This research utilized the NTSB aviation accident and incident database (eADMS) from 1982 to 2014 to examine the severity of accidents by gender. Each NTSB finding is coded by events such as occurrences, phases of flight, weather conditions, sky conditions, age and gender of pilot, etc. Of interest in these data were number of flight hours for the pilots, degree of damage to the plane (None, Minimal, Substantial, Destroyed), and degree of bodily injury (None, Minor, Serious, Fatal). (NTSB, 1998).

There were 74,666 entries in eADMS. For this study, commercial (14 CFR part 121 and 135) operations, home built aircraft, and gliders were excluded leaving 61,312 entries. There were 56,284 (96.0%) male pilots and 2,287 (3.9%) female pilots. The average age for males pilots was 45.35 (SD=14.49) and for female pilots, 39.06 (SD=13.74). There was a statistically significant age difference, t(57,829)=20.22, p<.001. Consistent with the studies by Bazargan and Gzhva (2011) and Li et al. (2003) the variable for age was divided into six categories: younger than 20 years, 20-29, 30-39, 40-49, 50-59, and older than 60 years.

The mean number of flight hours for male pilots was 2,844.04 (SD=4,977, s.d=4.59). For female pilots, the mean was 1,305.13 (SD=3,395 52, s.d=657). Given skew, difference between male and female pilots flight hours was examined using a Mann-Whitney U and was significant, U(58,571)=4,31, p<.001 (median hours for male pilots was 879, for female pilots 280).

The total number of flight hours was divided into five experience categories based on FAR Part 61 guidance consistent with Bazargan and Gzhva (2011). The five pilot experience categories where: Category I (New Pilots) for pilots with 99 hours or fewer of total flight time, Category II (Moderate Experience) for 100 to 299 hours of flight time, Category III (Fairly Experienced) for between 300 and 1999 hours, Category IV (Very Experienced) for between 2000 and 4999, and Category V (Most Experienced) for pilots with more than 5000 hours.

Differences between male and female pilots were examined using the Test for Significance of a Difference Between Two Independent Proportions. Proportional comparisons compensate for disparity in the number of male versus female pilots.

### Results

#### Damage to the plane for males and females combined was examined across FAR Part 61 experience levels.

Experience Category (CAT) III had the highest level of incidents/accidents resulting in no damage to the aircraft (34.6%) with CAT I lowest at 8.3%. CAT V had the highest level of minor damage to the aircraft (30.8%) with CAT I lowest at 9.8%. For substantial damage, CAT III was highest (38.3%) with CAT I again lowest at 14.3%. And for destruction of the aircraft, CAT III was again the highest (41.2%) with CAT I lowest at 7.9%.

Injuries were also examined across experience levels for males and females combined. CAT III had the most incidents/accidents with no injuries (36.7%), with minor injuries (41.3%), with serious injuries (40.9%), and with fatalities (41.6%). CAT III was lowest for incidents/accidents with no injuries (15.4%), and CAT I was lowest for minor injuries (11.8%), serious injuries (9.9%), and fatalities (6.8%).

When injury was examined by gender without regard to the experience level of the pilots, females were significantly higher than males (60.7% and 56.8%, respectively) in incidents/accidents with no injuries (\( z = 3.718, p < .01 \)). Females were significantly higher than males for incidents/accidents with minor injuries (17.3% and 14.3%, respectively, \( z = 3.92, p < .05 \)) and, while not significant, for serious injuries (15.3% and 10% respectively, \( z = .36, p > .05 \)). Females were significantly lower than males in incidents/accidents with fatalities (11.7% and 18.8% respectively, \( z = 8.59, p > .05 \)).

#### Differences Between Two Independent Samples

Differences between male and female pilots were examined with more than 5000 hours.

In the research, did not clarify aircraft accident types by gender as suggested by Baker et al.

### Discussion, Conclusions and Recommendations

Previous research has not supported, generally, any real differences between male and female pilots particularly in accidents rates by gender. Bazargan & Gzhva, 2011; Caldwell & LeDuc, 1998; Mitchell et al., 2005; Puckett & Hynes, 1981; Vail & Elkan, 1986). However, in this study, differences were found when experience was taken into account with female pilots significantly higher in accidents at lower experience levels as compared to male pilots, significantly lower in accidents at higher experience levels when compared to male pilots. Some research has suggested that these differences are the result of gender—that is, males are likely to be impulsive, take risk, and be less likely to plan the flight as compared to female pilots (Baker et al., 2001; Jonas, 2001). This research did not clarify aircraft accident types by gender as suggested by Baker et al.

These data seem to suggest that female pilots at higher levels of experience do fly under better conditions, i.e., clear skies, VFR conditions, during daylight hours, and during minimal weather, but not significantly more than male pilots. By counter, male pilots at higher levels of experience are flying more complicated aircraft with multi-engine and/or retractable landing gear. There does seem to be some difference between male and female pilots regarding damage or injury when twin-engine aircraft are examined. However, there does not seem to be the clear gender trend noticed in the general data and, indeed, the results seem more sporadic and without a clear pattern. Finally, the trend in the data suggest, in accordance with Baker et al., that female pilots tend to engage in less risky behavior.

The stereotypical beliefs identified by Mitchell et al. (2005) that females are less capable than males at all levels does not appear to be supported by this research, with some equivocation that could be entertained relative to twin-engine aircraft. The twin-engine aircraft data needs further exploration to see if a discernable pattern emerges.

Future research might focus on the age of pilots and the interaction of age and flying hours as an indicator of experience. In addition, future research should examine causes and phase-of-flight factors that might contribute to accidents.