CFIs' Safety Behaviors at Flight Training Schools: Understanding the Effects of Personality Traits, Self-Efficacy, Risk Perception, and Safety Climate

Vivek Sharma
Florida Institute of Technology - Melbourne, vsharma2016@my.fit.edu

Meredith Bell Carroll
Florida Institute of Technology - Melbourne, mcarroll@fit.edu

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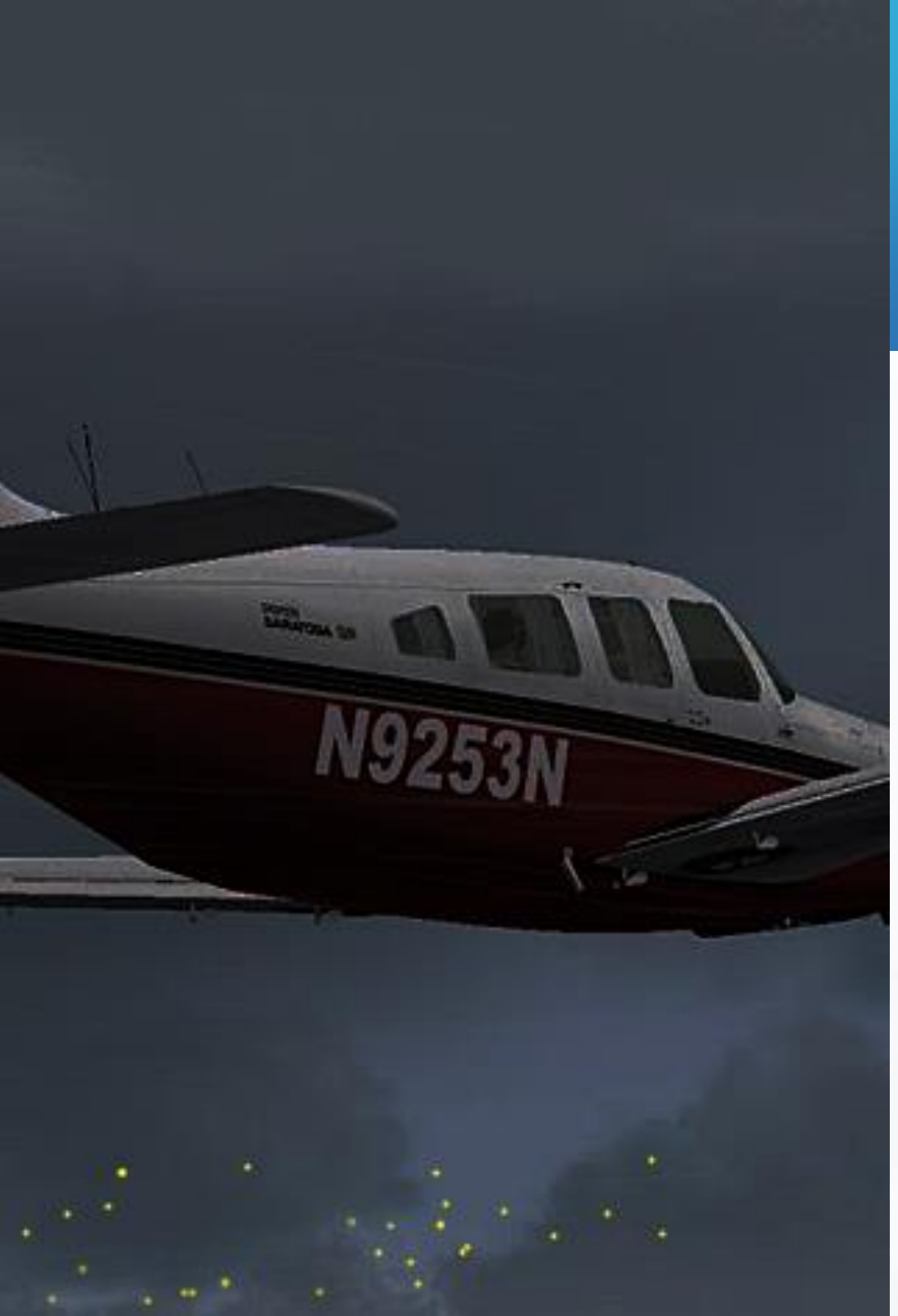
Vivek Sharma and Dr. Meredith Carroll



Background

- 6,042 non-commercial fixed-wing general aviation accidents between 2015 and 2020 (Aircraft Owners Pilot Association (AOPA), 2020).
- Of those, 990 were instructional accidents constituting 16% of the total non-commercial fixed-wing general aviation accidents.
- Probable cause of LOC and midair collisions were due to poor decision making, bad judgement and unsafe behaviors of the CFI (AOPA, 2015).

Rationale and Purpose

Rationale: Several different factors influence safe behaviors.

- Social cognition and personality influence individual differences in risky behaviors and accident involvement (Ji et al., 2011).
- Attitude, perceived risk, safety climate, and self-efficacy influence safety behaviors (Adjekulm, 2017; Chen & Chen, 2012; Hunter, 2006; O' Hare, 1990).

Gap: Extant research has examined these relationships individually, but no research to date has looked at them collectively, including interactions.

Purpose: Build a theoretical model of the relationship between personality traits, affective domain variables, safety climate, and safety behaviors of certified flight instructors.

Theoretical Grounding: Big Five Personality

- Most basic dimensions in the structure of human personality (Novikova, 1993).
- All people have the same essential personality traits but differ in intensity along dimensions.

Dimensions	Description
Neuroticism	Intensity and frequency of experienced negative emotions, sensitivity to negative aspects of environment
Extraversion	Amount of energy directed outwards to the external environment, and need for external stimulation
Openness	Receptivity to a range of external and internal sources of information and new input
Agreeableness	Accepting, and being influenced by perspectives or concerns of others
Conscientiousness	Strength of purpose and drive to goal accomplishment

Theoretical Grounding: Bandura's Self-Efficacy

- According to Bandura (1981), self-efficacy refers to "judgments of how well one can execute courses of action required to deal with perspective situations" (p. 122).
  - Individuals with high self-efficacy are more likely to engage in certain behaviors.

- In the context of the proposed study CFI's:
  - High Self-efficacy are likely to have higher safety behaviors

Method

- Literature review conducted to identify direct and indirect relationships between target constructs in extant research.
- Literature searched using the following databases:
  - ProQuest, Google Scholar, and Florida Tech Summons library database.
- Resulted in:
  - Over **100 abstracts** reviewed for relevancy.
  - **43 articles** selected for a full review.
  - **30** articles included in analysis in which information was extracted.

Overview of Studies Reviewed

Domain [a]	Sample Size	
	N [b]	% [c]
Aviation	1980	18.14%
Athletics	211	1.93%
Construction	1130	10.35%
NPP	462	4.23%
Students	302	2.77%
Education	1810	16.58%
Manufacturing	964	8.83%
Driving	653	2.97%
General Population	4036	36.97%
Total	10,917	100%

Note. [a] indicates the domain from which the article was reviewed. [b] indicates the total number of sample size from all the articles that were reviewed from each domain. [c] indicates the proportion of sample from each domain

- Hypothesized model is driven by research from 5 different domains
  - Aviation
  - Teachers
  - Nuclear Power Plant
  - Construction
  - Athletes
- Relevance of Other Domains due to:
  - High risk
  - Complex task
  - Education-based
  - Dynamic environment

Results:
Personality Influence on Safety Behaviors

Personality shown to directly influence Safety Behaviors

- **Extraversion: positive relationship with safety behaviors** (Jong-Hyun et al., 2018; Bues et al., 2015; Gao et al., 2020) in nuclear power plant workers, drivers, and construction workers.
- **Agreeableness: positive relationship with safety behaviors** (Bues et al., 2015; Ji et al., 2019) among construction workers and aviation personnel.
- **Openness: positive relationship with safety behaviors** (Jong-Hyun et al., 2018; Bues et al., 2015) in nuclear power workers, drivers, and construction workers.
- **Conscientiousness: positive relationship with safety behaviors** (Jong-Hyun et al., 2018; Bues et al., 2015) among aviation personnel, construction workers, and nuclear power plant workers.
- **Neuroticism: negative relationship with safety behaviors** (Rajabi et al., 2001; Gao et al., 2020) among operational staff at gad refinery and construction workers.

Results:
Self-Efficacy Influence on Safety Behaviors

Self-efficacy shown to directly influence Safety Behaviors

- **Self-efficacy: positively related to safety behaviors** (Li et al., 2018; Chen & Chen, 2014; Adjekulm, 2017) among airline pilots in China, Taiwan, and students enrolled in aviation programs.

Self-efficacy shown to indirectly influence Safety Behaviors

- Self-efficacy: **mediated relationship between Neuroticism, Extraversion, and mobile phone use while driving** (Zhang et al., 2020) among food delivery workers.
- **Creative self-efficacy: mediated relationship between Conscientiousness and work behaviors** among teachers in China (Li et al., 2017).

Results:
Risk Perception Influence on Safety Behaviors

Risk Perception shown to directly influence Safety Behaviors

- **Risk perception: positive relationship with safety behaviors** (Ji et al., 2011; Ji et al., 2011; Taylor & Snyder, 2017) among Chinese airline pilots, South China airline pilots, and college students.

Risk Perception shown to indirectly influence Safety Behaviors

- **Risk perception: mediated relationship between Extraversion, Agreeableness, and risky driving behaviors** (Machin & Sankey) among young drivers.
- **Risk perception: mediated relationship between Proactive personality (an aspect of Conscientiousness) and situational judgment** among flying cadets (Ji et al., 2018).

Results:
Safety Climate Influence on Safety Behaviors

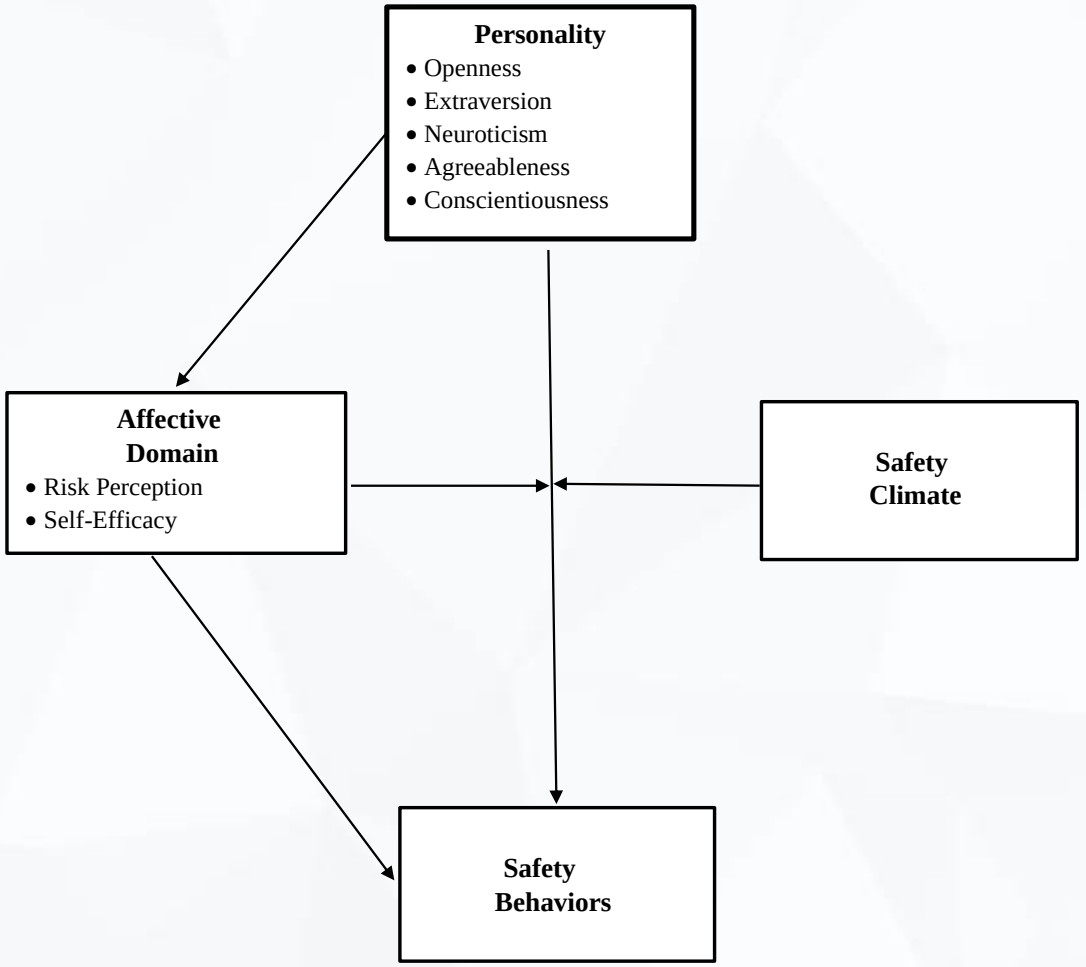
Safety Climate shown to directly influence Safety Behaviors

- **Safety climate: positively relationship with safety behaviors** (Lu & Tsai 2010; Kouabenan et al., 2015; He et al., 2020) among managers in nuclear power plants, seafarers, and workers in construction organizations.

Safety Climate shown to indirectly influence Safety Behaviors

- **Safety climate: moderated relationship between personality traits and safety behaviors**.
  - Higher safety climate weakens the direct effects of Impulsiveness traits on safety compliance and safety participation (Rajabi et al., 2020; Lee & Dalai., 2016) among construction and manufacturing workers.
- **Safety climate: moderated relationship between personality traits of Conscientiousness, Extraversion, and safety behaviors** (Doerr, 2020) among working employees in the U.S.

Proposed Theoretical Model



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Conclusions and Future Research

- Findings can help flight schools understand CFI's propensity towards risk-taking behaviors .
  - New safety procedures or protocols to enhance safety performance.
  - New safety goals, in which every CFI is motivated to contribute, to the best of their abilities, towards safety goals.

- Future research
  - Validate theoretical model by collecting empirical data from CFIs across the United States.

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