedance. Impedance was both the characteristics of the commute and consequences of the commute (Stokols et al., 1978). Examples are distance, time, slow speed, and traffic congestion. Therefore, traditional commuting, through the Commute Impedance Model, is assumed to cause psychologically mediated strain that includes health problems, decrements in performance, and negative attitudes towards the experience of traditional commuting (Schaeffer et al., 1988). Researchers have specifically found that longer commutes are positively correlated to numerous negative effects in life: High blood pressure, self-reported tension, reduced task performance at work, negative moods in the evening hours, and the following symptoms: A stiff neck, tiredness, lower back pain, a difficulty in focusing attention, and anger (Kluger, 1998; Schaeffer et al., 1988; Stokols et al., 1978). One of the main determinants of increased stress in traditional commuting came from the unreliability of services – public transportation not running on time (Kluger, 1998). Traditional commuting was also more stressful when there was less control over factors of the commute, such as traffic congestion and time of mass transit service (Kluger, 1998).

As stated earlier, pilots commuting to their domicile have no control on a flight's order of merit list for standby and jump seat listings. A commuting regional pilot also has no control over the reliability of service of airlines. An example of loss of control and unreliability of services can be seen by reviewing the 2014 Bureau of Transportation Statistics for a U.S. airline. American Airlines was selected for analysis in this literature review as it is alphabetically the first major airline in U.S. See Table 3 (Department of Transportation: Buearu of Transportation Statistics, 2015).

Table 3: American Airlines Statistics – 2014.

	Number	Percentage	Average Delay Time
Total Scheduled Flights	537,697	100.00%	N/A
Total Delayed Flights	121,561	22.61%	53 minutes
Total Cancelled Flights	8,457	1.57%	N/A

Almost a quarter of American Airlines flights were delayed in 2014, with an average delay of 53 minutes. From an airline commuter standpoint, that did not serve well for commuting or a pilot's health due to added the stress and unreliability in service.

Summary

This literature review sought to give a broad overview the pilot commute process, traditional commuting background information, the globalized SWLS and an understanding of the term subjective well-being. The review touched on aspects of traditional commuting that related to pilot commuting, which was analyzed in this study. Finally, the review set a baseline of knowledge that was used to design the qualitative and quantitative portions of this study.

CHAPTER II

METHODS

Introduction

Studies have found that long traditional commutes cause stress and lower subjective well-being on the SWLS on an individual. Although there have been many studies done on traditional commuting, there were only two studies identified that used an unrepresented pilot population to study pilot commuting and fatigue (Brown & Whitehurst, 2011; National Research Council, 2011b). No studies were identified on how commuting affects pilots' subjective well-being. The purpose of this study was to gain knowledge on regional airline pilot commutes, how it affects their satisfaction with life, and explore why regional airline pilots choose to commute. Furthermore, knowledge in this study was gained using the pilot population of a U.S. regional airline.

Study Design

This study utilized a mixed methods exploratory sequential design. Qualitative exploration was completed with a small regional pilot group sample to determine if the qualitative findings generalize to the larger regional airline pilot group sample quantitatively. Questions for the qualitative interview were derived from the National Research Council's unrepresentative, yet insightful study titled, "The Effects of Pilot Commuting on Fatigue." From the initial exploration of the qualitative regional airline pilot interviews and the National Research Council's study, that information was combined to develop quantitative assessment measures. These assessment measures

created the quantitative survey that was administered to a large U.S. regional airline pilot group.

Population

The population for this study was professional pilots of a U.S. headquartered and based FAR 121 regional airline.

Sample

There were two samples taken in this mixed methods study. The first sample was a qualitative sample, which consisting of five interviews conducted by current professional regional airline pilots of FAR 121 commercial carriers. The qualitative sample of regional airline pilots was a sample of convenience and known by the researcher as regional airline pilots that commuted at the time of interview. Qualitative interview data was only used to confirm or deny insight gained from the National Research Council's research, and to help build the quantitative survey for this study. The second sample was a quantitative sample using a U.S. regional airline's pilot group. The quantitative survey was emailed to all pilots employed by the U.S. regional airline through the airline's internal email server. Most pilots that completed the survey were a part of the sample. Pilots who had not yet completed 100 hours of flight in a FAR Part 121 airline, or been employed by a FAR Part 121 airline for at least one year were removed from the sample due to lack of perspective and experience. Surveys that had no answered questions were also removed from the sample.

Data Collection Methods / Procedures

For the qualitative portion of this study, data was collected via recorded telephone interview by five currently employed regional airline pilots who were commuting at the

time of the interview. The regional pilots selected for the qualitative interviews were known by the researcher and chosen due to the researcher having access to these pilots. All pilots verbally agreed to give responses voluntarily. The qualitative interview questions consisted of six open-ended questions for pilots to describe their commute and how it affected their life and subjective well-being. All participants were asked the same set of questions, in the same order with follow-on questions used as needed to expand responses to gain more qualitative information. The qualitative interview questions were:

1. Tell me about your most recent commuting experience?
2. Tell me about your best commuting experience?
3. Tell me about your worst commuting experience?
4. What is your average commuting experience like?
5. What are the main reasons that you commute?
6. How do you see your lifestyle changing if you did not have to commute?

For the quantitative portion of the study, the survey was created using the online survey tool Qualtrics. The intent of the quantitative survey was to gather demographic data on the sample regional pilot population, find each pilot's score on the SWLS and various scale scores for domains of satisfaction with life for pilots that commuted. The SWLS is a validated scale used to measure global life satisfaction among the different domains of subjective well-being. It is not affected by peoples' age, and participants can weigh the importance of each subjective well-being domain as they see fit (Diener, Emmos, Larson & Griffin, 1985). See Appendices B and C for SWLS Questionnaire.

The quantitative survey was distributed through the U.S. regional airline's internal email system from their communications department via a link and short write-up

provided by the researcher. The airline reviewed the email and sent to all pilots within its organization. The survey distribution using the U.S. regional airline's communication department was used to reduce the pilot groups' possible thought of the survey being "spam" email and helped gain the highest percentage of completed surveys. The survey was open to complete for four weeks, with two total emails sent to the pilot group; the initial request for participation, and a reminder email two weeks later asking to participate.

Qualitative and Quantitative Reliability and Validity

The qualitative questions asked during pilot interviews were derived from previous research from the National Research Council's study on "The Effects of Commuting on Pilot Fatigue." These interviews, combined with the National Research Council's study, formed the questions for the pilot quantitative survey. In order to ensure the success and content validity of the quantitative portion of this study, the survey was evaluated by four experts from both the aviation industry and associated collegiate experts. The experts reviewed the survey for both content and structure.

Proposed Data Analysis

The qualitative interview responses for this study were analyzed by the researcher and combined with the National Research Council's study to form the quantitative survey. For the quantitative portion of this study, a descriptive analysis using SPSS was conducted on regional pilot demographic categories, the pilot SWLS scores, and domains of subjective well-being through a series of statistical test. Specifically, the quantitative research sought to find each pilot's SWLS score, then statistically see if there were significant differences between pilots that commuted and ones that traditionally

commuted. Furthermore, the study sought to find if there were statistically significant differences in SWLS scores between the different demographic groups using all pilots and only commuting pilots. Many survey questions were asked that put pilots into different demographic groups for quantitative testing. The alpha level for the entire study was .05. See table 4 for the variables collected in the quantitative survey.

Table 4. Variables Collected in Quantitative Survey.

Variable Type	Abbreviated Question	Answer	
Continuous	Age?	Age Entered	
Categorical	Gender?	Male or Female	
Categorical	Relationship Status?	Married / Domestic Partner	Single - Living with Significant Other
		Divorced	Widowed
		Single - Never Been Married	Other
Categorical	Sole provider or primary earner?	Yes or No	
Continuous	Number of children in house hold?	#	
Categorical	Regional Airline Captain or First Officer?	Captain or First Officer	
Continuous	How many hours flown in FAA 121 environment?	#	
Continuous	How many years employed by current employer?	#	
Categorical	Airport domicile assignment?	Three letter airport code	
Continuous	On average, how many hours does a round trip commute take (home – domicile – home)?	#	

Table 4 cont. Variables Collected in Quantitative Survey.

Variable Type	Abbreviated Question	Answer
Categorical	Commute day of trip? Commute day before trip? Commute day before and day after trip?	Statement that best describes commute
Continuous	Average number of legs in commute?	#
Continuous	Estimated number of flights a day from your home airport to domicile?	#
Continuous	Average drive time to and from domicile	#
Continuous	Average number of round-trip drives to and from domicile (round-trip = 1)	#
Categorical	What reasons do you commute?	Select answers
	How much commute has affected:	
Interval	Work	Likert Scale 1-7
	Family	Likert Scale 1-7
	Leisure / Health	Likert Scale 1-7
	Finances	Likert Scale 1-7
	SWLS Questions:	
Interval	In most ways my life is close to ideal?	Likert Scale 1-7
	The conditions of my life are excellent?	Likert Scale 1-7
	I am satisfied with my life?	Likert Scale 1-7
	So far I have gotten the most important things in my life?	Likert Scale 1-7
	If I could live my life over, I would change almost nothing?	Likert Scale 1-7

Table 4 cont. Variables Collected in Quantitative Survey.

Variable Type	Abbreviated Question	Answer
Multiple Response	Indicate reasons for commute	9 Response Options
Categorical	Aspire to move to mainline?	Yes or No
Write-In	Anything else you want your airline to know to try and make commuting better?	Fill in the blank

Protection of Human Subjects

Pilots who participated – or did not participate – in this study did so voluntarily and at no jeopardy to themselves in regard to their employment status at their respective airline. Furthermore, all pilots who participated understood their individual results would not be disclosed in the research. All participants understood that individual responses would not be shared with their employer so long as they did not disclose any criminal activity. All responses, both qualitative and quantitative, were completely de-identified to protect the individuals.

CHAPTER III

RESULTS

This study consisted of two parts. First, qualitative interviews followed by a quantitative survey. The quantitative survey was conducted using a regional airline's pilot group, which consisted of over 1,800 regional pilots. These pilots were asked to volunteer participation through completion of an online survey. In total, there were 271 survey responses. From those responses, all participants who had less than 100 hours of flight time at a FAR Part 121 airline and less than one year experience at a FAR Part 121 airline were removed. Those parameters were chosen to allow pilots to gain enough experience within the airline industry so that they could give proper perspective to the quantitative survey questions. Secondly, these parameters are commonly used within the airline industry as metrics for pilots.

1) 100 hours of aircraft experience within four months of initial simulator evaluations.

2) One year probationary period for each new pilot hired at most airlines.

In total, there were 253 participants after removing FAR Part 121 regional airline pilots who did not meet the minimum experience, as well as submitted surveys in which no questions were answered.

Satisfaction With Life Scores Between Different Groups of Regional Pilots

A series of statistical tests were conducted that compared Satisfaction With Life Scores between different groups of pilots. Numerous pilot backgrounds and characteristics were compared utilizing the Satisfaction With Life Scale (SWLS) to determine where significant differences in scores may arise. First, all pilot data was tested (commuting pilots and traditionally commuting pilots) to see where distinctions ran across the entire regional pilot population. Then, only data from commuting regional airline pilots were tested to see where distinctions ran between commuting pilot subgroups. When applicable, the median was used to create as close to the equal number in each group as possible and reduce outlier effects. Statistical tests that were not run under this format are described below in further detail. The SWLS was used to give meaning to pilots' globalized score from the five satisfaction with life survey questions.

Table 5. Satisfaction With Life Scale (SWLS) Score Defined.

SWLS Score	Description
31 to 35	Extremely Satisfied
26 to 30	Satisfied
21 to 25	Slightly Satisfied
20	Neutral
15 to 19	Slightly Dissatisfied
10 to 14	Dissatisfied
5 to 9	Extremely Dissatisfied
23.5 = Average Person Score	

Commute vs Traditional Commute

The first metric used to divide pilots into groups was pilots that commute by airplane to their domicile and those that traditionally commute to their domicile. The independent t-test showed that there was a significant difference in Satisfaction With Life

Scores for regional pilots who commute by airplane (N = 169, M = 22.99, SD = 7.07) and regional pilots who traditionally commute (N = 65, M = 26.23, SD = 6.38), conditions; t(127.90) = -3.37, p = .001. These results suggest that the way regional airline pilots' travel from home to their domicile has an effect on their Satisfaction with Life Score. Specifically, regional airline pilots that commute from their home to domicile by airplane were "Slightly Satisfied" with life. Pilots who traditionally commute from their home to their domicile were considered "Satisfied" with life.

Table 6. Independent Samples t-Test for Commute vs. Traditional Commute.

	Commute by Airplane – Yes	Commute by Airplane – No
N	169	65
Mean	22.99	26.23
SD	7.07	6.38
df	127.90	
t Stat	-3.37*	
Sig. (2-Tailed)	.001	
95% CI	[-5.14, -1.34]	

* $p < .05$

Age

The next metric asked for all pilots' age. Using age, all pilots were separated into multiple groups in different ways. First, age was broken into two categories based on the median. Coincidentally, the median also separated all pilots into two separate groups by approximate generations: Millennials (born between 1980 – 1995) vs. Generation X (born between 1965 – 1980) and Baby Boomers (born between 1946 – 1964). The independent t-test results showed that there was not a significant difference in Satisfaction With Life Scores for all regional pilots whose age was within the Millennial group / at and below the median age (N = 65, M = 24.69, SD = 6.32) and all regional

pilots whose age was within the Generation X and Baby Boomer group / at and above the median age (N = 78, M = 22.67, SD = 7.68), conditions; t(140.99) = 1.73, p = .086.

Table 7. Independent Samples t-Test for All Pilots Age Groups – Median / Generation.

	23 – 34.99 Years Old (Millennial)	35 – 65 Years Old (Gen X & Baby Boomer)
N	65	78
Mean	24.69	22.67
SD	6.32	7.68
df	140.99	
t Stat	1.73	
Sig. (2-Tailed)	.086	
95% CI	[-0.29, 4.34]	

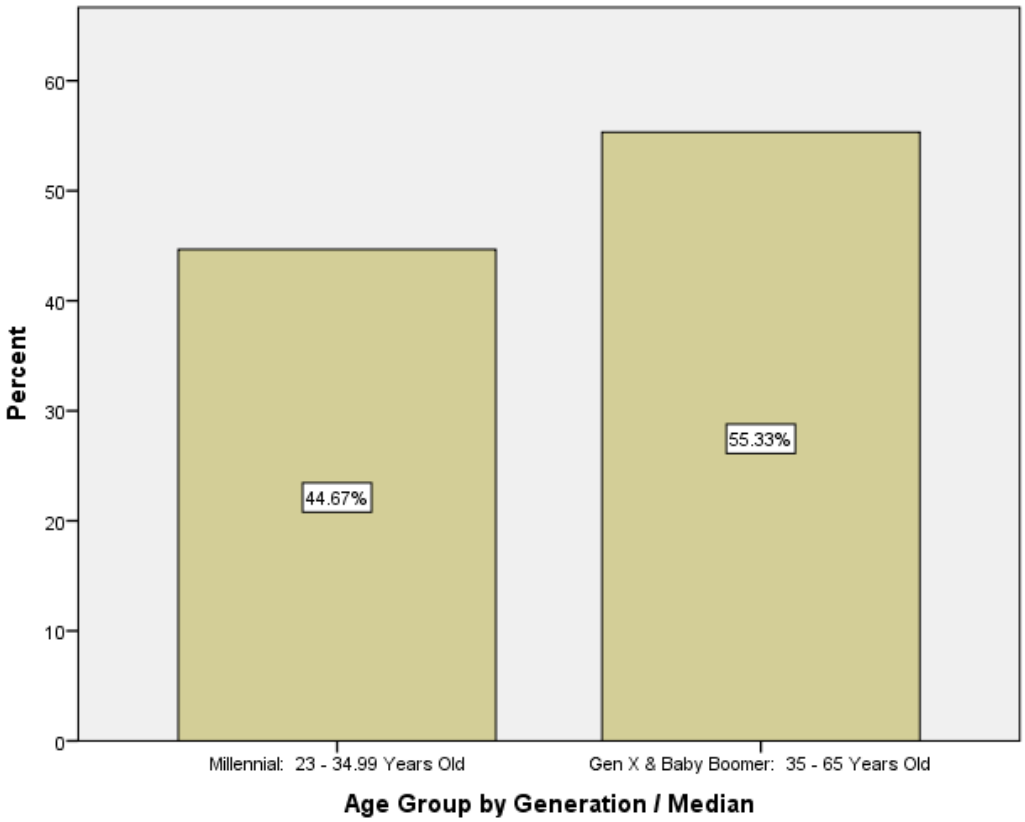

Figure 5. Age Group by Generation / Median.

Next, this study sought to know if only commuting pilots had different Satisfaction with Life Scores based on their generational groups / median age. Similarly, the independent t-test results showed that there was not a significant difference in Satisfaction With Life Scores for regional pilots who commute and whose age was within the Millennial group / at and below the median age (N = 37, M = 24.19, SD = 6.75) and regional pilots who commute and whose age was within the Generation X and Baby Boomer group / at and above the median age (N = 61, M = 21.92, SD = 7.46), conditions; t(96) = 1.51, p = .130. The results from both t-tests based on generations / median age suggest that pilots' generation does not have an effect on their satisfaction with life for the pilot career.

Table 8. Independent Samples t-Test for Commuting Pilots: Age Groups.

	23 – 34.99 Years Old (Millennial)	35 – 65 Years Old (Gen X & Baby Boomer)
N	37	61
Mean	24.19	21.92
SD	6.75	7.46
df	96	
t Stat	1.51	
Sig. (2-Tailed)	.130	
95% CI	[-0.71, 5.25]	

Gender

The next question asked for pilots' gender. Pilots were able to identify as either male or female. The independent t-test results showed that there was not a significant difference in Satisfaction With Life Scores for all regional pilots separated by gender; male (N = 225, M = 23.71, SD = 6.96) and female (N = 11, M = 27.27, SD = 6.74), conditions; t(234) = -1.66, p = .098. Although there was a large response to the survey

conducted, the distribution of male vs. female respondents violated the homogeneity of variance. It is unknown if the breakdown of male vs. female respondents is proportional to the male vs. female total pilots at the surveyed airline.

Table 9. Independent Samples t-Test for All Pilots: Gender.

	Male	Female
N	225	11
Mean	23.71	27.27
SD	6.96	6.74
df	234	
t Stat	-1.66	
Sig. (2-Tailed)	.098	
95% CI	[-7.79, 0.66]	

Next, only commuting pilots were analyzed for their Satisfaction With Life Scores based on commuting and gender. As with the same test for all pilots, the independent t-test for only commuting pilots showed that there was not a significant difference in Satisfaction With Life Scores for commuting male regional pilots (N = 162, M = 22.85, SD = 7.03) and commuting female regional airline pilots (N = 6, M = 26.50, SD = 8.48), conditions; $t(216) = -1.24$, $p = .216$. This test also violated the homogeneity of variance. These results from both t-tests based on gender suggest that gender does not affect a pilot's satisfaction with life.

Table 10. Independent Samples t-Test for Commuting Pilots: Gender.

	Male	Female
N	162	6
Mean	22.85	26.50
SD	7.03	8.48
df	166	
t Stat	-1.24	
Sig. (2-Tailed)	.216	
95% CI	[-9.46, 2.15]	

Legal Dependent

The next questions in the survey probed whether the regional airline pilots had a legal dependent at home. The intent was to identify additional responsibilities pilots may have in life by inquiring if they were legally responsible for someone other than themselves. The independent t-test results showed that there was not a significant difference in Satisfaction With Life Scores for all pilots with a legal dependent at home (Married/Domestic Partner or Child Under 18) (N = 177, M = 23.77, SD = 7.22) and all pilots with no legal dependent (Single No Children, Divorced No Children, or Single Living with Boyfriend/Girlfriend/Fiancé with No Children) (N = 54, M = 24.41, SD = 6.44), conditions; t(229) = -.583, p = .560.

Table 11. Independent Samples t-Test for All Pilots: Legal Dependent.

	Yes	No
N	177	54
Mean	23.77	24.41
SD	7.22	6.44
df	229	
t Stat	-.583	
Sig. (2-Tailed)	.560	
95% CI	[-2.80, 1.52]	

Next, commuting pilots were only assessed. The independent t-test did not yield significant results for Satisfaction With Life Scores for commuting pilots with a legal dependent at home (Married/Domestic Partner or Child Under 18) (N = 131, M = 22.67, SD = 7.22) and commuting pilots with no legal dependent at home (Single No Children, Divorced No Children, or Single Living with Boyfriend/Girlfriend/Fiancé with No Children) (N = 32, M = 24.16, SD = 6.75), conditions; t(161) = -1.06, p = .293. The combine t-test results suggest pilots with dependents at home does not affect their satisfaction with life.

Table 12. Independent Samples t-Test for Commuting Pilots: Legal Dependent.

	Yes	No
N	131	32
Mean	22.67	24.16
SD	7.22	6.75
df	161	
t Stat	-1.06	
Sig. (2-Tailed)	.293	
95% CI	[-4.62, 1.29]	

Due to the multiple groups that were an option for the "dependent" survey questions, a t-test was also conducted solely on pilots' relationship status response. Possible responses were:

1. Married / Domestic Partner
2. Divorced
3. Single: Never Been Married
4. Single: Living with Boyfriend / Girlfriend / Fiancé
5. Widowed
6. Other

Pilots were separated into groups by 1) Married / Domestic Partner and 2) All other responses. Over 72% of pilots fell into the category of "Married / Domestic Partner," while the remaining 28% of the respondents fell into the other five response groupings.

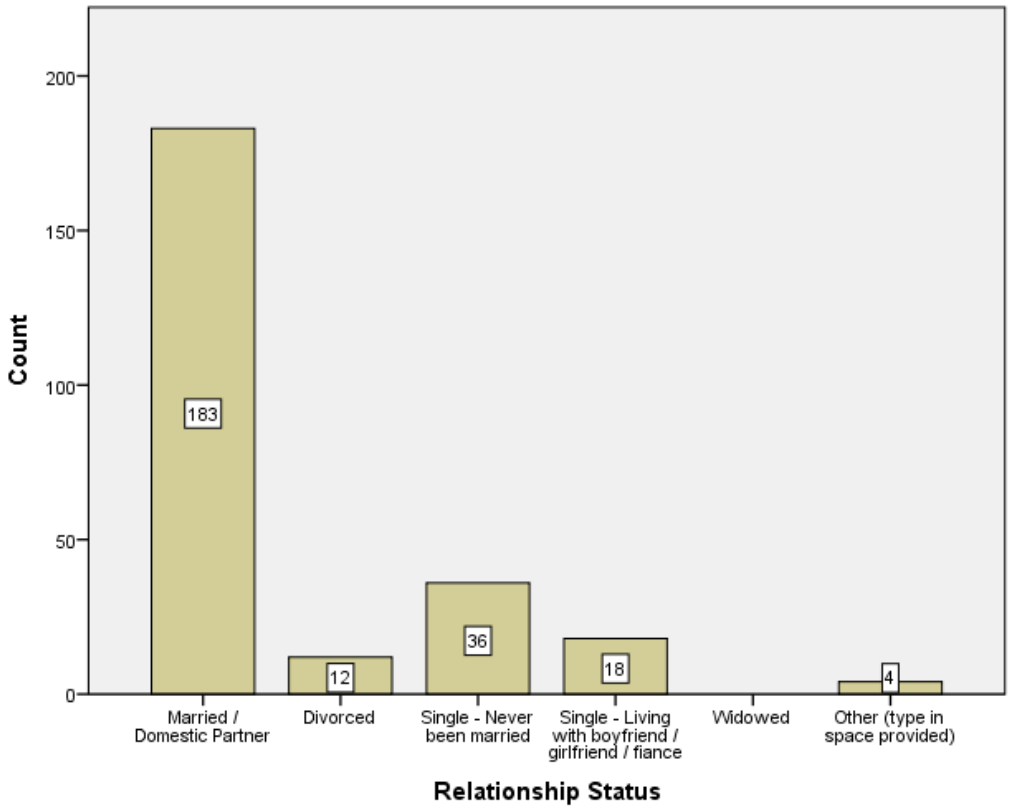

Figure 6. Relationship Status Responses.

The independent t-test results showed that there was not a significant difference in Satisfaction With Life Scores for all pilots who were Married/Domestic Partner (N = 172, M = 23.84, SD = 7.15) and all pilots which fell in any other relationship category (Other) (N = 62, M = 24.35, SD = 6.51), conditions; t(232) = -.494, p = .621.

Table 13. Independent Samples t-Test for All Pilots: Relationship Status.

	Married / Domestic Partner	Other
N	172	62
Mean	23.84	24.35
SD	7.15	6.51
df	232	
t Stat	-.494	
Sig. (2-Tailed)	.621	
95% CI	[-2.55, 1.53]	

Again, only commuting pilots were analyzed next. The independent t-test results showed that there was not a significant difference in Satisfaction With Life Scores for commuting pilots who were Married/Domestic Partner (N = 128, M = 22.88, SD = 7.19) and commuting pilots which fell in any other relationship category (Other) (N = 37, M = 23.65, SD = 6.75), conditions; t(163) = -.584, p = .560. Combined, these t-tests indicate that relationship status does not affect a commuting pilot's Satisfaction With Life Score.

Table 14. Independent Samples t-Test for Commuting Pilots: Relationship Status.

	Married / Domestic Partner	Other
N	128	37
Mean	22.88	23.65
SD	7.19	6.75
df	163	
t Stat	-.584	
Sig. (2-Tailed)	.560	
95% CI	[-3.39, 1.84]	

Primary Provider

The next survey question inquired if pilots were the primary provider within their household. The intent was to see if the responsibility to provide for themselves or a family affected satisfaction with life. Interestingly, only 44% of the respondents were the

primary providers, while slightly under 56% were not the primary providers. When analyzing all pilots together, the independent t-test results did not yield a significant difference in Satisfaction With Life Scores for those who were the primary provider within their household (N = 84, M = 22.81, SD = 7.67) and those who were not the primary providers within their household (N = 107, M = 24.38, SD = 6.60) conditions; t(164.20) = -1.50, p = .136. This indicates that the responsibility of being a primary provider within a household does not affect all pilots' (commuting and traditionally commuting) Satisfaction With Life Score.

Table 15. Independent Samples t-Test for All Pilots: Primary Provider.

	Yes	No
N	84	107
Mean	22.81	24.38
SD	7.67	6.60
df	164.20	
t Stat	-1.50	
Sig. (2-Tailed)	.136	
95% CI	[-3.65, 0.50]	

Conversely, when analyzing only the sub-group of commuting pilots, the independent t-test results did provide a significant difference in Satisfaction With Life Scores for commuting pilots who were primary provider within their household (N = 60, M = 21.28, SD = 7.53) and commuting pilots were not the primary provider within their household (N = 83, M = 23.69, SD = 6.63) conditions; t(141) = -2.02, p = .045. This indicated that pilots that commute and have the added responsibility of serving as the primary provider within a household have a lower satisfaction in life compared to their counterparts who are not the primary providers within their household.

Table 16. Independent Samples t-Test for Commuting Pilots: Primary Provider.

	Yes	No
N	60	83
Mean	21.28	23.69
SD	7.53	6.63
df	141	
t Stat	-2.02*	
Sig. (2-Tailed)	.045	
95% CI	[-4.76, -0.05]	

*p < .05

Children At Home

The next questions focused solely on children within pilots' households. The intent was to see if the further responsibility of children within the pilots' household had an effect on Satisfaction With Life Score. Children were defined as under 19 years old and not yet completed high school / GED. First, a t-test was conducted splitting all pilots into two groups; those without children and those with children.

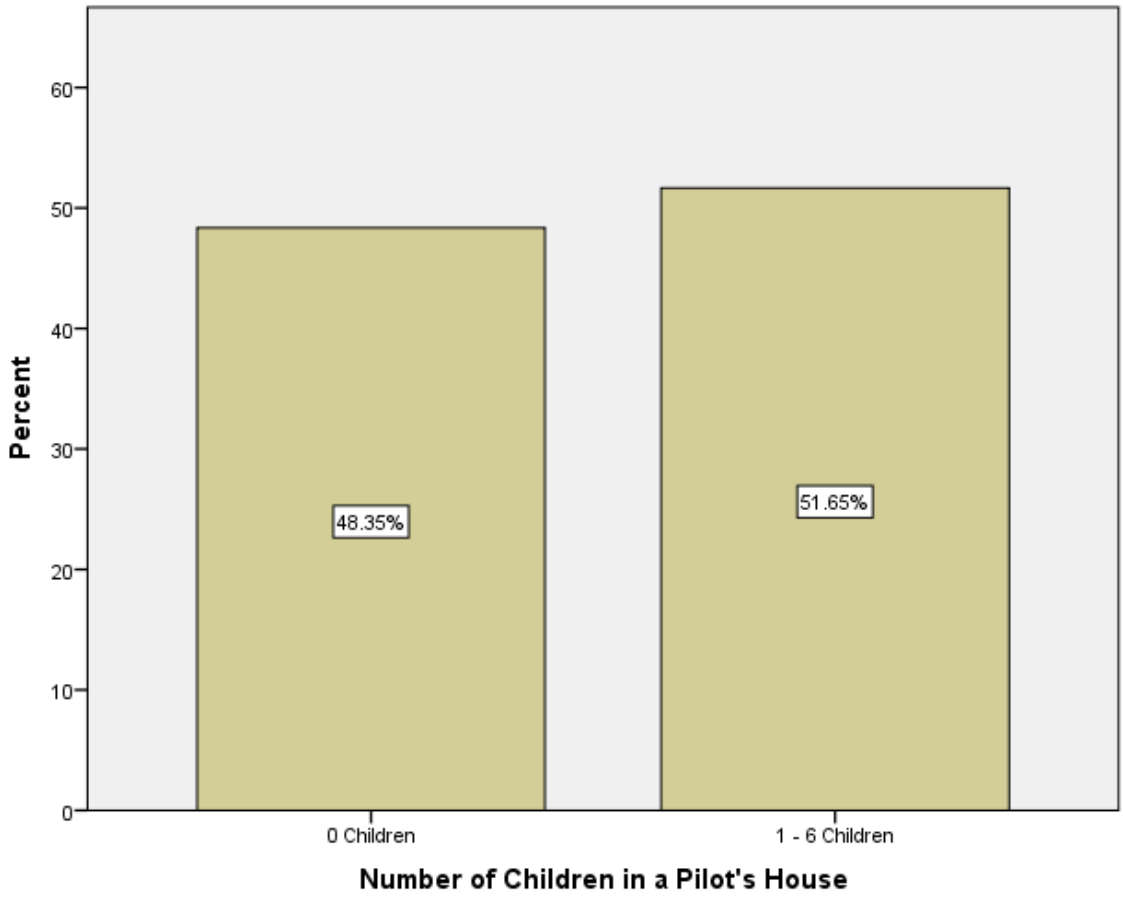

Figure 7. Number of Children in a Pilot's House.

The independent t-test results showed that there was not a significant difference in globalized Satisfaction With Life Scores based on all pilots that had no children in their house (N = 108, M = 24.54, SD = 6.88) and all pilots who had one or more children in their house (N = 121, M = 23.06, SD = 7.12) conditions; t(227) = 1.60, p = .112.

Table 17. Independent Samples t-Test for All Pilots: Number of Children.

	0 Children	1 or More Children
N	108	121
Mean	24.54	23.06
SD	6.88	7.12
df	227	
t Stat	1.60	
Sig. (2-Tailed)	.112	
95% CI	[0.39, 3.31]	

Next, only commuting pilots were split into two separate groups based on the number of children in their household. Again, the two groups of "0 Children" and "1 or More Children" were utilized. The independent t-test results showed that there was not a significant difference in Satisfaction With Life Scores for commuting pilots that had no children in their house (N = 73, M = 23.82, SD = 6.85) and commuting pilots who had one or more children in their house (N = 91, M = 22.11, SD = 6.85) conditions; t(162) = 1.54, p = .126. These results indicate that the number of children in pilots' household's do not affect their satisfaction with life, regardless if they commute or traditionally commute.

Table 18. Independent Samples t-Test for Commuting Pilots: Number of Children.

	0 Children	1 or More Children
N	73	91
Mean	23.82	22.11
SD	6.85	7.28
df	162	
t Stat	1.54	
Sig. (2-Tailed)	.126	
95% CI	[-0.49, 3.91]	

Pilot Position

The next question in the survey sought to know if there was a difference in Satisfaction With Life Scores between all regional airline pilots who are captains and all regional airline pilots who are first officers. A t-test was conducted, but did not yield significant results for all captains (N = 117, M = 23.54, SD = 6.94) and all first officers (N = 110, M = 24.27, SD = 7.14), conditions; t(225) = -.786, p = .433.

Table 19. Independent Samples t-Test for All Pilots: Pilot Position.

	Captain	First Officer
N	117	110
Mean	23.54	24.27
SD	6.94	7.14
df	225	
t Stat	-.786	
Sig. (2-Tailed)	.433	
95% CI	[-2.58, 1.11]	

Next, only commuting pilots were separated by their pilot position, whether they commuted, and their Satisfaction With Life Score. First, captains were analyzed. The independent t-test results showed that there was a strong significant difference in Satisfaction With Life Scores for commuting captains (N = 89, M = 22.28, SD = 6.63) and traditionally commuting captains (N = 28, M = 27.54, SD = 6.48) conditions; t(115) = -3.86, p < .001. This indicates that captains that can live close enough to their assigned domicile to traditionally commute have a much higher satisfaction with life compared to their commuting captain peers.

Table 20. Independent Samples t-Test for All Captains.

	Captains: Commute by Airplane?	
	Yes	No
N	89	28
Mean	22.28	27.54
SD	6.63	6.48
df	115	
t Stat	-3.68*	
Sig. (2-Tailed)	<.001	
95% CI	[-8.09, -2.42]	

* $p < .05$

First officers were analyzed on the same conditions: Whether they commuted and the Satisfaction with Life Score. The independent t-test results did not show that there was a significant difference in Satisfaction with Life Scores for commuting first officers ($N = 72$, $M = 23.72$, $SD = 7.59$) and traditionally commuting first officers ($N = 35$, $M = 25.29$, $SD = 6.32$) conditions; $t(79.63) = -1.12$, $p = .265$. When combining t-test results from captain tests and first officer tests, commuting may affect captains' satisfaction with life, but it seems to have no significant effect on first officers.

Table 21. Independent Samples t-Test for All First Officers.

	First Officers: Commute by Airplane?	
	Yes	No
N	72	35
Mean	23.72	25.29
SD	7.59	6.32
df	79.63	
t Stat	-1.12	
Sig. (2-Tailed)	.265	
95% CI	[-4.34, 1.21]	

Finally, captains that commute and first officers that traditionally commute were analyzed against each other. This was done as many senior first officers are faced with

the dilemma of commuting to an upgrade as a junior captain (higher pay, more responsibility, but much lower relative captain seniority) or remain in domicile to traditionally commute as a senior first officer (lower pay, less responsibility, but much better relative first officer seniority). The independent t-test results did show that there was a significant difference in Satisfaction with Life Scores for commuting captains (N = 89, M = 22.28, SD = 25.65) and traditionally commuting first officers (N = 34, M = 25.65, SD = 6.04) conditions; t(121) = -2.58, p = .011. These result indicate that first officers that traditionally commute to their domicile would be happier in life 1) moving to a new captain domicile assignment if different than their first officer domicile assignment, or 2) waiting to upgrade to captain until they can hold their current domicile assignment if unwilling or unable to move.

Table 22. Independent Samples t-Test for Pilot Position & Commute Type.

	Captain: Commute	First Officer: Traditionally Commute
N	89	34
Mean	22.28	25.65
SD	6.63	6.04
df	121	
t Stat	-2.58*	
Sig. (2-Tailed)	.011	
95% CI	[-5.95, -0.78]	

* $p < .05$

Flight Hours

Flight hours gained in a FAA Part 121 airline environment was the next survey topic. First, this question was used to remove applicants who had less than 100 flight hours as a FAR Part 121 crewmember. Next, pilots were broken into two groups by the

median FAR Part 121 flight hours (5,000). The independent t-test results did not yield a significant difference in Satisfaction With Life Scores for all pilots under the median flight hours (N = 105, M = 24.03, SD = 6.91) and all pilots at and above the median flight hours (N = 108, M = 23.31, SD = 7.11), conditions; t(211) = .743, p = .458.

Table 23. Independent Samples t-Test for All Pilots: Median Flight Hours.

	100 – 4,999 FAR 121 Flight Hours	5,000 and Greater FAR 121 Flight Hours
N	105	108
Mean	24.03	23.31
SD	6.91	7.11
df	211	
t Stat	.743	
Sig. (2-Tailed)	.458	
95% CI	[-1.18, 2.61]	

Flight hours was next assessed only accounting for only commuting pilots to see if it affected their Satisfaction with Life Score. The independent t-test results did not give a significant difference in Satisfaction With Life Scores for commuting pilots who had the median flight hours (N = 66, M = 23.24, SD = 7.27) and commuting pilots who had at and above the median flight hours (N = 85, M = 22.49, SD = 7.03), conditions; t(149) = .639, p = .524. These results suggest that as regional airline pilots become more experienced (in terms of flight hours), there is no affect on their satisfaction with life.

Table 24. Independent Samples t-Test for Commuting Pilots: Median Flight Hours.

	1,500 – 4,999 Flight Hours	5,000 and Greater Flight Hours
N	66	85
Mean	23.24	22.49
SD	7.27	7.03
df	149	
t Stat	.639	
Sig. (2-Tailed)	.524	
95% CI	[-1.57, 3.06]	

Length of Employment

Next, surveyed pilots needed to be put into equal size groups based on length of employment. To do this, the median employment length at the surveyed regional airline (nine years) was used. The independent t-test did not yield significant differences in Satisfaction With Life Scores for all pilots under the median employment length (N = 116, M = 23.28, SD = 7.31) and all pilots at and above the median employment length (N = 118, M = 24.43, SD = 6.68), conditions; t(232) = -1.25, p = .211.

Table 25. Independent Samples t-Test for All Pilots: Median Employment Length.

	8.99 Years and Under	9.00 Years And Over
N	116	118
Mean	23.28	24.43
SD	7.31	6.68
df	232	
t Stat	-1.25	
Sig. (2-Tailed)	.211	
95% CI	[-2.95, 0.67]	

Next, only commuting pilots were assessed under the same conditions. The independent t-test did not yield significant differences in Satisfaction With Life Scores

for commuting pilots under the median employment length (N = 79, M = 22.51, SD = 7.55) and commuting pilots at and above the median employment length (N = 88, M = 23.30, SD = 6.64), conditions; t(165) = -.719, p = .473. Again, these t-tests suggest that as experience is gained through years of service as an airline pilot, it has no effect on their satisfaction with life.

Table 26. Independent Samples t-Test for Commuting Pilots: Median Employment Length.

	8.99 Years and Under	9.00 Years And Over
N	79	88
Mean	22.51	23.30
SD	7.55	6.64
df	165	
t Stat	-.719	
Sig. (2-Tailed)	.473	
95% CI	[-2.96, 1.38]	

Commute Distance

The next set of questions sought to determine if Satisfaction With Life Scores were affected by airplane commute distances using straight line distance that a pilot normally commutes. This was done by asking pilots their domicile assignment, and the airport from which pilots normally start their commute. A straight line distance calculation was completed through an online based distance mapping system. There was no significant correlation between total straight line distance commuted and Satisfaction With Life Scores, r = .029, p = .716.

Next, commuting pilots were broken into two separate groups based on the median distance commuted (789 statute miles) to see if there was a difference in Satisfaction With Life Scores. There was no significant difference in Satisfaction with

Life Scores for commuting pilots under the median commute distance (N = 66, M = 23.24, SD = 7.27) and commuting pilots at and above the median commute distance (N = 85, M = 22.49, SD = 7.03), conditions; t(149) = .639, p = .524. This suggests that the distance pilots commute has no effect on their satisfaction with life.

Table 27. Independent Samples t-Test for Commuting Pilots: Median Commute Distance.

	Under 789 Statute Miles	At and Above 789 Statue Miles
N	66	85
Mean	23.24	22.49
SD	7.27	7.03
df	149	
t Stat	.639	
Sig. (2-Tailed)	.524	
95% CI	[-1.57, 3.06]	

Pilot Commute Percentages

In previous research conducted by the National Research Council, it gathered Home of Record data for participating airlines and pilots. These were combined with pilot domicile assignments to get a possible straight line distance commute length. The National Research Council assumed all pilots with a Home of Record within 150 miles of their domicile traditionally commuted to work, which equated to 44% of regional airline pilots. On the other side, the study assumed all pilots with a Home of Record greater than 150 miles from their domicile commute to work, which equated to 56% of the regional airline pilots (National Research Council, 2011).

Table 28. National Research Council Study: Assumed Pilot Commute Percentages.

Most Likely Commute Type	Traditional Commute	Commute by Air	
Distance	0 – 150 Miles	151 - 750 Miles	750 Miles and Greater
Regional Airline	44%	34%	22%

Data collected in this study for the survey airline was able to determine that only 26.1% of regional airline pilots traditionally commuted to their domicile (unknown length), 62.8% of regional airline pilots commuted by airplane to their domicile, and 11.1% not reporting commute type or length. Far more regional airline pilots are commuting by airplane vs. traditional commuting than previously thought.

Table 29. Actual Pilot Commute Percentages.

Commute Type	Commute Type Unknown	Traditional Commute	Commute by Air			
Distance	Unknown Distance	Unknown Distance	0 – 90 Miles	91 - 150 Miles	151 - 750 Miles	750 Miles and Greater
Regional Airline	11.10%	26.10%	0%	2.00%	28.00%	32.80%

Commute Distance

To align this study with previous research conducted by the National Research Council, pilots were separated into the two categories of "151 – 750 Miles" and "751 Miles and Greater" for a t-test. There were no significant differences in Satisfaction With Life Scores for pilots that commuted 151 – 750 Miles (N = 69, M = 23.23, SD = 6.79) and pilots that commuted 751 Miles and Greater (N = 81, M = 23.23, SD = 7.01),

conditions; t(148) = -.002, p = .998. Again, this suggests that commute distance does not have an effect on pilot satisfaction with life.

Table 30. Independent Samples t-Test for Commuting Pilots: Commute Length.

	151 – 750 Statute Miles	751 and Greater Statute Miles
N	69	81
Mean	23.23	23.23
SD	6.79	7.01
df	148	
t Stat	-.002	
Sig. (2-Tailed)	.998	
95% CI	[-2.24, 2.23]	

Commute on Days Off

When airline pilots' duty day starts early in the morning, the need to commute the day before the beginning of a trip (their day off) is needed to report for work on time. The same can be true when pilots' trips end later in the evenings. Pilots must commute home the next day (their day off) as there are no more flights from their domicile to home. In a worse case commute scenario, both the beginning of a trip and the end of a trip are considered "un-commutable." This study found that 11.1% of pilots needed to normally commute in this style. Alternatively, 66.1% of pilots reported they normally had to commute a day before a trip began, or a day after it ended (partially commutable trip, loss of only a single day off). Only 22.8% of pilots reported being able to normally commute to domicile on the first day of their trip, and commute home on the last day of their trip (commutable trip, loss of zero days off).

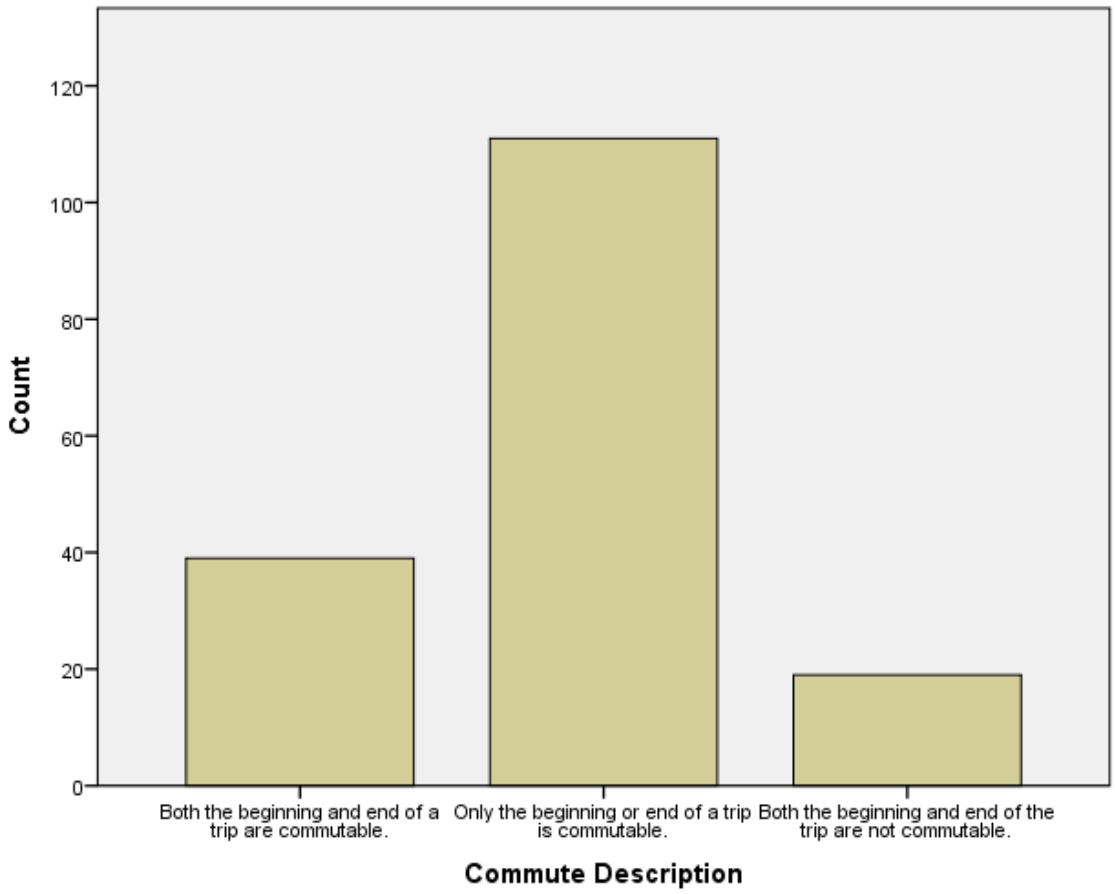

Figure 8. Commute Description Results.

A One Way Between-Groups ANOVA was conducted to compared the different commute types effect on Satisfaction With Life Scores for commutable trips, partially commutable trips, and un-commutable trips. There was a significant effect on commute type and Satisfaction With Life Score $F(2, 162) = 8.06$, $p < .001$. Post Hoc comparisons using the Tukey HSD test indicated that the mean Satisfaction With Life Score for un-commutable trips ($N = 18$, $M = 17.61$, $SD = 1.70$) was significantly different than commutable trips ($N = 38$, $M = 25.42$, $SD = 5.85$), and partially commutable trips ($N = 109$, $M = 22.86$, $SD = 7.03$).

Table 31. Between Groups ANOVA for Commuting Pilots: Commute Type.

	Both Beginning and End of Trip are Commutable (Commutable)	Only Beginning or End of Trip is Commutable (Partially Commutable)	Both Beginning and End of Trip are Not Commutable (Un-commutable)
N	38	109	18
Mean	25.42	22.86	17.61
SD	5.85	7.03	1.70
95% CI	[23.50, 27.34]	[21.53, 24.20]	[14.02, 21.20]
F	8.06*		
p	< .001		

* p < .05

Table 32. Post Hoc Analysis - Tukey HSD for Commuting Pilots: Commute Type.

			MD	SE	Sig.	95% CI	
						LL	UL
Tukey HSD	Commutable Trip	Partially Commutable Trip	2.559	1.281	.116	-.47	5.59
		Un-commutable Trip	7.810*	1.945	.000	3.21	12.41
	Partially Commutable Trip	Commutable Trip	-2.559	1.281	.116	-5.59	.47
		Un-commutable Trip	5.251*	1.730	.008	1.16	9.34
	Un-commutable Trip.	Commutable Trip	-7.810*	1.945	.000	-12.41	-3.21
		Partially Commutable Trip	-5.251*	1.730	.008	-9.34	-1.16

* p < .05

These results strongly suggest that the types of trips pilots are awarded on their schedules affects their satisfaction with life. Pilots who primary fly un-commutable trips are considered "Slightly Dissatisfied" with life. In contrast, pilots that can fly commutable trips, or partially commutable trips are considered "Slightly Satisfied" with life.

Time Spent Commuting in a Month

It is known that if traditional commuters spend over an hour commuting one way to work (two or more hours for round trip in a day), then their subjective well-being is lower when compared to their counterparts who traditionally commute under an hour one way to work (Stutzer & Frey, 2008). This study sought to determine if this same concept held true for pilots. Since pilots do not commute by airplane five times a week, monthly commute times were assessed. First, a traditional commute of two hours roundtrip equated to 43.33 hours traditionally commuting a month:

2 hours roundtrip traditional commute a day
X 5 days traditional commute a week = 10 hours traditional commute a week
X 52 weeks in a year = 520 hours traditional commute a year
/ 12 months in a year = 43.33 hours traditional commute an average month

Commuting pilots were split into two groups based on under 43.33 hours commuting a month, and at and above 43.33 hours commuting a month. Pilot commute times were determined by asking two questions. First, on average how many round trip commutes are completed in a month? Second, on average how much time does a round trip commute take? These two numbers were multiplied by each other to get total monthly commute times. An independent samples t-test showed that the difference in Satisfaction With Life Scores for commuter pilots who reported commuting at or above 43.33 hours a

month (N = 21, M = 18.90, SD = 7.08) and commuter pilots who reported commuting below 43.33 hours a month (N = 138, M = 23.57, SD = 6.87) was statistically significant, conditions; t(157) = 2.89, p = .004.

Table 33. Independent Samples t-Test for Commuting Pilots: Monthly Commute Time.

	Commute Time Under 43.33 Hours a Month	Commute Time At or Above 43.33 Hours a Month
N	138	21
Mean	23.57	18.90
SD	6.87	7.08
df	157	
t Stat	2.89*	
Sig. (2-Tailed)	.004	
95% CI	[1.47, 7.85]	

* $p < .05$

These results for pilot commutes, when taken on a monthly average of commute hours, support the traditional commuter theory that longer than an hour one-way commute to work/domicile equates to a lower Satisfaction With Life Score. Pilots, who on a monthly average, need to commute an hour one way to work are considered "Slightly Dissatisfied" with life, where as pilots, who on a monthly average, need to commute less than one hour one way to work are considered "Slightly Satisfied" with life.

Number of Flight on On-Way Commute

The next question in the survey wanted to determine if the number of legs in pilots' commutes affected their satisfaction with life. For most pilots, they were able to commute from their home to domicile utilizing a single flight (90.5%). However, some pilots needed to utilize two or more flight to get from their home airport to their domicile (9.5%). This was due to there being no direct flights from their home airport to their

domicile. An independent sample t-test showed that the significant difference in Satisfaction With Life Scores for pilots that were able to commute from home to domicile using a one leg commute (N = 153, M = 23.71, SD = 6.79) and for pilots that had to use two or more legs to commute from home to domicile (N = 16, M = 16.19, SD = 6.22) was statistically significant, conditions; $t(167) = 4.26$, $p < .001$.

Table 34. Independent Samples t-Test for Commuting Pilots: Number of Legs in Commute.

	1 Leg in Commute	2 or More Legs in Commute
N	153	16
Mean	23.71	16.19
SD	6.79	6.22
df	167	
t Stat	4.26*	
Sig. (2-Tailed)	<.001	
95% CI	[4.02, 11.01]	

* $p < .05$

These results suggest that the number of legs in pilots' commutes has an effect on their satisfaction with life. Pilots that must rely on two or more flights during their commutes are "Slightly Dissatisfied" with life, where as pilots who must rely on a single commute flight are "Slightly Satisfied" in life.

Average Number of Flights: Home to Domicile

The next survey question separated pilots into groups by the number of flights from the airport they normally commute from (home airport) to their domicile. Pilots were separated into two groups based on the median number of flights per day (6). An independent t-test was conducted and did not yield significant results on commuting pilots' Satisfaction With Life Scores for pilots who reported below the median flight per day from home to domicile (N = 68, M = 85, SD = 7.31) and for pilots who reported at

and above the median flights per day from home to domicile (N = 85, M = 24.49, SD = 6.27), conditions; t(151) = -1.62, p = .108.

Table 35. Independent Samples t-Test for Commuting Pilots: Flights Home – Domicile.

	5 or Less	6 or More
N	68	85
Mean	22.72	24.49
SD	7.31	6.27
df	151	
t Stat	-1.62	
Sig. (2-Tailed)	.108	
95% CI	[-3.94, 0.40]	

Areas of Pilots' Lives Most Affected by Commuting

Part of what is the foundation of the Satisfaction With Life Scale (SWLS) are the domains of Subjective Well-Being (SWB). Using the same Likert scale from the globalized SWLS test, pilots were asked to how their commute has affected five of the six specific domains of their SWB. The domains of SWB targeted were: Work, Family, Leisure / Health, Finances and One's Group. These domains were targeted to see if a single domain of SWB that was affected more than another. The domain not targeted not was Self. It was not targeted as the Self domain required input beyond which the online survey could obtain. The Domain of One's Group is determined based on total group score; in this case, the group was "Commuting Regional Airline Pilots." Since the Self domain score was not gathered, the One's Group domain is not a true score. Nevertheless, it was still reported in this study.

Table 36. Domains of Subjective Well-Being (SWB) Scores.

	Commute Affect on Work or Job	Commute Affect on Family	Commute Affect on Leisure Time / Health	Commute Affect on Finances	Commute Affect One's Group
N	173	173	173	173	173
Mean	2.84	2.64	2.35	2.88	2.6777
SD	1.291	1.110	1.082	1.158	.96176
Variance	1.667	1.231	1.170	1.340	.925

The domain of Leisure Time / Health (2.35) was most affected by pilot commuting, scoring the lowest of the groups tested. The domains of Family (2.64), One's Group (2.68), Work (2.84), and Finances (2.88) followed in order. All domains fell within the "Dissatisfied" category (2.00 – 3.00).

Table 37. Subjective Well-Being Scale Scores.

Score	Description
7.00	Extremely Satisfied
6.00 - 6.99	Satisfied
5.00 - 5.99	Slightly Satisfied
4.00 - 4.99	Neutral
3.00 - 3.99	Slightly Dissatisfied
2.00 - 2.99	Dissatisfied
1.00 - 1.99	Extremely Dissatisfied

Reasons Why Pilots Commute

To confirm or deny previous research conducted by the National Research Council, pilots that indicated they commuted to their domicile by airplane were asked the reasons why they commute. Possible responses were taken directly from the previous researcher, as well as the additions of "Sole or Primary Provider in Household" and an "Other" option. The pilot could select as many reasons as needed for this question. The National Research Council did not use a representative pilot population in their study, so

differences in results were expected. In Table 54 below, the left side is the percentage of responses in this study. In the center of the table is the reason for the pilot commute. On the right side of the table is the rank of the reason for this study and the National Research Council study (# / #). The National Research Council study did not provide percentages for their data, only rank order.

Table 38. Reasons Why Regional Airline Pilots Commute.

Percentage in This Study	Reason	This Study / NRC Study Rank
60.8%	Desire to maintain family stability	1 / 4
51.1%	Lifestyle choice (IE - good weather, outdoor living, etc.	2 / 6
44.9%	High cost of living near domicile location	3 / 1
37.5%	Frequent domicile closings & future unpredictability of airline industry	4 / 2
37.0%	Low pay, especially for regional carriers	5 / 5
20.5%	Cost and availability of adjunct sleeping accommodations	6 / 3
16.5%	Sole or primary provider in household	7 / N/A
15.0%	Other	8 / N/A
11.9%	Absence of adequate coverage for costly moving expenses	9 / 7

Desire to maintain family stability and lifestyle choice were ranked much higher in this study. High cost of living near domicile dropped to third place in this study, but it was ranked first in the NRC study. Nevertheless, it was still reported by almost 45% of the pilots. Frequent domicile closings & future unpredictability of airline industry, and cost of and availability of adjunct sleeping accommodations fell to lower positions in this

study. Both low pay and absence of adequate coverage for costly moving expenses matched the NRC study rankings. Differences from this study and the NRC study could be explained by the use of a representative pilot population, and possible domicile locations of the regional airline surveyed.

CHAPTER IV

DISCUSSION

Significance

Commute vs Traditional Commute

The primary research question in this study was to determine if commuting by airplane affected regional airline pilots' satisfaction with life. Just as traditional commuting was described, commuting by airplane was found to be an activity in pilots' lives that demanded a significantly large portion of their valuable and limited time. This large portion of valuable, limited and unproductive time led commuting pilots to have a lower Satisfaction With Life Score (22.99 – Slightly Satisfied) compared to their traditionally commuting counterparts (26.23 – Satisfied). Pilots who were able to traditionally commute to their domicile spent a median additional time of six hours a month (mean of 11.67 hours) traditionally commuting spread over a median of five days (mean of 6.98 days). Pilots that commuted by airplane spent a median time of 24 hours a month (mean of 27.42 hours) commuting spread over a median of eight days (mean of 8.5 days). That is a difference of 1.8 hours per commute day (mean difference of 1.56 hours per commute day).

Table 39. Median Pilot Commute Times.

	Median Commute Hours a Month	Median Number of Commutes a Month	Median Daily Commute Hours on Commute Day	Median Hours Difference per Commute Day
Traditional Commuter Pilot	6	5	1.2	1.8
Airplane Commuter Pilot	24	8	3	

Table 40. Mean Pilot Commute Times.

	Mean Commute Hours a Month	Mean Number of Commutes a Month	Mean Daily Commute Hours on Commute Day	Mean Hours Difference per Commute Day
Traditional Commuter Pilot	11.67	6.98	1.67	1.56
Airplane Commuter Pilot	27.42	8.5	3.23	

Commute Impedance

Commute Hours + Commute Legs + Commute Days = Lower SWLS

The second research question this study sought to answer what aspects of traditional commuting related to pilot commuting. This study found that the traditional Commute Impedance Model applied to airplane commuting as well. Commute impedance was evident by the lower Satisfaction With Life Scores for commuting pilots, and the additional time needed to commute by airplane. Specifically, this study found

three-time sensitive areas of subgroups for commuting pilots in which statistically significant Satisfaction With Life Scores were evident:

1. Monthly Commute Time Over/Under 43.33 Hours
2. Commute Type on Days Off
3. Commute Type: 1 Leg vs. 2 or More Leg One Way Commute (indirect measure of time)

First, pilots that needed to commute over 43.33 hours a month had a significant and much lower satisfaction with life (18.90). In terms of time, this is the equivalent of a one hour, one way traditional commute. When commuter times are longer, there can be fewer opportunities for pilots to commute to or from a domicile in a single leg. A pilot's commute route could be two or more legs (additional impedance), which also equated to a lower Satisfaction With Life Score (16.19). Finally, when more time and more legs were required in pilot commutes, commuting on days off are required (additional time + additional impedance). Pilots that had un-commutable trips at the beginning and end of a trip (loss of two days off) had a lower Satisfaction With Life Score (17.61). The more time pilots spend commuting steals limited and valuable time from other domains of subjective well-being, which creates an overall lower Satisfaction With Life Score.

Findings

Commuting Pilots Sub-Groups

This study further dissected regional airline pilots into sub-groups of commuting pilots and found three key differences in Satisfaction With Life Scores:

1. Commute Pilots – Additional Responsibilities at Home
2. Commute Captains vs. Traditional Commute First Officers

3. Commute Captains vs. Traditional Commute Captains

Commute Pilot – Additional Responsibilities at Home

In this survey, there were four questions asked to separate pilots into sub-groups based on additional responsibilities at home: Primary provider, legal dependent, one or more children at home, and married/domestic partner. Commute pilots who were responsible as the primary provider ($p = .045$) had a significant and lower Satisfaction With Life Score (21.28) compared to commuting pilots who were not the primary providers (23.69). Although both of these scores fell within the "Slightly Satisfied" category, primary provider commuting pilots were at the very lower end of this group score (21 – 25). The exact reason why the additional responsibility of being a primary provider equated to a lower satisfaction score is unknown. The other aspects of additional responsibilities at home for a commuter pilot were not significant: Legal dependent ($p = .293$), one or more children at home ($p = .126$), and married/domestic partner ($p = .560$). Nevertheless, every commuter pilot sub-group which involved additional responsibilities at home had a lower Satisfaction With Life Score compared to their counterparts, which creates the hypothesis of additional responsibilities at home for commuting pilots equates to a lower satisfaction with life. With a large sample population in future studies, this may be able to be proven true on a larger scale.

Table 41. Commuter Pilot Additional Responsibilities Comparison.

	Yes	No	p
Commute Pilot - Primary Provider	21.28	23.69	0.045
Commute Pilot - Legal Dependent	22.67	24.16	0.293
Commute Pilot - Children at Home	22.11	23.82	0.126
Commute Pilot - Married/Domestic Partner	22.88	23.65	0.560

Commute Captain vs. Traditional Commute First Officer

The airline industry is a seniority based system. For a pilot to gain seniority and upgrade from first officer to captain, two things are needed: 1) Time and 2) senior pilot attrition or airline growth. As time passes, first officers gain additional responsibilities in life mentioned above. They are also afforded the opportunity to gain experience and perspective on the airline industry and establish stability in life by deciding where to live. When a captain upgrade is awarded, it is not always awarded in the domicile where a first officer lives. First officers must decide to move to their awarded captain domicile or commute to their new captain domicile. Most pilots are choosing to commute (62.8%) in order to maintain family stability (60.8%), maintain a lifestyle choice (51.1%) or avoid the high cost of living in the new domicile assignment (44.9%). Commuting by airplane is done at the expense of the pilot's satisfaction with life (violation of the Location Theory). Traditional commuting first officers were significantly more satisfied with life (25.65) compared to their commuting captain counterparts (22.28) ($p = .011$), which supports the idea that first officers who can traditionally commute to their domicile should 1) delay upgrade until the same domicile can be held, or 2) move to the new domicile to maintain the ability to commute traditionally. The caveat to moving to a new domicile should be underscored by desired domicile movement; it would not make sense for soon to be captains to move their families to a new domicile if the desired domicile may be obtained within a few months. Each first officer upgrade must be viewed individually be each first officer.

Commute Captains vs. Traditional Commute Captains

The final key finding in this study discovered that regional airline captains who traditionally commuted (27.54) had a much higher Satisfaction With Life Score compared to captains who commuted by airplane (22.28) ($p < .001$). In fact, the category of traditional commute captains had the highest Satisfaction With Life Score for any group within this study, which can be attributed to three reasons. First, the stated differences in commuting vs. traditional commuting.

Secondly, the captain is ultimately responsible for the safety of flight as the Pilot-In-Command (PIC). There is no true "boss" to a captain inside each airplane; the captain is the manager of both the flight deck and cabin crew. Captains have a large degree of freedom as long as each flight is operated within FAA regulations and specific airline Standard Operating Procedures (SOP). Developments and training in Crew Resource Management (CRM) have made the airplane a team-based system in which the captain sees the success of leadership on each safe flight completed.

Finally, regional airline captains have finally made it to a position within aviation to earn a decent salary, especially for the amount of specialized training needed. On average, a fourth year regional airline captain makes approximately $70,000 (Airline Pilot Central, 2015). At that amount of yearly salary, captains are able to pay student loans from flight training, pay student loans from an undergraduate degree (not required but often obtained), provide for a family and start saving for retirement. Although first officer pay – especially new hire pay – has increased significantly since 2015, there remains a pilot pay shortage for regional airlines across the industry (ALPA, 2016).

Future Research

This study was only able to survey a single regional airline. This airline was selected due to its larger pilot group size to try and get a complete quantitative data for statistical testing. This regional airline was also selected due to having multiple pilot domicile locations throughout the United States. A second large regional airline was asked to take part in this study, but the airline was unable to volunteer participation.

This study was unable to survey major airlines, cargo airlines, and charter carriers. Although this study gives a good understanding of the regional pilot commute effect on Satisfaction With Life Scores, it does not represent other pilot demographic groups mentioned above. The sheer differences in career progression, pay, schedules, commute policies, vacation, etc. could drastically affect how pilots' assesses their Satisfaction With Life Score. Extending this study beyond a single regional airline would give the entire airline industry a better understanding on how commuting affects' pilots' satisfaction with life, the actual percentage of pilots that commute, and how pilots are commuting. This type of study could also support other areas of studies such as pilot fatigue.

Future research could partner with psychologists to give a large scale, more robust Satisfaction With Life test to pilots. This study used a single scale – the Satisfaction With Life Scale (SWLS) – to assess pilots' Satisfaction With Life Score. The SWLS proposed by Diener, Emmos, Larson and Griffin in 1985 was selected due to the vast amount of past research on this scale. Furthermore, its simple five question format could be easily used for an online survey in which there would be no researcher physically present at the time of the survey.

Although the SWLS is an acceptable scale within the field of psychology and has been widely used and researched, it does have some drawbacks. First, the SWLS is purposely a participant-driven subjective scale that can be weighted as needed using each participant's own criteria and judgment. For instance, one participant may "Strongly Agree" with a statement, while another participant under similar circumstances may only "Slightly Agree." A participant-driven subjective scale provides freedom within the test; the negative aspect to this degree of freedom is the researcher does not know the context or weight that each participant placed on each domain within the SWLS. Second, as with any self-reporting instrument, participants may knowingly distort results. Previous studies using a third person (informant target) to judge someone else's (target) satisfaction with life have closely matched the target's reported Satisfaction With Life Scores. This study was unable to use informant targets and relied solely honest responses from the participating pilot sample. Finally, the SWLS questionnaire reference the past, present and future. It is currently not know if an individual would score their past higher than their present or future, or any other mix of the three tenses, and is an area for further study within the field of psychology and the SWLS.

Recommendations

Regional Airline Pilots and Prospective Regional Airline Pilots

Having a high satisfaction with life as a regional airline pilot begins well before the first flight in a small airliner. Nevertheless, there are four steps that regional airline pilots, and perspective regional airline pilots can take to make an informed decision on commuting to help them have the highest satisfaction with life possible for their situation.

Commute Education

First, pilots must educate themselves about commuting by finding factual data – much like the information presented in this study. Specific data on the possible commuting route would help greatly. Examples would be the number of flights from a commuting city pair (route), airline load factors for this route, the number of airlines that service this route and statistical delayed flight information for a route. The intent is to not overload a pilot with data, but provide initial un-opinionated information before a further investment of individual time and resources are utilized.

First-Hand Pilot Perspective on Commuting and Commute Route

Step two would be for a pilot to gain perspective on a commute from regional airline pilots that are currently commuting. In today's multifaceted online world, there are numerous resources available through the internet to gain this knowledge. Networking and building a beneficial relationship is obtainable through postings and private messages in various pilot message boards. Further knowledge can be gained here as well such as airline specific junior pilot domiciles for new first officers and captain upgrade domicile assignments. Still, this knowledge is unfiltered, unconfirmed and can heavily opinionated by individuals volunteering information. Gathered first-hand information should always be verified through multiple sources before accepting it as the norm.

Individual Pilot Assessment on Commuting

Now that a strong knowledge of a possible commute has been gained, first-hand perspective gathered from multiple sources, and domicile assignments known by specific airlines, the third step would be for pilots to make an honest assessment of themselves. Does commuting sound like something that is going to have a drastic effect on other

portions of one's own life? If these effects would be perceived to be moderate to strongly negative, a commute may not be worth it. Other options, such as moving or choosing an airline with a base assignment in a pilot's home city should be explored. Accepting the first airline job offer, or captain upgrade position may not be in the best interest of certain pilots or their families if it means commuting, and commuting is determined to have a significant effect on satisfaction with life through a personal assessment.

Family and Significant Other's Management Expectation on Commute

The fourth step of managing expectations applies to pilots with dependents in their lives. Many times, a commute is tough of pilots, but even harder on their families at home. Educating significant other's on the multitude of unknown factors and changing variables in a commute can help them understand why a commute is not always successful. Managing expectations with families and significant others also helps them provide input on a commute, reduces stress to get immediately home and overall be a part of something (commuting) that is very individualized.

Airline Management and Aviation Industry

Airlines are constantly trying to separate themselves from their competitors. A way in which this could be done is by further investing in their employees who interact with passengers. Of course, pilots are only a small portion of the string of airline employees who communicate with passengers on behalf of an airline, but pilots are the most trusted and may be the most influential.

Home of Record to Domicile Positive Space Seat

As seen from this study, at least 62% of regional pilots commute. Airline management can ease the burden of commuting by providing a "positive space" seat

assignment to an assigned domicile. A possible positive space agreement could read, "The nearest airline service airport from a pilot's home of record that is over 90 statute miles from domicile. Any pilot within 90 statute miles would be considered a traditional commuter" (as discovered by this study). Further details must be worked out such as own airline dependent route or codeshare major airline route. For example, it would be unreasonable for a regional airline pilot for Delta Connect Carrier to get a positive space seat on a Jet Blue Low Cost Carrier flight.

Another way a positive space agreement could be reached is by building upon the current Cockpit Access Security System (CASS) for jumpseat awards. Airline management, the FAA, and airline unions and associations could agree to allow all pilots to reserve jumpseats for commutes online at home to or from work a certain number of days in advance. The same security procedures would still have to be met for pilot identification at the departure gate, but the ambiguity of multiple pilots lining up to sign up for a jumpseat with a gate agent at the gate for a late flight with passengers all around would no longer be an issues. Furthermore, a jumpseat priority list could also be automated and published for each flight through the same online means. This would allow pilots to make more educated decisions about upcoming commutes. The creation of Known Crew Member (KCM) entrances at airports made it easier for pilots to get through security at airports while maintaining high security standards. The same could be applied to CASS through individualized sign-up means.

Commuter Hotels

Even with a form of a "positive space" agreement for pilots by airline management, some commutes must take place the day before an early morning trip

begins, or the day after a late trip ends. Many airlines have started offering "commuter hotels" in their domicile. Many of these agreements allow for up to four hotels a month. This practice should become a standard across the airline industry. It benefits pilots by ensuring a proper and restful sleep will be obtained before a trip begins, and benefits airlines by setting pilots up for success during the many unique challenges faced in the day. This is especially important since the 2009 Colgan Air crash, which was partially attributed to pilot fatigue. Allowing a commuter hotel at the end of a trip allows for pilots to get restful sleep to be functional when arriving home the next day. It also reduces the amount of out of pocket expenses on a pilot, allowing for a more desirable standard of living.

Eliminate or Incentivized Un-Commutable Trips

Airlines need to optimized pilots' schedules to create trips do not contain flying that is un-commutable at the beginning and end of trips; both ends of a trip are un-commutable. As seen from this study, a four day trip that turns into six days due to un-commutability drastically affects pilots' satisfaction with life. A commuter hotel and a positive space flight to work will not soften the blow of being away almost a full week, while only getting paid for four days of flying. Not to mention the lost family time. Continued improvements on bidding software, trip creations, scheduling liaisons and other means should continuously be assessed to eliminate un-commutable trips. If trips must be made that are un-commutable, incentivized pay should be created so that pilots who traditionally commute will be rewarded for flying it. This would allow more trip flexibility for airline schedulers and better pay for regional pilots.

Forwarded Results

The results of this study will be forwarded to the regional airline that participated, as well as the Airline Pilots Association (ALPA) in hopes that all parties involved will better understand the components which mostly affect regional airline pilots' satisfaction with life.

APPENDICES

Appendix A
Informed Consent

University of North Dakota Institutional Review Board: Informed Consent Statement

Title of Project: Regional Airline Pilot Commute: How Commuting by Air Affects Pilots' Satisfaction with Life

Principal Investigator: Andy Kleinfehn, (651)-334-6126, andrew.kleinfehn@ndus.edu
Advisor: Dr. Beth Bjerke, (701)-777-3922, ebjerke@aero.und.edu

Purpose of the Study: The purpose of this research study is to see if commuting by airplane has an effect on regional airline pilots' satisfaction with life.

Procedures to be Followed: You will be asked to answer up to 22 questions on an online survey. Survey length differs depending upon answers selected.

Risks: There are no known or foreseeable risks to participants for this study.

Benefits: This research will provide a better understanding of how commuting by airplane may affect regional airline pilots' satisfaction with life. This information could help regional airline pilots make more informed decisions in their lives if they are presented the option to commute to their domicile by airplane.

Duration: The online survey will take about 5 minutes to complete.

Statement of Confidentiality: The online survey does not ask for any information that would identify who the responses belong to. Therefore, your responses are recorded anonymously. If this research is published, no information that would identify you will be included since your name is in no way linked to your responses. All survey responses that we receive will be treated confidentially and stored on a secure server. However, given that the surveys can be completed from any computer (e.g., personal, work, school), we are unable to guarantee the security of the computer on which you choose to enter your responses. As a participant in our study, we want you to be aware that certain "key logging" software programs exist that can be used to track or capture data that you enter and/or websites that you visit.

Right to Ask Questions: The researchers conducting this study is Andy Kleinfehn, advised by Dr. Beth Bjerke. You may ask any questions that you have now through the phone numbers listed above during normal business hours. If you later have questions, concerns, or complaints about the research please contact Dr. Beth Bjerke at (701)-777-3922. If you have questions regarding your rights as a research subject, you may contact The University of North Dakota Institutional Review Board at (701) 777-4279. You may also call this number with problems, complaints, or concerns about the research. Please call this number if you cannot reach research staff, or you wish to talk with someone who

is an informed individual who is independent of the research team. General information about being a research subject can be found on the Institutional Review Board website "Information for Research Participants" http://und.edu/research/resources/human-subjects/research-participants.cfm

Compensation: You will not receive compensation for your participation.

Voluntary Participation: You do not have to participate in this research. You can stop your participation at any time. You may refuse to participate or choose to discontinue participation at any time. Due to the survey being anonymous, once your answers to the online survey are submitted, you will not be able to have your answers withdrawn. You do not have to answer any questions you do not want to answer. You must be 18 years of age older to participate in this research study. Completion of the online survey implies that you have read the information in this form and consent to participate in the research. Please print this page for your records.

- ❍ I AGREE to participate in the anonymous online survey.
- ❍ I DO NOT want to participate in the anonymous online survey.

Appendix B

Survey Questionnaire for Regional Airline Pilot Commuting: How Commuting by Air Affects Pilots' Satisfaction With Life

1) How old are you?

2) What is your gender?

- ❍ Male
- ❍ Female

3) What relationship status best describes you?

- ❍ Married / Domestic Partner
- ❍ Divorced
- ❍ Single - Never been married
- ❍ Single - Living with boyfriend / girlfriend / fiancé
- ❍ Widowed
- ❍ Other (type in space provided) _____

4) In terms of house hold income, are you the sole or primary provider in your house hold?

- ❍ Yes
- ❍ No

5) How many children do you care for in your household?
A child is defined as under 19 years old and not yet completed high school / GED

- ❍ 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5+

6) Please select your pilot position at your airline.

- ❍ Captain
- ❍ First Officer

7) Approximately how many hours have you flown in a FAA Part 121 environment?

8) How long have you been employed by your current airline?

9) What airport are you currently based at?

- ❍ DTW
- ❍ JFK
- ❍ LGA
- ❍ MSP
- ❍ Other _____

10) Do you currently commute by airplane to your domicile?

- ❍ Yes
- ❍ No

Survey Continues on Next Page

11) Below are five statements with which you may agree or disagree. Using the 1 to 7 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

The 7-point scale is as follows:

	1 Strongly Disagree	2 Disagree	3 Slightly Disagree	4 Neither Agree nor Disagree	5 Slightly Agree	6 Agree	7 Strongly Agree
In most ways my life is close to my ideal.	❍	❍	❍	❍	❍	❍	❍
The conditions of my life are excellent.	❍	❍	❍	❍	❍	❍	❍
I am satisfied with my life.	❍	❍	❍	❍	❍	❍	❍
So far I have gotten the important things I want in life.	❍	❍	❍	❍	❍	❍	❍
If I could live my life over, I would change almost nothing.	❍	❍	❍	❍	❍	❍	❍

12) Below are four statements with which may have a positive or negative affect on your life. Using the 1 to 7 scale below, indicate the affect of each statement by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

The 7-point scale is as follows:

	1 Strong Negative	2 Negative	3 Slightly Negative	4 Neither Positive nor Negative	5 Slightly Positive	6 Positive	7 Strong Positive
My commute has had a _____ affect on my work / job.	❍	❍	❍	❍	❍	❍	❍
My commute has had a _____ affect on my family.	❍	❍	❍	❍	❍	❍	❍
My commute has had a _____ affect on my leisure time / health.	❍	❍	❍	❍	❍	❍	❍
My commute has had a _____ affect on my finances.	❍	❍	❍	❍	❍	❍	❍

13) What airport do you normally commute from?

14) Please choose the comment that best describes your average commute.

- ❍ Most often, I can commute to domicile on the first day of a trip, and commute home on the last day of a trip. Both the beginning and end of a trip is commutable.
- ❍ Most often, I need to commute to domicile a day before my trip begins, or commute home the day after a trip ends. Only the beginning or end of a trip is commutable.
- ❍ Most often, I need to commute to domicile a day before my trip begins, and commute home the day after a trip ends. Both the beginning and end of the trip is not commutable.

15) On average, how many round trip commutes do you complete in a month?

16) On average, how much time does your round trip commute take?

17) On average, how many legs is your commute?

- ❍ 1
- ❍ 2
- ❍ 3+

18) On average, how many flights a day are there from your home to your domicile?

19) On average, how much time do you spend driving to and from your domicile (combined drive time)?

20) In an average month, how many times do you drive to and from work (round-trip)? Round-Trip drive counts as 1.

21) Indicate the reasons why you commute by airplane. You many choose as many answers as necessary.

- ❑ Lifestyle choice (IE - good weather or outdoor living).
- ❑ Desire to maintain family stability.
- ❑ Low pay, especially for regional carriers.
- ❑ Absence of adequate coverage for costly moving expenses.
- ❑ Frequent domicile closing and future unpredictability of the airline industry.
- ❑ High cost of living near the domicile location.
- ❑ Cost and availability of adjunct sleeping accommodations.
- ❑ Sole provider or primary provider in your house hold.
- ❑ Other _____

21) As of today, do you aspire to move on another airline (IE - mainline, cargo, etc.)

- ❍ Yes
- ❍ No

22) Is there anything you would like your airline to do to make commuting better?

Appendix C

Satisfaction with Life Scale and Questionnaire

(Diener, Emmos, Larson & Griffin, 1985)

Below are five statements that you may agree or disagree with. Using the 1 - 7 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

- 7 - Strongly agree
- 6 - Agree
- 5 - Slightly agree
- 4 - Neither agree nor disagree
- 3 - Slightly disagree
- 2 - Disagree
- 1 - Strongly disagree

____ In most ways my life is close to my ideal.

____ The conditions of my life are excellent.

____ I am satisfied with my life.

____ So far I have gotten the important things I want in life.

____ If I could live my life over, I would change almost nothing.

Satisfaction with Life Scale (SWLS) Score - Not Seen By Participants

- *31 - 35 Extremely satisfied*
- *26 - 30 Satisfied*
- *21 - 25 Slightly satisfied*
- *20 Neutral*
- *15 - 19 Slightly dissatisfied*
- *10 - 14 Dissatisfied*
- *5 - 9 Extremely dissatisfied*

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