

# How Do Depression Medications Taken by Pilots Affect Passengers' Willingness to Fly?

## —A Mediation Analysis

Stephen Rice<sup>1</sup>, Scott R. Winter<sup>1</sup>, Keegan Kraemer<sup>2</sup>, Rian Mehta<sup>1</sup> & Korhan Oyman<sup>1</sup>

<sup>1</sup> College of Aeronautics, Florida Institute of Technology, Melbourne, USA

<sup>2</sup> Department of Psychology, Walden University, Minneapolis, USA

Correspondence: Stephen Rice, College of Aeronautics, Florida Institute of Technology, Melbourne, FL 32901, USA. E-mail: [srice@fit.edu](mailto:srice@fit.edu)

Received: May 13, 2015 Accepted: June 15, 2015 Online Published: July 30, 2015

doi:10.5539/res.v7n11p200

URL: <http://dx.doi.org/10.5539/res.v7n11p200>

### Abstract

The mental health of airline pilots has been a concern for decades. In 2010, the United States Federal Aviation Administration began allowing four types of selective serotonin reuptake inhibitors (SSRIs) to be used by pilots suffering from depression. After a procedural wait period, pilots may be awarded a special issuance of their medical certificates to maintain flight currency. Missing from the literature was any research on consumer's perceptions of pilots taking antidepressants, along with some other approved medications. Therefore, the purpose of the current study was to examine consumer's willingness to fly once told that the pilot of their hypothetical flight was taking medication compared to a control group in which the pilot was not on any prescribed and approved medications. The current study also manipulated dosage levels and gathered affect data to determine if consumers' responses were rationally or emotionally motivated. Across two studies, consumers were less willing to fly when the pilot was taking medication, and when the medication was a high dose opposed to a low dose. Additionally, affect was found to completely mediate the relationship between three of the four medications when compared to the control condition, suggesting that participants' responses were emotionally driven. Finally, a discussion of the findings and practical implications of the study are provided.

**Keywords:** stigmas, affect, antidepressants, aviation, pilots, willingness to fly

### 1. Introduction

According to the World Health Organization (2012), approximately 350 million people of all ages suffer from depression. In 2010, the United States Federal Aviation Administration (FAA) reversed their stance on the allowance of antidepressant medications for pilots. Four types of selective serotonin reuptake inhibitors (SSRI) will be allowed under the new rule: Fluoxetine (Prozac), Sertraline (Zoloft), Citalopram (Celexa), and Escitalopram (Lexapro) (AOPA, 2010). Prior research on the use of antidepressant medications for flight crews and air traffic controllers has demonstrated few adverse effects to the use of these medications while on duty. Concern was also expressed that in allowing approved and prescribed medications, aviation personnel may not hide medical conditions that would disqualify them from operations. Given the minimal adverse effects and open reporting channels, it was viewed as a favorable regulation change within the aviation industry. However, still to be determined is the perceptions of consumers if the pilot of their flight is prescribed antidepressant medication.

#### 1.1 Mental Health and Depression

Depression is a non-discriminatory mental illness, it affects a wide variety of demographics (Depression & Bipolar Alliance, 2015). The Depression and Bipolar Support Alliance indicated that depression could be diagnosed at any age, although the median age of onset is 32 years old (2015). However, some individuals may be more prone to depression than others based on genetic, biological, environmental, and or psychological factors (National Institute of Mental Health, 2015). Studies using MRI scans indicate that the brains of individuals suffering from depression appear to differ than those who do not suffer from depression; more specifically the regions of the brain that control mood, thinking, sleep, appetite, and behavior. Although certain environmental factors can also contribute to depression disorder, such as death of a loved one, trauma, or

difficult relationship (National Institute of Mental Health, 2015), episodes of depression can arise with or without a triggering circumstance. In addition, over 80% of individuals with symptoms of clinical depression go undiagnosed every year (Healthline, 2015).

In addition to the varying factors that may cause depression, there are also several types. Major depressive disorder often occurs once or several times in an individual's life. This interferes with the ability to carry out daily activities, such as working, sleeping, eating, or relationships. Individuals who are suffering from major depressive disorder tend to lack enjoyment in life (National Institute of Mental Health, 2015). Persistent depressive disorder is diagnosed as a depressed mood lasting two or more years with bouts of major depressive episodes and episodes with less severe symptoms. Postpartum depression is due to the hormonal imbalances and physical changes that occur after pregnancy in addition to the new responsibility of a baby. Seasonal Affective Disorder, also referred to as SAD, is depressive symptoms that occur during the winter months when there is less natural sunlight. Lastly Bipolar, or manic-depressive disorder is the combination of cycling moods from extreme happiness to extreme sadness (National Institute of Mental Health, 2015).

Each individual differs in their severity, frequency, and duration of their depressive symptoms. Typical symptoms include feeling sad or empty, pessimism, hopelessness, guilt, worthlessness, irritability, loss of interest in hobbies or sexual activities, fatigue and low energy, difficulty concentrating, remembering details, or making decision, restlessness, insomnia, waking very early or excessive sleeping, overeating or loss of appetite, bodily aches and pains, headaches, digestive issues, suicidal thoughts or attempts (Depression and Bipolar Support Alliance, 2015; National Institute of Mental Health, 2015). Many of these symptoms can take a toll on personal and professional relationships, work and or school, and physical health.

As self-esteem, energy, motivation, and interest are all affected by depression, living or working with someone with depression can take a major toll on personal and professional relationships. Depression creates self-doubt, through low self-esteem and self-compassion. Criticism is also manifested, as positive aspects of one's life are minimized and negative aspects intensified. Furthermore, depression can cause unrealistic expectations, which can be further intensified through unclear communication and internal scripts (Tartkovsky, 2014).

Depression is ranked as the number one disability in the United States, costing the US workforce \$44 billion a year in lost productivity through absenteeism and presenteeism, or present worker functioning at a lower rate of productivity than their non-depressive counterparts (Depression Center: University of Michigan Health System, 2015b). Employees with depression can experience difficulty finding, retaining, and regaining meaningful and permanent employment (Depression Center: University of Michigan Health System, 2015a). Organizations are now realizing the impact that depression has on the workplace and are offering their employees resources through Employee Assistance Programs or EAPs. Studies show when employees utilize their organization's EAPs they effectively reduce their depression symptoms, increase the likelihood that they will receive appropriate treatment, while also reducing the likelihood of absenteeism (Depression Center: University of Michigan Health System, 2015c).

Depression can also manifest into physical symptoms or worsen already present physical illnesses. Depression can also co-exist with other mental illnesses and substance abuse disorders. Individuals suffering from serious physical illnesses, such as AIDS, cancer, and heart disease often experience depression and other mood disorders. Other mental illnesses that often co-occur with depression include PTSD, OCD, panic disorder, social phobia, and generalized anxiety. When physical and mental illnesses co-exist the symptoms of each are often intensified (National Institute of Mental Health, 2015).

Furthermore, men and women experience depression differently. While women are 70% more likely to experience depression in their lifetime than men, males are more likely to turn to drugs or alcohol as a means of coping with depression. Men also tend to become more abusive, throw themselves into their work, and behave recklessly (National Institute of Mental Health, 2015). This type of behavior for either males or females can put other peoples' lives at risk, particularly if they are in a position of responsibility for other.

### *1.2 Mental Health in Aviation*

While flight crewmembers hold a position of authority and responsibility in operation of their careers, they are only human. They struggle with the same emotional and mental challenges, as do members of the normal population. This could include a wide spectrum of mental illnesses such as mood disorders, adjustment disorders, anxiety disorders, bipolar disorder, obsessive-compulsive disorder, and depression (Morse & Bor, 2006). Unique to aviation, and other high consequence industries, is that there is an extremely small margin for error. However, given their extensive medical requirements, until 2010 in the United States, pilots suffering from depression were not allowed to obtain medical certification.

This led to great concern in the aviation community that pilots may be under reporting or even hiding medical conditions to avoid being grounded (Bor & Hubbard, 2006). In a review of National Transportation Safety Board (NTSB) data from 1991-2010, 137 accident reports contained the word antidepressant. These accidents had a high fatality rate and, perhaps most concerning, few of the pilots had reported on their medical application the usage of antidepressants (Thurber, 2010). Furthermore, the aviation industry has additional stressors such as extended periods away from home, varying schedules, and jet lag, which may increase workplace stress. Earlier research has shown that having a strong social support network at home can help to minimize or act as a buffer against workplace stress (Cooper & Sloan, 1985; Raschmann, Petterson, & Schofield, 1990).

A study completed in 2007 examined safety concerns of pilots prescribed antidepressant medications in Australia (Ross, Griffiths, Dear, Emonson, & Lambeth, 2007). Australia has allowed pilots to take antidepressant medications since 1987. In this study, data was collected from January 1993 to June 2004. No significant differences were found in incidents or accidents between the control and medicated groups. Additionally, there were no significant differences noted in the time period before or after starting the antidepressant medication.

While there was a concern over a lack of reporting, ignoring or self-medicating when antidepressants were prohibited, an extreme outcome was aircraft assisted suicide. Cullen (1998) reviewed general aviation statistics in the United Kingdom over a period between 1970 and 1996. In that time, pilot suicide was attributed to between 0.72 and 2.4 percent of general aviation accidents. For general aviation within the United States in the period between 1983 and 2003, pilot suicide was determined to be the cause of 37 accidents with 25 percent related to alcohol abuse and 14 percent other illicit substances (Bills, Grabowski, & Li, 2005). Other high profile accidents such as the crash of a Boeing 767 operating as Egypt Air Flight 990 in 1999 and a Boeing 737 operated by Silk Air in Indonesia in 1997 are suspected to be cases of pilot suicide resulting in the loss of all passengers aboard (Morse & Bor, 2006).

More recently in March 2013, Germanwings Flight 9525 crashed into the French Alps killing all on-board. While the investigation is still open, initial reports seem to allege that the co-pilot may have intentionally caused the crash of the aircraft due to a pre-existing diagnosis of depression; however, this is still an ongoing investigation (Brown, Smith-Spark, & Pleitgen, 2015).

For a pilot to receive a special issuance of a medical certificate from the FAA while using antidepressants, certain guidelines must be met. In their guide for aviation medical examiners, the FAA first states the pilot must be on the prescribed medication for a period of 6 months and shown to be stable (FAA, 2015). Additionally, there must be no disqualifying side effects from the medication or a worsening of the pilot's condition. The applicant must be on one of the four approved SSRIs and cannot have a history of psychosis, suicidal ideation, electro convulsive therapy or multi SSRI or other psychiatric drug usage (FAA, 2015).

### *1.3 Affect*

Research on the role of affect on decision-making and evaluative processes has increased (Bodenhausen, 1993; Bower, 1991; Clore, Schwarz, & Conway, 1994; Forgas, 1995; Loewenstein, 1996; Schwarz & Clore, 1996; Zajonc, 1998). More specifically of interest is how affect or emotions influence the decision-making process. Emotions have been found to influence decisions when humans have to make decisions quickly, with multiple sources of information such as physiological, behavioral, and experimental responses, and without much time to process that information (Frijda, 1986; Levenson, 1994; Oatley & Johnson-Laird, 1996). For more deliberate decisions, emotions may direct attention, memory, and judgment to interpret cognitive processes (Johnson-Laird & Oatley, 1992; Lazarus, 1991; Schwarz, 1990; Simon, 1967; Tooby & Cosmides, 1990).

Worth noting is that previous research has demonstrated cognition and affect to in fact be separate components (Trafimow & Sheeran, 1998, 2004; Trafimow et al., 2004) although in evaluative judgments research has demonstrated the integral role of emotions (Clore, Schwarz, & Conway, 1994; Schwarz, 1990; Schwarz & Clore, 1983, 1988, 1996). This has been highlighted in situations where emotions are used to form personal opinions.

### *1.4 Social Stigmas and Affect*

Stigmas can have powerful influences upon an individual's opinions. As defined by Crocker, Major, and Steele (1998) stigmas influence a person's opinion of another based solely on that person's membership or participation in a particular group. This normally results in a disvalued view toward that person (Link & Phelan, 2001; Mahjan et al., 2008). As a result, strong correlations have been shown to exist between negative stigmas and mental illnesses such as depression and posttraumatic stress disorder (PTSD) (Preston, D'Augelli, Kassab, & Starks, 2007; Simbayi, et al., 2007; Vanable, Carey, Blaire, & Littlewood, 2006; Whetten, Reif, & Murphy-McMillan, 2008). Stigmas have been shown to exist for physical or mental disabilities, sexual

orientation, age, gender, ethnic background, obesity, and physical or mental disabilities (Crocker, Major, & Steele, 1998; Link & Phelan, 2001).

Mental illness, physical disabilities, and physically unattractive people are an example of just some of the groups of people that have been researched on stigmatization (Berscheid & Walster, 1974; Farina, 1982; M. Harris, R. Harris, & Bocher, 1982; Newman, 1976). In the majority of this research, those individuals affected by the stigma suffer from greater hardships related to things such as social and economic barriers (Crocker & Major, 1989; Crocker, Voelkl, Testa, & Major, 1991; Jones et al., 1984). One example demonstrated by researchers (Cash, Gillen, & Burns, 1977; Landy & Sigall, 1974) shows that people viewed as unattractive find it more difficult to gain employment and are judged more severely at work when compared to their better looking coworkers. Obese individuals are another example of persons that are frequently stigmatized in social situations (Crocker, Cornwall, & Major, 1993).

An interesting effect of social stigma is its ability to extend beyond the individual itself. This phenomenon is referred to as a courtesy stigma. Groffman (1963) defines courtesy stigmas as a situation where others also judge those people who are associated with the stigmatized person negatively. Hebl and Mannix (2003) found that a job applicant that sat near an overweight person was also negatively viewed and Pryor, Reeder, and Monroe (2012) found relatives of stigmatized individuals also experience social devaluation.

Based on prior research, it appears that social stigmas and affect may influence decision-making when limited information is available. Alhakami and Slovic (1994) found that the affect heuristic is heavily influenced by strong emotion, and there is little reliance on cognitive processes. Therefore, if one holds a negative view towards those with mental illness and is asked to make a quick decision as to their view of someone on antidepressant medication, it is plausible that their view may be influenced by affect (Pryor, Reeder, Yeadon, & Hesson-McInnis, 2004). Prior research in the aviation field has shown that pilots are viewed less favorably based on various demographic variables such as older, overweight, and ethnicity (Remy, Winter, & Rice, 2014; Winter, Rice, & Mehta, 2014), and when pilots were portrayed as antisocial, consumers viewed them as more likely to have a mental illness (Winter & Rice, in press). Additionally, in these studies affect was found to play a mediating role in the relationships suggesting that emotions played a key role in consumer's perceptions and responses.

### *1.5 Willingness to Fly Instrument*

A valid and reliable instrument was used as the dependent variable in the current study. This scale has been demonstrated to measure consumer's willingness to fly (Rice et al., 2015). The creation of this scale used consumers in all five stages of development from word generation to word pairing to discrimination. The resulting scale consists of seven statements in which participants rate their willingness to fly on a 5-point Likert scale from strongly disagree (-2) to strongly agree (+2), with a neutral option (0). A copy of the instrument is available in Appendix A.

## **2. Current Study**

To date, no research that we know of has examined consumer willingness to fly based on the type of medication that the pilot might be taking. Nor has any research been conducted on whether consumers are using rational or emotional reasons for their willingness to fly under these situations. We presented participants with various scenarios about a pilot who has been taking one of four types of medications (or no medication at all) at a low or high dosage, and asked participants to rate their willingness to fly, along with affect ratings in Study 2. The current study tests the following hypotheses:

H<sub>1</sub>: Participants would have more negative affect and be less willing to fly when told that the pilot was taking any of the medications.

H<sub>2</sub>: When told that the medication dosage was high, participants would be less willing to fly compared to conditions where the medication dosage was low.

H<sub>3</sub>: When comparing each of the medications to a control group (no medication), affect would mediate the relationship between the condition and willingness to fly. That is, the reason that participants were less willing to fly when told that the pilot was taking a certain medication would be due to emotional reasons.

## **3. Methodology**

### *3.1 Study 1—Methods*

#### **3.1.1 Participants**

Eighty-eight (34 females) participants from the United States took part in the study. They were recruited via a

convenience sample using Amazon's <sup>®</sup> Mechanical Turk <sup>®</sup> (MTurk). MTurk provides participants who complete tasks in exchange for monetary compensation. Prior research shows that data from MTurk is as reliable as typical laboratory data (Buhrmester, Kwang, & Gosling, 2011; Germine et al., 2012). The mean age was 34.65 ( $SD = 12.32$ ).

### 3.1.2 Materials and Procedure

Participants first signed an electronic consent form and then were given instructions about the study. Following this, they were presented with the following hypothetical scenario for the control condition, "Imagine a situation where you will be flying on a commercial aircraft from one major city to another. The captain (pilot) in charge of the aircraft is not taking any medications. Given this information, please respond to each of the following questions below." In eight separate experimental conditions, participants were told that the pilot had been taking a low or high dosage of either Prozac, Claritin, Ibuprofen or Catapres for the past two months for depression, allergies, arthritis or high blood pressure, respectively.

Participants then filled out a 'willingness to fly' scale that was validated by Rice, et al. (2015). Please see Appendix A for the full questionnaire. Participants responded on a 5-point bipolar Likert-type scale from -2 (strongly disagree) to +2 (strongly agree) with a neutral choice of zero. Lastly, participants were asked basic demographics questions, debriefed, and paid for their time.

### 3.1.3 Design

A within-participants factorial design was used whereby all participants were exposed to all nine conditions. The first experimental factor was the type of drug, while the second factor was the dosage of the drug (low or high). The ninth condition was the control group (no medication).

### 3.2 Study 1—Results

The data from Study 1 are presented in Figure 1. A two-way within-participants analysis of variance was conducted on the eight experimental conditions using Drug (type of drug) as one factor, and Dosage (low or high) as the other factor. There was a significant main effect of Drug,  $F(3, 261) = 53.17, p < .001, partial\ eta\ squared = .38$ , indicating that, in general, some medications appeared to have reduced willingness to fly more than others. This was seen most clearly with the Prozac condition, although all conditions were significantly lower than the control group ( $M = 1.61; SD = .06$ ). There was also a significant main effect of Dosage,  $F(1, 87) = 187.83, p < .001, partial\ eta\ squared = .69$ , indicating that, in general, the high dosage conditions appeared to have reduced willingness to fly more than the low dosage conditions. This was qualified by a significant interaction between Drug and Dosage,  $F(3, 261) = 2.91, p = .035, partial\ eta\ squared = .03$ , indicating that the difference between the low and high dosages differed as a function of drug type. Figure 1 reveals that the biggest difference between the low and high dosages occurred in the Catapres condition. We also note that all conditions, regardless of dosage level, differed significantly from the control group (all  $ps < .001$ ).

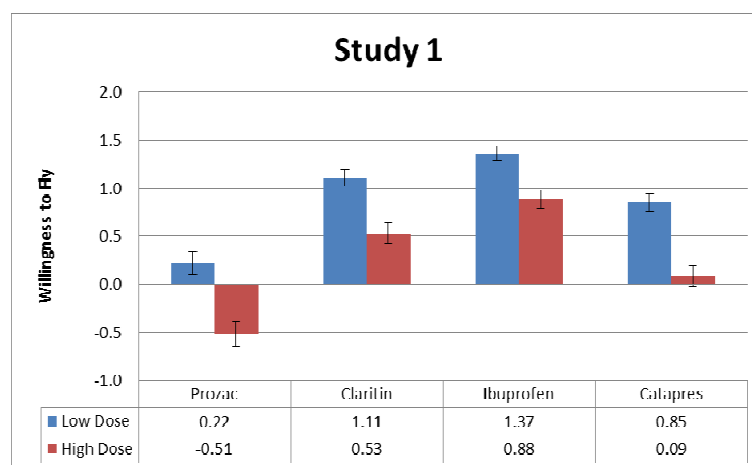


Figure 1. Data from Study 1

Standard error bars are included. The mean and standard deviation of the control group was ( $M = 1.61; SD = .06$ ).

### 3.3 Study 1—Discussion

The purpose of this study was to determine if knowing that a pilot was taking a particular type of medication would affect a participants' willingness to fly on that aircraft. The data from the study supported both hypotheses. First, when told that the pilot was taking medication, participants were less willing to fly on that aircraft compared to the control condition where participants were told that the pilot was not taking any medication. This effect was most pronounced for the condition where the pilot was taking Prozac, which is an anti-depressant drug.

The second hypothesis was also supported, in that when participants were told that the pilot was taking a high dosage as compared to a low dosage of the medication, they were much less willing to fly on the aircraft. This was the case for all four types of medication, but was most pronounced in the Catapres condition, as was evident by the significant interaction between type of drug and dosage. We discuss more about the implications of these findings in the general discussion.

### 3.4 Study 2—Introduction

The data from Study 1 reveal that participants are indeed less willing to fly in situations where a pilot is known to be taking a particular medication. However, it is not yet known whether this effect is due to cognitive or emotional reasons. Since it is known that airline passengers often base their judgments of airline issues due to emotional reasons (Winter & Rice, in press; Winter, Rice, & Mehta, 2014), we felt it was important to determine if an affective perspective would also explain this data. In Study 2, participants were again presented with various hypothetical scenarios where their pilot was taking one of four different medications, but in this case, they were also asked how they felt about the situation prior to be asked how willing they were to fly in that scenario. We predicted that the data would replicate Study 1, and also show that emotions mediate the relationship between pilot medication and willingness to fly.

### 3.5 Study 2—Methods

#### 3.5.1 Participants

Four hundred and ninety-two (216 females) participants from the United States took part in the study. They were recruited via a convenience sample using Amazon's ® Mechanical Turk ® (MTurk). The mean age was 34.72 (SD = 10.58).

#### 3.5.2 Materials and Procedure

Study 2 was identical to Study 1 with the following exceptions. First, this study was conducted using a between-participants design in order to ensure that hypothesis-guessing was not occurring in the previous study. Second, after reading the hypothetical scenario and prior to filling in the willingness to fly scale, participants were asked to provide affect ratings. Specifically, participants were asked to rate how they felt about the scenario on three separate 7-point Likert-type scales ranging from "extremely negative/bad/unfavorable" to "extremely positive/good/favorable" with a neutral choice of zero. This type of affect scale is common in the aviation literature (e.g. Winter & Rice, in press; Winter, Rice, & Mehta, 2014). We highlight that the mediating variable was presented temporally prior to the outcome variable in order to avoid reverse causal effects (Kenny, 2011).

### 3.6 Study 2—Results

While Figure 2 presents the data from Study 2 in a factorial manner combining the affect and willingness to fly measures, we did not combine them for factorial analyses because there is no theoretical value in comparing the affect and willingness to fly measures to each other. Instead, we combined them for the mediation analyses. Thus, we discuss first the affect measures and then the willingness to fly measures, followed by mediation analyses.

#### 3.6.1 Affect Measures

A one-way between-participants analysis of variance was conducted on the affect measures. There was a significant main effect of Drug,  $F(4, 491) = 37.13, p < .001, partial \eta^2 = .23$ , indicating that, in general, some medications appeared to have generated more negative affect than others. All of the experimental conditions differed significantly from the control group using a Bonferroni correction (all  $ps < .001$ ).

#### 3.6.2 Willingness to Fly Measures

A one-way between-participants analysis of variance was conducted on the willingness to fly measures. There was a significant main effect of Drug,  $F(4, 491) = 31.03, p < .001, partial \eta^2 = .20$ , indicating that, in general, some medications appeared to have reduced willingness to fly more than others. All of the experimental conditions, with the exception of the Ibuprofen condition ( $p = .16$ ), differed significantly from the control group

using a Bonferroni correction (all  $ps < .01$ ).

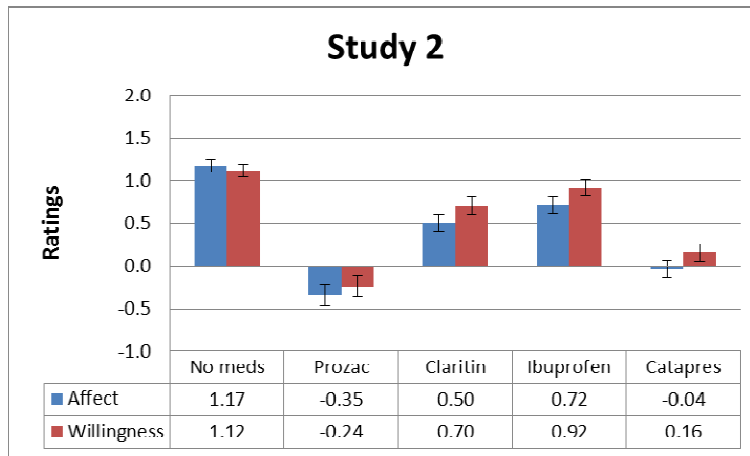


Figure 2. Data from Study 2

Standard error bars are included.

### 3.6.3 Mediation Analyses

Mediation analyses were conducted on each of the four conditions. To be clear, in each mediation analysis, one drug was compared to the control group. This is the “condition” part of the mediation. Affect was the mediator variable, and Willingness to Fly scores were the outcome variable. As can be seen in Figure 3, three of the four conditions showed total mediation of affect on the relationship between Type of Drug and Willingness to Fly.

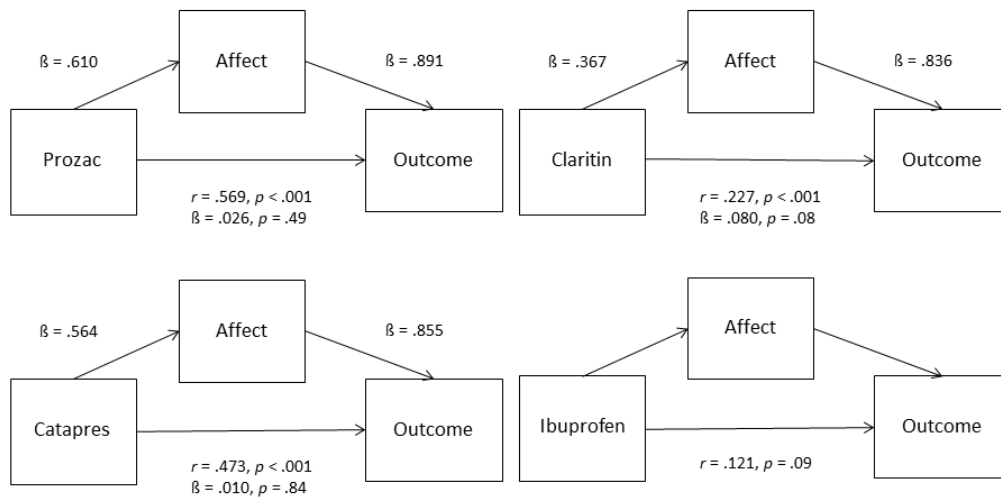


Figure 3. Mediation analyses from Study 2 as a function of the type of drug

In order to conduct the mediation analysis on the Prozac condition, the correlation between Condition and Outcome was first found to be significant,  $r = .569, p < .001$ , showing that the initial variable correlated with the outcome variable. The standardized path coefficients were: Condition to Affect ( $.610, p < .001$ ); Affect to Outcome ( $.891, p < .001$ ); Condition to Outcome controlling for Affect ( $.026; p = .49$ ). These data show that Affect had total mediation on the relationship between Condition and Outcome.

In order to conduct the mediation analysis on the Claritin condition, the correlation between Condition and Outcome was first found to be significant,  $r = .227, p = .001$ , showing that the initial variable correlated with the outcome variable. The standardized path coefficients were: Condition to Affect ( $.367, p < .001$ ); Affect to

Outcome (.836,  $p < .001$ ); Condition to Outcome controlling for Affect (.080;  $p = .08$ ). These data show that Affect had total mediation on the relationship between Condition and Outcome.

In order to conduct the mediation analysis on the Catapres condition, the correlation between Condition and Outcome was first found to be significant,  $r = .473$ ,  $p = .001$ , showing that the initial variable correlated with the outcome variable. The standardized path coefficients were: Condition to Affect (.564,  $p < .001$ ); Affect to Outcome (.855,  $p < .001$ ); Condition to Outcome controlling for Affect (.010;  $p = .84$ ). These data show that Affect had total mediation on the relationship between Condition and Outcome.

In the Ibuprofen condition, the correlation between Condition and Outcome was not significant,  $r = .121$ ,  $p = .09$ , thus eliminating the need for further mediation analysis.

### 3.7 Study 2—Discussion

The purpose of Study 2 was twofold. First, we wanted to replicate the findings from Study 1 using a between-participants design that was not subject to hypothesis guessing. The data did replicate across both studies, with the exception that there was not a significant difference between the Ibuprofen condition and the control condition (no medication). We do note, however, that while it was not statistically significant, it was in the same direction as the data from Study 1.

Second, we wanted to determine if affect would be a significant mediator between the medication and willingness to fly. In three out of the four cases, affect was not only a significant mediator, but also the mediation analyses showed total mediation. That is, affect explained all of the relationship between medication and willingness to fly for Prozac, Claritin and Catapres. We discuss these issues further in the general discussion.

## 4. General Discussion

The purpose of the current research was threefold. First, we wanted to determine if knowledge about a pilot's medications would influence participants' willingness to fly on that aircraft. The data across both studies clearly showed this to be the case. Not only did knowledge of the medication negatively influence participant willingness to fly, but also the type of medication has differential effects on their willingness to fly. In the Prozac condition, participants provided the most negative willingness to fly ratings in both studies. This is an interesting find, and one that is supported by previous literature that shows that people tend to stigmatize persons with mental illnesses (Berscheid & Walster, 1974; Farina, 1982; M. Harris, R. Harris, & Bocher, 1982; Newman, 1976). The Catapres condition also generated lower willingness to fly ratings, presumably because of the severity of the illness that it is medicating (high blood pressure). Interestingly, the second study showed that the willingness to fly ratings matched up fairly closely with the affect ratings for all four medications.

The second hypothesis was also supported, in that when the dosage of the medication was high versus low, participants were less willing to fly. This is a sensible finding given that a high dosage of the medication indicates that the severity of the illness is greater. Interestingly, the difference in scores was greatest for the Catapres condition, presumably because participants felt that a high dosage of blood pressure medication indicated a risky situation for the pilot and aircraft.

The third hypothesis was in relation to the mediation analyses that we performed on the data. Specifically, the data showed that in three of the four conditions (Prozac, Claritin, & Catapres), affect had total mediation on the relationship between medication and willingness to fly. That is, affect explained the entire relationship between medication and willingness to fly for Prozac, Claritin and Catapres. Clearly, participants were basing their willingness to fly ratings on their emotions, which were triggered by the knowledge of the pilot's medication intake. This finding is supported in the literature by previous studies that have also found that affect has strong mediating influences in the field of aviation (Winter & Rice, in press; Winter, Rice, & Mehta, 2014).

### 4.1 Practical Implications

There are some practical implications that can be taken away from the current study. From the literature review, there is evidence that there are advantages to the FAA allowing for pilots to take approved and prescribed medication for certain health related issues. As previously mentioned with issues surrounding depression, there was concern that aviation professionals would hide their condition, self-medicate or take medication without reporting it to the FAA due to fear of being grounded or losing flight privileges. Advantages have been seen since the FAA allowed for the use of four antidepressants to ease some of these concerns and provide for a condition where pilots are able to maintain their careers while also receiving treatment for depression issues.

However, even while the FAA approves certain drugs, the data of this study suggests that consumers are less willing to fly while pilots are taking these medications than when they are not. Dosage level further decreases



consumer's willingness to fly. It is possible that these responses are fueled by stigmas toward individuals suffering from certain physical and emotional disabilities. With affect data mediating the relationship for three of the four conditions, it may be possible that educational and informative information on the value of allowing pilots to take certain medications may be able to modify the consumer's view of these issues.

We wish to note that these data were collected prior to the GermanWings accident. Future research should seek to replicate these findings in light of that accident, and to determine if consumer attitudes have changed since hearing about the news.

#### 4.2 Delimitations and Limitations

All research comes with limitations and this study is no exception. Pilots are legally able to take a wide variety of medications. For our purposes, we specifically chose Prozac due to the mental illness stigma, Catapres for the potential severity of the illness that it treats, and two fairly common over-the-counter medications that should not elicit fear of deathly illnesses. Future research should include other possible medications to ensure that our results replicate and generalize to other drugs.

A second major limitation is the hypothetical aspect of the scenarios. Since it is obviously impossible to conduct this study in the "real world", we are limited to hypotheticals when presenting the information to the participants. However, we note that many, if not most, social psychology studies are similar in nature and that there is strong evidence that attitudes influence future behaviors (Ajzen & Fishbein, 1970, 1977, 1980, 2000). Having said this, we hope that future research is allowed to replicate this study using higher fidelity situations.

While Amazon's Mechanical Turk provides data that is as reliable as laboratory data (Buhrmester, Kwang, & Gosling, 2011; Germine et al., 2012), it comes with certain limitations. First, this sample generalizes only to Americans who use this service and happen to be online at that time of day. Second, we recognize that WEIRD (Western, Educated, Industrialized, Rich and Democratic) data does not well represent the rest of the world (Henrich, Heine, & Norenzayan, 2010a, 2010b). Lastly, participants may or may not have been active airline passengers. Because of these limitations, we hope that future research projects sample different populations for future replications.

### 5. Conclusions

The overall goal of this study was to examine consumer perceptions of pilots taking certain approved and prescribed medications while maintaining flight duty. Since 2010, the FAA has allowed pilots to take certain medications for conditions related to depression. This study sought to determine if consumer's willingness to fly would be degraded due to the pilot of their hypothetical flight taking approved and prescribed medications. Dosage level was also manipulated. In general, the study found that consumers were less willing to fly when pilots were taking medications compared to when they were not. Additionally, willingness to fly further decreased when the dosage level was high compared to when it was low. Affect measures were found to totally mediate the relationship for three of the four drugs, which suggest that consumer's responses were emotionally driven instead of rationally determined.

### References

- Aircraft Owner's and Pilot's Association (AOPA). (2010, April). *FAA approves SSRIs for medical certification*. Retrieved from <http://www.aopa.org/News-and-Video/All-News/2010/April/2/FAA-approves-SSRIs-for-medical-certification>
- Ajzen, I., & Fishbein, M. (1970). The prediction of behavior from attitudinal and normative variables. *Journal of Experimental Social Psychology*, 6, 466-487. [http://dx.doi.org/10.1016/0022-1031\(70\)90057-0](http://dx.doi.org/10.1016/0022-1031(70)90057-0)
- Ajzen, I., & Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin*, 84, 888-918. <http://dx.doi.org/10.1037/0033-2909.84.5.888>
- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood-Cliffs, NJ: Prentice-Hall.
- Ajzen, I., & Fishbein, M. (2000). Attitudes and the attitude-behavior relation: Reasoned and automatic processes. In W. Stroebe, & M. Hewstone (Eds.), *European review of social psychology* (Vol. 11, pp. 1-33). Chichester, UK: Wiley. <http://dx.doi.org/10.1080/14792779943000116>
- Alhakami, A. S., & Slovic, P. (1994). A psychological study of the inverse relationship between perceived risk and perceived benefit. *Risk Analysis*, 14, 1085-1096. <http://dx.doi.org/10.1111/j.1539-6924.1994.tb00080.x>
- Berscheid, E., & Walster, E. (1974). Physical attractiveness. In L. Berkowitz (Ed.), *Advances in experimental*

- social psychology* (Vol. 6, pp. 157-215). New York: Academic Press. [http://dx.doi.org/10.1016/s0065-2601\(08\)60037-4](http://dx.doi.org/10.1016/s0065-2601(08)60037-4)
- Bills, C., Grabowski, J., & Li, G. (2005). Suicide by aircraft: A comparative analysis. *Aviation, Space, and Environmental Medicine*, 76, 715-719.
- Bodenhausen, G. V. (1993). Emotions, arousal, and stereotypic judgments: A heuristic model of affect and stereotyping. In D. M. Mackie, & D. L. Hamilton (Eds.), *Affect, cognition, and stereotyping: Interactive processes in group perception* (pp. 13-37). San Diego, CA: Academic Press. <http://dx.doi.org/10.1016/b978-0-08-088579-7.50006-5>
- Bor, R., & Hubbard, T. (2006). Aviation mental health: An introduction. In R. Bor, & T. Huddard (Eds.), *Aviation Mental Health* (pp. 1-9). Burlington: Ashgate.
- Bower, G. H. (1991). Mood congruity of social judgment. In J. Forgas (Ed.), *Emotion and social judgment* (pp. 31-54). Oxford, UK: Pergamon.
- Brown, P., Smith-Spark, L., & Pleitgen, F. (2015). Germanwings crash: Co-pilot researched suicide methods, cockpit doors. *CNN News*. April 2, 2015. Retrieved from <http://www.cnn.com/2015/04/02/europe/france-germanwings-plane-crash-main/>
- Buhrmester, M., Kwang, T., & Gosling, S. D. (2011). Amazon's Mechanical Turk: A new source of inexpensive, yet high-quality data? *Perspectives on Psychological Science*, 6(3), 3-5. <http://dx.doi.org/10.1177/1745691610393980>
- Cash, T. F., Gillen, B., & Burns, D. S. (1977). Sexism "beautyism" in personal consultant decision making. *Journal of Applied Psychology*, 62, 301-310. <http://dx.doi.org/10.1037/0021-9010.62.3.301>
- Clore, G. L., Schwarz, N., & Conway, M. (1994). Cognitive causes and consequences of emotion. In R. S. Wyer, Jr., & T. K. Srull (Eds.), *Handbook of social cognition* (2nd ed., pp. 323-417). Hillsdale, NJ: Erlbaum.
- Cooper, C., & Sloan, S. (1985). Occupational and psychological stress among commercial airline pilots. *Aviation, Space, and Environmental Medicine*, 56, 317-321.
- Crocker, J., Cornwell, B., & Major, B. (1993). The stigma of overweight: Affective consequences of attributional ambiguity. *Journal of Personality and Social Psychology*, 64, 60-70. <http://dx.doi.org/10.1037/0022-3514.64.1.60>
- Crocker, J., & Major, B. (1989). Social stigma and self-esteem: The self-protective properties of stigma. *Psychological Review*, 26, 608-630. <http://dx.doi.org/10.1037/0033-295X.96.4.608>
- Crocker, J., Major, B., & Steele, C. (1998). Social stigma. In D. T. Gilbert, & S. T. Fiske (Eds.), *The handbook of social psychology* (pp. 504-553). New York: McGraw-Hill.
- Crocker, J., Voelkl, K., Testa, M., & Major, B. (1991). Social stigma: The affective consequences of attributional ambiguity. *Journal of Personality and Social Psychology*, 60, 218-228. <http://dx.doi.org/10.1037/0022-3514.60.2.218>
- Cullen, S. (1998). Aviation suicide: A review of general aviation accidents in the UK, 1970-96. *Aviation, Space, and Environmental Medicine*, 69, 696-698.
- Depression and Bipolar Support Alliance. (2015). *Depression Statistics*. Retrieved April 6, 2015, from [http://www.dbsalliance.org/site/PageServer?pagename=education\\_statistics\\_depression](http://www.dbsalliance.org/site/PageServer?pagename=education_statistics_depression)
- Depression Center: University of Michigan Health System. (2015a). *Depression in the Workplace*. (2015a). Retrieved April 10, 2015, from <http://www.depressioncenter.org/work/>
- Depression Center: University of Michigan Health System. (2015b). *Why Employers Should Care About Depression*. Retrieved April 10, 2015, from <http://www.depressioncenter.org/work/depression-and-work/why-should-care/>
- Depression Center: University of Michigan Health System. (2015c). *Developing an Employee Assistance Program*. Retrieved April 10, 2015, from <http://www.depressioncenter.org/work/information-for-employers/developing-an-employee-assistance-program/>
- Farina, A. (1982). The stigma of mental disorders. In A. G. Miller (Ed.), *In The eye of the beholder: Contemporary approaches to stereotyping* (pp. 305-363). New York: Praeger.
- Federal Aviation Administration (FAA). (2015). *Guide for aviation medical examiners*. Retrieved from:

- [https://www.faa.gov/about/office\\_org/headquarters\\_offices/avs/offices/aam/ame/guide/app\\_process/exam\\_tech/item47/amd/antidepressants/](https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/app_process/exam_tech/item47/amd/antidepressants/)
- Forgas, J. P. (1995). Mood and judgment: The affect infusion model (AIM). *Psychological Bulletin*, *117*, 39-66. <http://dx.doi.org/10.1037/0033-2909.117.1.39>
- Frijda, N. H. (1986). The emotions. *Bulletin*, *117*, 39-66.
- Germine, L., Nakayama, K., Duchaine, B. C., Chabris, C. F., Chatterjee, G., & Wilmer, J. B. (2012). Is the web as good as the lab? Comparable performance from web and lab in cognitive/perceptual experiments. *Psychonomic Bulletin & Review*, *19*(5), 847-857. <http://dx.doi.org/10.3758/s13423-012-0296-9>
- Goffman, E. (1963). Stigma: Notes on the management of spoiled identity. In *Englewood Cliffs*. NJ: Prentice Hall.
- Harris, M. B., Harris, R. J., & Bochner, S. (1982). Fat four-eyed and female: Stereotypes of obesity glasses and gender. *Journal of Applied Social Psychology*, *12*, 503-516. <http://dx.doi.org/10.1111/j.1559-1816.1982.tb00882.x>
- Healthline. (2015). *Unhappiness by the number: 2012 Depression Statistics*. Retrieved April 10, 2015, from <http://www.healthline.com/health/depression/statistics-infographic>
- Hebl, M. R., & Mannix, L. M. (2003). The weight of obesity in evaluating others: A mere proximity effect. *Personality and Social Psychology Bulletin*, *29*, 28-38. <http://dx.doi.org/10.1177/0146167202238369>
- Henrich, J., Heine, S. J., & Norenzayan, A. (2010a). Most people are not WEIRD. *Nature*, *466*(29). <http://dx.doi.org/10.1038/466029a>
- Henrich, J., Heine, S. J., & Norenzayan, A. (2010b). The weirdest people in the world. *Behavioral and Brain Sciences*, *33*(2-3), 61-83. <http://dx.doi.org/10.1017/S0140525X0999152X>
- Johnson-Laird, P. N., & Oatley, K. (1992). Basic emotions, rationality, and folk theory. *Cognition and Emotion*, *6*, 201-223. <http://dx.doi.org/10.1080/02699939208411069>
- Jones, E. E., Farina, A., Hastorf, A. H., Markus, H., Miller, D. T., & Scott, R. A. (1984). *The dimensions of stigma: The psychology of marked relationships*. New York: W. H. Freeman Company.
- Kenny, D. A. (2011). *Mediation*. Retrieved from: <http://davidkenny.net/cm/mediate.htm#D>
- Landy, D., & Sigall, H. (1974). Beauty is talent: Task evaluation as a function of the performer's physical attractiveness. *Journal of Personality and Social Psychology*, *29*, 299-304. <http://dx.doi.org/10.1037/h0036018>
- Lazarus, R.S. (1991). *Emotion and adaptation*. New York: Oxford University Press.
- Levenson, R. (1994). Human emotion: A functional view. In P. Ekman, & R. J. Davidson(Eds.), *The nature of emotion* (pp. 123-126). New York: Oxford University Press.
- Link, B. G., & Phelan, J. C. (2001). Conceptualizing stigma. *Annual Review Sociology*, *27*, 363-385. <http://dx.doi.org/10.1146/annurev.soc.27.1.363>
- Loewenstein, G. (1996). Out of control: Visceral influences on behavior. *Organizational Behavior and Human Decision Processes*, *65*, 272-292. <http://dx.doi.org/10.1006/obhd.1996.0028>
- Mahjan, A. P., Sayles, J. N., Patel, V. A., Remien, R. H., Ortiz, D., Szekeres, G., & Coates, J. (2008). Stigma in the HIV/AIDS epidemic: A review of the literature and recommendations for the way forward. *AIDS*, *22*, 67-79.
- Morse, J. S., & Bor, R. (2006). Psychiatric disorders and syndromes among pilots. In R. Bor, & T. Huddard (Eds.) *Aviation Mental Health*, (pp. 107-125). Burlington: Ashgate.
- National Institute of Mental Health. (2015). *Depression*. Retrieved April 7, 2015, from [http://www.nimh.nih.gov/health/topics/depression/index.shtml#part\\_145395](http://www.nimh.nih.gov/health/topics/depression/index.shtml#part_145395)
- Newman, J. (1976). Faculty attitudes toward handicapped students. *Rehabilitation Literature*, *37*, 194-197.
- Oatley, K., & Johnson-Laird, P. N. (1996). The communicative theory of emotions: Empirical tests, mental models, and implications for social interaction. In L. L. Martin, & A. Tesser (Eds.), *Striving and feeling: Interactions among goals, affect, and self-regulation*. Hillsdale, NJ: Erlbaum.
- Preston, D. B., D'Augelli, A. R., Kassab, C. D., & Starks, M. T. (2007). The relationship of stigma to the sexual risk behavior of rural men who have sex with men. *AIDS Education Preview*, *19*, 218-230.

- <http://dx.doi.org/10.1521/aeap.2007.19.3.218>
- Pryor, J. B., Reeder, G. D., & Monroe, A. E. (2012). The infection of bad company: Stigma by association. *Journal of Personality and Social Psychology, 102*, 224-241. <http://dx.doi.org/10.1037/a0026270>
- Pryor, J. B., Reeder, G. D., Yeadon, C., & Hesson-McInnis, M. (2004). A dual-process model for reactions to perceived stigma. *Journal of Personality and Social Psychology, 87*, 436-452. <http://dx.doi.org/10.1037/0022-3514.87.4.436>
- Raschmann, J., Patterson, J., & Schofield, G. (1990). A retrospective study of material discord in pilots: The USAFSAM experience. *Aviation, Space, and Environmental Medicine, 61*, 1145-1148.
- Remy, B., Winter, S. R., & Rice, S. (2014, April). American aviation consumer's trust in pilots. *Presentation at the 7<sup>th</sup> annual Human Factors and Applied Psychology Student Conference, Daytona Beach, FL.*
- Rice, S., Mehta, R., Dunbar, V., Oyman, K., Ghosal, S., Oni, M. D., & Oni, M. A. (2015, January). A valid and reliable scale for consumer willingness to fly. *Proceedings of the 2015 Aviation, Aeronautics, and Aerospace International Research Conference.*
- Rice, S., Richardson, J., & Kraemer, K. (in press). The emotional mediation of distrust of persons with a mental illness. *International Journal of Mental Health.*
- Richardson, J., & Rice, S. (in press). The role of affect and cognition in the public's judgments about the need for mental health treatment and willingness to help. *International Journal of Mental Health.*
- Ross, J., Griffiths, K., Dear, K., Emonson, D., & Lambeth, L. (2007). Antidepressant use and safety in civil aviation: A case-control study of 10 years of Australian data. *Aviation, Space, and Environmental Medicine, 78*, 749-755.
- Schwarz, N. (1990). Feelings as information: Informational and motivational functions of affective states. In E. T. Higgins, & R. M. Sorrentino (Eds.), *Handbook of motivation and cognition: Foundations of social behavior* (Vol. 2, pp. 527-561). New York: Guilford Press.
- Schwarz, N., & Clore, G. L. (1983). Mood, misattribution and judgments of well-being: Informative and directive functions of affective states. *Journal of Personality and Social Psychology, 45*, 513-523. <http://dx.doi.org/10.1037/0022-3514.45.3.513>
- Schwarz, N., & Clore, G. (1988). How do I feel about it? The information function of affective states. In K. Fiedler, & J. P. Forgas (Eds.), *Affect, cognition, and social behavior: New evidence and integrative attempts* (pp. 44-63). Toronto: C. J. Hogrefe.
- Schwarz, N., & Clore, G. (1996). Feelings and phenomenal experiences. In E. T. Higgins, & A.W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 433-465). New York: Guilford Press.
- Simbayi, L. C., Kalichman, S. C., Strebel, A., Cloete, A., Henda, N., & Mqeketo, A. (2007). Disclosure of HIV status to sex partners and sexual risk behaviours among HIV-positive men and women, Cape Town, South Africa. *Sex Transmission Infection, 83*, 29-34. <http://dx.doi.org/10.1136/sti.2006.019893>
- Simon, H. A. (1967). Motivational and emotional controls of cognition. *Psychological Review, 74*, 29-39. <http://dx.doi.org/10.1037/h0024127>
- Tartakovsky, M. (2014). *How Depression Damages Your Relationship & What You Can Do.* Psych Central. Retrieved April 10, 2015, from <http://psychcentral.com/blog/archives/2014/07/04/how-depression-damages-your-relationship-what-you-can-do/>
- Thurber, M. (2010, June). Pilots split on new rule for antidepressants. *AIN Online.* Retrieved from <http://www.ainonline.com/aviation-news/aviation-international-news/2010-06-28/pilots-split-new-rule-antidepressants>
- Tooby, J., & Cosmides, L. (1990). The past explains the present: Emotional adaptations and the structure of ancestral environments. *Ethology and Sociobiology, 11*, 375-424. [http://dx.doi.org/10.1016/0162-3095\(90\)90017-Z](http://dx.doi.org/10.1016/0162-3095(90)90017-Z)
- Trafimow, D., & Sheeran, P. (1998). Some tests of the distinction between cognitive and affective beliefs. *Journal of Experimental Social Psychology, 34*, 378-397. <http://dx.doi.org/10.1006/jesp.1998.1356>
- Trafimow, D., & Sheeran, P. (2004). A theory about the translation of cognition into affect and behavior. In G. Maio, & G. Haddock (Eds.), *Contemporary perspectives in the psychology of attitudes: The Cardiff*

*Symposium* (pp. 57-76). London: Psychology Press.

- Trafimow, D., Sheeran, P., Lombardo, B., Finlay, K. A., Brown, J., & Armitage, C. J. (2004). Affective and cognitive control of persons and behaviors. *British Journal of Social Psychology*, *43*, 207-224. <http://dx.doi.org/10.1348/0144666041501642>
- Vanable, P. A., Carey, M. P., Blaire, D. C., & Littlewood, R. A. (2006). Impact of HIV related stigma on health behaviors and psychological adjustment among HIV-positive men and women. *AIDS Behavior*, *10*, 473-482. <http://dx.doi.org/10.1007/s10461-006-9099-1>
- Whetten, K., Reif, S., Whetten, R., & Murphy-McMillan, L. K. (2008). Trauma, Mental Health, Distrust, and Stigma Among HIV-Positive Persons: Implications for Effective Care. *Psychosomatic Medicine*, *70*, 531-538. <http://dx.doi.org/10.1097/PSY.0b013e31817749dc>
- Winter, S. R., & Rice, S. (in press). Pilots who are perceived as unsociable are perceived as more likely to have a mental illness: An affective perspective. *Aviation Psychology and Applied Human Factors*. <http://dx.doi.org/10.1027/2192-0923/a000071>
- Winter, S. R., Rice, S., & Mehta, R. (2014). Aviation consumers' trust in pilots: A cognitive or emotional function. *International Journal of Aviation, Aeronautics, and Aerospace*, *1*(1), 1-18. <http://dx.doi.org/10.15394/ijaaa.2014.1003>
- World Health Organization. (2012, October 5). *Depression*. Retrieved December 13, 2014, from <http://www.who.int/mediacentre/factsheets/fs369/en/>
- Zajonc, R. (1998). Emotions. In D. Gilbert, S. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (Vol. 1, pp. 591-632). New York: Oxford University Press.

## Appendix A

Please respond to each of the following statement:

I would be willing to fly in this situation.

Strongly disagree      Disagree      Neutral      Agree      Strongly agree

I would be comfortable flying in this situation.

Strongly disagree      Disagree      Neutral      Agree      Strongly agree

I would have no problem flying in this situation.

Strongly disagree      Disagree      Neutral      Agree      Strongly agree

I would be happy to fly in this situation.

Strongly disagree      Disagree      Neutral      Agree      Strongly agree

I would feel safe flying in this situation.

Strongly disagree      Disagree      Neutral      Agree      Strongly agree

I have no fear of flying in this situation.

Strongly disagree      Disagree      Neutral      Agree      Strongly agree

I feel confident flying in this situation.

Strongly disagree      Disagree      Neutral      Agree      Strongly agree

## Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/3.0/>).