SAFETY CLIMATE AND SAFETY BEHAVIORS AMONG THAI PILOTS: THE MEDIATED MODERATED STRUCTURAL EQUATION MODELING TECHNIQUE

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Abstract

Past research reveals that safety climate plays an essential role in influencing safety-related behavior in various work contexts. However, few studies have considered how safety climate could influence safety behavior among pilots. This study aims to contribute to the safety literature by investigating the impact of group or fleet safety climate on pilots' safety behavior and to investigate the mediating roles of attitudinal pride and safety knowledge and the moderating role of organizational tenure. Based on a sample of 610 commercial pilots in Thailand, a moderated mediation structural equation modelling technique was utilized. Results of the analysis affirm that fleet safety climate has a significant positive effect on pilots' safety behavior via an increase in their attitudinal pride and safety knowledge. Additionally, the indirect influence of fleet safety climate on safety behavior was found to be stronger among pilots with longer tenure. This suggests that longer-tenured pilots are more reliant on workplace safety norms to maintain safety behaviors. Airlines can use the results from this study to establish and implement fleet-wide safety policies to reduce aviation risks at work.

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Keywords: Aviation, Attitudinal Pride, Safety Behavior, Safety Climate, Safety Knowledge

INTRODUCTION

Safety has always been regarded as the pinnacle priority in aviation. While the safety performance of the flight crew plays an important role in ensuring flight safety, pilots are said to be directly responsible for the safety of the entire flight operations (Durlak & Wells, 1997). Unfortunately, empirical evidence indicates that aviation accidents are often caused by human error (Helmreich, 1997; Wiegmann & Shappell, 2001). In fact, it has been suggested that pilots are the primary cause of aviation accidents and that pilots' rulebooks are "written by blood" (DaRBy, 2006). In addition, it has been indicated that human factors account for approximately 75% of air accidents or incidents, with pilot error being identified as a key contributing factor of aviation safety concerns (Gramopadhye & Drury, 2000; Kelly & Efthymiou, 2019; Kharoufah et al., 2018). Although air accidents are rare, when they do occur, they often attract international attention. It is therefore critical to gain more understanding about factors affecting pilots' safety behavior and the factors which could help to enhance their safety performance.

While past research indicates that several individual, team, and organizational factors, are associated with an increase in safety behavior (Crichton, 2017; Curcuruto & Griffin, 2018; Gao et al., 2016; Makary et al., 2006), this study focuses on the role of safety climate, which has been defined as the sum of individuals' shared perceptions of safety procedures residing within a work unit (Chmiel et al., 2017; Quach et al., 2021). Specifically, this study draws attention to the role of safety climate that exists in an aircraft fleet (Brondino et al., 2012). In aviation, fleets can be considered as work units in the same way they are in other settings. Accordingly, work-related information and safety practices are often shared among pilots within fleets; this could result in a unique molding and development of safety behavior that differs from those of other fleets.

To explain the positive influence of the fleet safety climate, this study examines the mediating roles of attitudinal pride and safety knowledge. Attitudinal pride can be defined as the feelings of pride that are developed through one's membership in an organization (Goudarzi et al., 2011; Helm, 2013). Meanwhile, safety knowledge is defined as an ability to know and recognize any issues in one's own safety working procedures (Neal & Griffin, 2002; Zohar, 2000). On the one hand, this study argues that safety knowledge can be instilled in pilots through a social learning process (Bandura, 1977), that is, through a strong safety climate in work units. It is expected

that pilots will be exposed to a high level of safety emphasis within the socializing process, of the work environment that informs their knowledge, and how they should behave. From a social exchange perspective (Blau, 1964), it is possible that strong safety climate could engender a sense of organizational pride among pilots, leading to an increased commitment to safety practices (Kraemer & Gouthier, 2014).

It is further argued that the proposed relationships could differ depending upon pilots' length of tenure in the organization. Past research reveals that tenure is an important factor that influences an individual's behavior at work (Murphy et al., 2019). In this research, pilots' tenure is conceptualized as the total number of years spent in the organization, which in the aggregate not only reflects their total flight time experience but also their experience involving non-flying job duties such as ground handling, flight dispatching, paperwork, instruction, or management. While it is true that longer-tenured pilots may have accumulated more job-related knowledge, experience, and skills, it should be acknowledged that, with longer tenure, they could experience a state of boredom and complacency in their jobs (Kass et al., 2001). In fact, work experience has also been associated with increased human error (Tao et al., 2021). Therefore, it is proposed that longer-serving pilots could be more strongly influenced by the prevailing safety norms that exist in their fleets. That is, they are likely to be more reliant on the safety environment to affect their actions.

This research contributes to safety literature in several aspects. Firstly, although previous research has already shed light on the role of fleet safety climate in other important working contexts (Lee et al., 2019; Neal & Griffin, 2006), the significance of aviation fleets has been neglected in the context of aviation research. This is an important omission as, apart from the influence of top organizational leaders via organizational safety climate (Shen et al., 2017; Walumbwa & Schaubroeck, 2009), fleets can present a crucial working context in which pilots' work-related behaviors are formed. Secondly, relatively few studies to date have examined how and why a safety climate can have a virtuous influence on workers' safety-related behavior. While previous research has already examined the mediating role of safety knowledge (Griffin & Neal, 2000; Guo, Yiu, & González, 2016), little previous research has investigated how attitudinal pride may provide an additional explanation for the influence of a safety climate. Thirdly, the consideration of pilots' tenure as a moderating variable provides an important insight into the interplay between organizational and time-related factors. The following

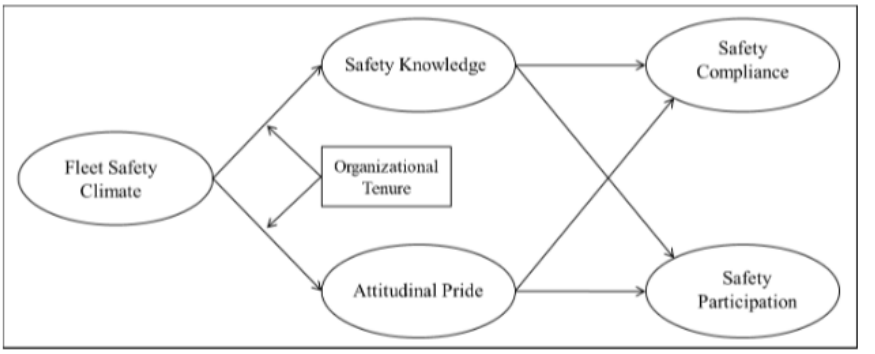

Figure 1 Theoretical Model

sections offer a discussion of the literature that underpins the theoretical model, which is portrayed in Figure 1.

LITERATURE REVIEW

Fleet Safety Climate and Safety Behavior

The primary focus of this study considers how safety behavior among pilots can be further improved. According to the extant literature, safety behavior can generally be divided into two specific dimensions, namely, safety compliance and safety participation. Safety participation refers to the extent to which individuals are willing to participate in safety-related activities while safety compliance refers to the extent to which individuals willingly comply with safety standards and regulations at work (C.-S. Lu et al., 2017; Neal & Griffin, 2002).

In this study, we focus on the role of the safety climate, which falls under the direct control of the organization. Safety climate is an environmental factor which can emerge at both group and organizational levels (Newaz et al., 2019; Yari et al., 2019). Organizational safety climate refers to the company's overall emphasis on safety (DeJoy et al., 2010), whereas group-level safety climate provides the proximal interpersonal and professional settings for employees (Zohar, 2000). While past research has generally indicated that different levels of safety climates can lead to more favorable safety behavior (Agnew et al., 2013; Oah et al., 2018), the focus of this research is on the safety climate at the group level, or more specifically, the fleet safety climate.

Safety climate is regarded as a crucial organizational element affecting safety behavior. In particular, fleet safety climate can significantly shape pilots' safe behavior as fleets represent their most proximal social contexts. Pilots within the same fleets are trained and assigned to fly the same types of

aircraft. They are also trained to utilize the same standard operating procedures and depend upon the same technical knowledge. For example, a pilot operating a turbo propeller aircraft must be properly informed that such aircrafts can hardly handle cross-wind landings due to its performance limitations while a jet aircraft can better handle cross-wind or even downwind landings (Riebe, 1973). These technicalities and potential complications demand different training durations and safety protocols. Over time, it is argued that emphasis on such safety-related practices can give rise to the emergence of safety norms which can affect pilots' behavior. Hence, it is possible to assume that different fleets of aircraft will have significantly different levels of safety requirements (Zohar & Luria, 2010). Recent research has shown that more conscientious workers possess more positive attitudes towards questioning about unsafe work practices, which in turn leads to greater incidence of safety behavior (Tao et al., 2021).

The Mediating Role of Safety Knowledge

Safety knowledge can be construed as an ability to know and recognize issues regarding the importance of safety at work (Guo et al., 2016). In aviation, safety knowledge could play a critical role in an emergency or unforeseen situation such as in-flight engine failure, adverse weather conditions or even terrorist threats. Pilots with safety knowledge at heart will be able to recall what they have learned and act according to the demands of the situations. The way the flight crew reacts to adversity and determines the best course of action is crucial to safe flight operations (You et al., 2013). Safety decision-making especially during unfavorable situations can be recalled automatically when one possesses proper safety knowledge (Ji et al., 2017). This is comparable to System 1 thinking, which refers to an unconscious mechanism that allows one's knowledge to be retrieved quickly when needed (Milkman et al., 2009).

Apart from the technical knowledge and flight experience gained directly through rigorous training programs, pilots' learning will continue to expand once they join an airline. In particular, fleets provide an important social context that shapes pilots' knowledge and molds their behavior over time (Bandura, 1977). It has been argued that informal learning constantly takes place at the fleet level through a socialization process. Pilots socialize and share work-related information with peers in the same fleet. For example, in the event of turbulence in adverse meteorological conditions, operating a Boeing B737 Max may require different turbulence penetration airspeed due to the more powerful engines compared to Airbus A320 Neo and B737; pilots can share this information among peers within their fleet. Moreover, pilots will try to emulate the behavior of their peers to ensure that their behavior is consistent

with the accepted norms in their fleet. Empirically, safety knowledge has been shown to be an important mediating mechanism in the relationship between safety climate and safety behavior, in various contexts. This study seeks to replicate such findings in the context of piloting aircraft. Based on the above discussion and strong empirical evidence, it is hypothesized that:

Hypothesis 1: Safety knowledge mediates the relationship between fleet safety climate and pilots' safety behavior.

The Mediating Role of Attitudinal Pride

Attitudinal pride refers to the pleasure taken in being associated with one's employer. Such pride is said to emerge when one is given information to help evaluate organizational membership in a positive light (Ng, Yam, & Aguinis, 2019). In this respect, social exchange theory (Blau, 1964) posits that when one party receives a positive treatment from another, they will feel obligated to return the favor by engaging in positive behavior. In the organizational context, such behavior may include showing a strong commitment to one's organizational mission or devoting a significant amount of personal resources to accomplishing tasks (Best & Kahn, 1993). Attitudinal pride can be considered as a type of positive attitude, reflecting gratitude and loyalty toward the organization (Gouthier & Rhein, 2011).

In particular, fleet safety climate can induce feelings of pride among pilots, in turn leading to greater expression of safety behavior. There could be several reasons for this. Firstly, in aviation, fleet safety climate can be regarded as a reflection of the overall emphasis among pilots on passenger safety. When safety of passengers is regarded as the overarching mission of work units, it is likely that pilots will take greater pride in their jobs and be proud to work for their organizations, such that they will take their work professionally (Borst & Lako, 2017; Kraemer et al., 2017). Secondly, the emphasis on safety could also be viewed as the employer's obligation to uphold safety standards, to ensure the pilots' safety, which could in turn prompt the pilot to feel grateful for the employer's concern for their safety and to engage in more positive behavior. Thirdly, when pilots successfully land the aircraft and complete their flight mission, they feel proud that they have completed the job safely. Safe operations come from a positive safety climate and the good reputation of a company with high reliability, whereby a profession such as piloting may promote positive attitudinal pride. Such appreciation could possibly further enhance feelings of pride and safe performance among pilots.

While there is no direct empirical evidence regarding the influence of attitudinal pride on workers safety-related behavior, past studies have shown that attitudinal pride is related to several work-related attitudes, such

as job satisfaction and task performance (Seyedpour et al., 2020). Based on these reasons, attitudinal pride should mediate the influence of fleet safety climate on safety behavior. Thus, it is hypothesized that:

Hypothesis 2: Attitudinal pride mediates the relationship between fleet safety climate and pilots' safety behavior.

The Moderating Role of Tenure

The role of organizational tenure has been widely examined in management research. In particular, tenure has been associated with several organizationally important factors such as job commitment, job performance, and work motivation (Jain, 2015; León & Morales, 2019). Pilots with longer tenure may have developed more knowledge, experience, and skills in dealing with safety issues their work roles.

Specifically, seasoned pilots with longer tenure may have accumulated specific work experience, which may prompt them to inadvertently commit a greater number of complacency related mistakes. A classic example of such cases relates to the accident of Korean Air Flight 801, which crashed off the coast of Guam in 1997, killing 228 people. While the first officer and flight engineer recognized an ongoing problem, the captain ignored their warnings, the decision that finally led to the crash (Kim & Lee, 2008). In contrast to more senior pilots, novice pilots are fresh out of their flight training, and safety is still a primary concern for them. For these reasons, we argue that fleet safety climate could have a stronger influence on pilots with longer tenure. That is, longer-serving pilots are more reliant on the safety climate to affect their safety behavior. In contrast, shorter-tenured pilots could be relatively more safety-conscious and thus could be less affected by prevailing safety norms. Based on the arguments discussed above, the relationships between fleet safety climate and attitudinal pride and safety knowledge may be moderated by tenure. Specifically, this relationship will be stronger among longer tenured pilots than those with shorter tenure. This leads to the development of the hypotheses:

Hypothesis 3: Organizational tenure moderates the relationship between fleet safety climate and safety knowledge, such that the relationship is stronger when tenure is high.

Hypotheses 4: Organizational tenure moderates the relationship between fleet safety climate and attitudinal pride, such that the relationship is stronger when tenure is high.

METHODOLOGY

Overview of Sample and Data Collection

The study hypotheses were tested using a sample of commercial pilots in Thailand. This is an important sample for investigating air safety because several aviation-related accidents in Thailand are said to be related to

human error (Charoensook, 2018). Samples were drawn from both airplane and helicopter businesses from a total of seven air carriers. After being granted access from the HR departments of each airline company, self-administrated surveys were sent to the employees through each company's internal email system. The survey instrument was divided into 6 parts including fleet safety climate, safety knowledge, attitudinal pride, safety participation, safety compliance, and demographic data. One benefit of using email-based surveys is that the anonymity of the respondents could be assured. Seven hundred surveys were sent out. In total, six hundred and ten complete responses were returned. This specific sample size was considered a priority. Considering the suitable sample size for analyzing the structural equation model, the minimum acceptable sample size for the analysis ought to be at least 200 or about 8-15 cases per manifest indicator, whichever is larger (Kline, 2015).

Measures

The original scales were developed in English, with all being translated into the Thai language for the purposes of this study. A complete list of items and their measurement properties are presented in Table 2. *Fleet Safety Climate* (α = 0.95) was measured using a 3-item scale adapted from the study of Neal and Griffin (2006). *Attitudinal pride* (α = 0.95) was measured using a 3-item scale developed by Gouthier & Rhein (2011). *Safety Knowledge* (α = 0.92) was measured using a 3-item scale developed by Guo (2016). *Safety Participation* (α = 0.92) was measured using a 7-item scale developed by Lu (2017). *Safety Compliance* (α = 0.94) was measured using a 3-item scale developed by Neal and Griffin (2006). *Organizational tenure* was measured by directly asking respondents to fill in their total aviation-related tenure in years. All rating scales were based on a 5-point Likert type format (1 = *strongly disagree*, 5 = *strongly agree*). While safety compliance and safety participation were previously considered as parts of a composite model in various studies (Guo et al., 2016; Li et al., 2021; C. S. Lu & Yang, 2010), safety behavior was divided into two separate common factor models in this study. Neal & Griffin (2000) categorized the safety behavior construct as job performance in a generic context (Boorman & Motowildo, 1997). Meanwhile, safety compliance was considered as task performance, and safety participation was considered as contextual performance. Therefore, this study considered safety compliance and safety participation as separate common factor models.

Analytic Process

Hypotheses were tested by utilizing structural equation modeling in R with the lavaan (latent variable analysis) package (Rosseel, 2012). Several indices were used to assess the model fit (Browne & Cudeck,

1993). After the fit of the measurement model was obtained, the analysis estimated the hypothesized structural model in two models. The first model involved testing the mediation only structural model. The first model results were used to test the indirect effects of fleet safety climate on safety participation and safety compliance. The second model involved testing the first structural model with tenure as an interaction term. Finally, the second model results were used to test the conditional indirect effects.

RESULTS

Descriptive Statistics

Regarding the descriptive statistics of the dataset, most respondents were male (93.60%) and held a bachelor's degree or equivalent (75.60%). The majority of the pilots had received sponsorship for their flight training (57.70%), worked as Piot-in-Command (51.30%), had obtained their Air Transport Pilot License (53.30%), and flied Fixed-wing Aircraft (76.60%).

Measurement Model

The measurement model used in this study was found to fit with the empirical data as per the model fit indices (χ^2 = 551.36, df = 142, p < .000; relative χ^2 = 3.88; GFI = .91; CFI = .95; TLI = .94; RMSEA = .06; SRMR = .06). The discriminant validity of the constructs was assessed using the square roots of the Average Variance Extracted (Fornell & Larcker, 1981). As shown in Table 1, the size of the AVE values was greater than standardized square multiple correlations, indicating adequate discriminant validity among the constructs. In terms of convergent validity, the factor loadings on each construct were examined. As shown in Table 2, the standardized factor loadings were all above 0.60, ranging from 0.62 to 0.92. The size of the Average Variance Extracted for each

Table 1 Means, Standard Deviations, Bivariate Correlations, Standardized Multiple Correlation and Average Variance Extracted

Variables (n = 610)	*Mean*	*SD*	1	2	3	4	5
1. Fleet Safety Climate (FSC)	2.90	.94	***(.87)***	.55	.63	.49	.26
2. Safety Knowledge (KNW)	3.77	.69	.60	***(.84)***	.44	.48	.42
3. Attitudinal Pride (ATT)	3.72	.60	.68	.48	***(.91)***	.38	.39
4. Safety Compliance (COM)	3.53	.70	.55	.54	.42	***(.83)***	.25
5. Safety Participation (SPT)	3.84	.75	.28	.46	.42	.28	***(.77)***
6. Organizational Tenure (TEN)	13.14	9.04	-	-	-	-	-

Note. All values in this table are significant at p < .00; numbers in the diagonal line (shown in bold and in parentheses) are the square roots of the AVE, which are greater than the size of standardized multiple correlations shared between constructs; numbers below the diagonal line are bivariate correlations; numbers above the diagonal line are the standardized multiple correlations shared between the constructs; organizational tenure was measured in years.

Table 2 Standardized Factor Loadings, AVE, CR and Cronbach's Alpha

Variables	Items	Loadings
Fleet Safety Climate (FSC)	*AVE = .77; CR = .91; α = .91*	
	1. My fleet places a strong emphasis on workplace health and safety. (FSC1)	0.88
	2. Safety is given a high priority in my fleet. (FSC2)	0.84
	3. My fleet considers safety to be important. (FSC3)	0.91
Safety Knowledge (KNW)	*AVE = .72; CR = .88; α = .88*	
	1. I know how to maintain or improve workplace health and safety. (KNW1)	0.85
	2. I know how to reduce the risk of accidents and incidents in the workplace. (KNW2)	0.91
	3. I know what hazards are associated with my job and the necessary precautions to be taken while doing my job. (KNW3)	0.79
Attitudinal Pride (ATT)	*AVE = .83; CR = .93; α = .93*	
	1. I feel proud to work for my organization. (ATT1)	0.92
	2. I feel proud to contribute to my organization's success. (ATT2)	0.89
	3. I feel proud to tell others which organization I am working for. (ATT3)	0.92
Safety Compliance (COM)	*AVE = .70; CR = .87; α = .87*	
	1. I always use a checklist. (COM1)	0.76
	2. I use the correct safety procedures for carrying out my job. (COM2)	0.86
	3. I ensure the highest levels of safety when carrying out my job. (COM3)	0.88
Safety Participation (SPT)	*AVE = .60; CR = .91; α = .90*	
	1. Attending safety meetings. (SPT1)	0.62
	2. Volunteering for safety committees. (SPT2)	0.77
	3. Participating in setting safety goals. (SPT3)	0.82
	4. Making safety-related recommendations about work activities. (SPT4)	0.83
	5. Encouraging co-workers to get involved in safety issues. (SPT5)	0.65
	6. Rising safety concerns during planning sessions. (SPT6)	0.83
	7. Expressing opinions on safety matters even if others disagree. (SPT7)	0.79

Note. AVE = average variance extracted; CR = composite reliability; α = Cronbach's alpha; All factor loadings are significant at $p < .00$

variable was also acceptable, being above the recommended cut-off of 0.50. Composite Reliabilities of the constructs also ranged from 0.81 to 0.95, exceeding the recommended value of 0.60 (Bagozzi & Yi, 1988). Additionally, Cronbach's alphas showed satisfactory levels for the reliability of internal consistency, ranging from 0.87 to 0.93 (Hulland, 1999).

Structural Model

According to the adequate reliability and validity of the measurement model, the hypothesized structural model was then examined. All paths were estimated as shown in Table 3.

The mediation only model was fit with the empirical data as per the model fit indices (χ^2 = 590.32, df = 145, p < .000; relative χ^2 = 4.07; GFI = .90; CFI = .94; TLI = .93; RMSEA = .07; SRMR = .06). The results showed that fleet safety climate had a positive direct effect on attitudinal pride and safety knowledge (β = .81, p < .000; β = .49, p < .000, respectively). Attitudinal pride and safety knowledge were positively related to safety participation (β = .16, p < .000; β = .29, p < .000, respectively), while attitudinal pride and safety knowledge were also positively related to safety compliance (β = .12, p < .000; β = .33, p < .000, respectively).

The moderated mediation model also fit with the empirical data (χ^2 = 711.79, df = 217, p < .000; relative χ^2 = 3.28; GFI = .90; CFI = .95; TLI = .94; RMSEA = .06; SRMR = .05).

Table 3 Standardized Path Coefficients for Mediation Only and Moderated Mediated SEM

Estimated Paths	*Mediation Only*	*Moderated Mediation*
Main Paths		
Fleet Safety Climate > Attitudinal Pride	.64***	.62***
Fleet Safety Climate > Safety Knowledge	.56***	.54***
Attitudinal Pride > Safety Participation	.26***	.25***
Safety Knowledge > Safety Participation	.31***	.31***
Attitudinal Pride > Safety Compliance	.22***	.22***
Safety Knowledge > Safety Compliance	.40***	.40***
Tenure > Attitudinal Pride	-	-.01
Tenure > Safety Knowledge	-	.09**
Interaction Term Effect		
[Fleet Safety Climate*Tenure] > Attitudinal Pride	-	.10**
[Fleet Safety Climate*Tenure] > Safety Knowledge	-	.11**
Coefficient of Determination		
Attitudinal Pride R^2	.41	.42
Safety Knowledge R^2	.32	.34
Safety Participation R^2	.22	.22
Safety Compliance R^2	.28	.28

Note. N = 610; ** p < .01, *** p < .00

The results showed that fleet safety climate had direct positive effects on attitudinal pride and safety knowledge ($\beta = .78$, $p < .000$; $\beta = .47$, $p < .000$, respectively). Tenure was negatively related to attitudinal pride ($\beta = -.00$, $p < .000$) but positively related to safety knowledge $\beta = .01$, $p < .000$). The interaction term between fleet safety climate and tenure, was positively related to attitudinal pride ($\beta = .01$, $p < .000$), while the interaction term between fleet safety climate and tenure was also positively related to safety knowledge ($\beta = .01$, $p < .000$). Attitudinal pride and safety knowledge were positively related to safety participation ($\beta = .16$, $p < .000$; $\beta = .29$, $p < .000$, respectively) and attitudinal pride and safety knowledge were also positively related to safety compliance ($\beta = .12$, $p < .000$; $\beta = .33$, $p < .000$, respectively). Therefore, hypotheses 1-2 were supported.

In terms of the indirect effects, contrast effect and total effect of the mediation only path analysis, shown in Table 4, the results revealed that the indirect effects of fleet safety climate on safety participation and safety compliance via safety knowledge were significant; moreover, the indirect effects of fleet safety climate on safety participation and safety compliance via attitudinal pride were also significant. However, the contrast effects between the four indirect effects were not significant. The total effect of the path analysis was significant.

In terms of the indirect effects and total effect of the moderated mediation path analysis shown in Table 5, the results further revealed that the conditional indirect effects of fleet safety climate on safety participation via the mediating role of attitudinal pride were stronger when tenure was high. The conditional indirect effects of fleet safety climate on safety compliance via the mediating role of attitudinal pride were slightly stronger when tenure was high. However, the conditional indirect effects of fleet safety climate on safety participation via the mediating role of safety knowledge were not significant. Finally, the conditional indirect effects of fleet safety climate on safety compliance

Table 4 Result of Indirect Effect, Contrast Effect and Total Effect – Mediated Path Analysis

Effects	*Coeff*	Std. *Coeff*	SE	z	*p* - value
Indirect Effect 1 (FSC > KNW > COM)	0.16	0.23	0.02	7.63	.00***
Indirect Effect 2 (FSC > KNW > SPT)	0.14	0.17	0.02	6.07	.00***
Indirect Effect 3 (FSC > ATT > COM)	0.10	0.14	0.02	4.99	.00***
Indirect Effect 4 (FSC > ATT > SPT)	0.13	0.16	0.02	5.52	.00***
Contrasting Indirect Eff.1 and Indirect Eff.3	0.06	0.08	0.03	1.85	.06
Contrasting Indirect Eff. 2 and Indirect Eff.4	0.00	0.00	0.03	0.18	.85
Total Effect	0.54	0.71	0.04	12.42	.00***

Note. *** $p < .00$

Table 5 Results of Conditional Indirect Effect - Moderated Mediation Path Analysis

Mediated paths	Levels of Tenure	Indirect Effects			Total Effects		
		Coeff	*SE*	*p* value	*Coeff*	*SE*	*p* value
Fleet Safety Climate > Attitudinal Pride > Safety Participation	Low	.18	.03	.00***	.21	.03	.00***
	High	.19	.03	.00***	.22	.03	.00***
	Difference	.00	.00	.00***	.01	.00	.01*
Fleet Safety Climate > Attitudinal Pride > Safety Compliance	Low	.03	.02	.13	.35	.03	.00***
	High	.03	.02	.13	.36	.03	.00***
	Difference	.00	.00	.17	.01	.00	.02*
Fleet Safety Climate > Safety Knowledge > Safety Participation	Low	.17	.02	.00***	.22	.03	.00***
	High	.18	.02	.00***	.23	.03	.00***
	Difference	.00	.00	.01*	.00	.00	.01*
Fleet Safety Climate > Safety Knowledge > Safety Compliance	Low	.11	.02	.00***	.35	.03	.00***
	High	.12	.02	.00***	.36	.03	.00***
	Difference	.00	.00	.01*	.00	.00	.02*

Note. * $p < .05$, *** $p < .00$

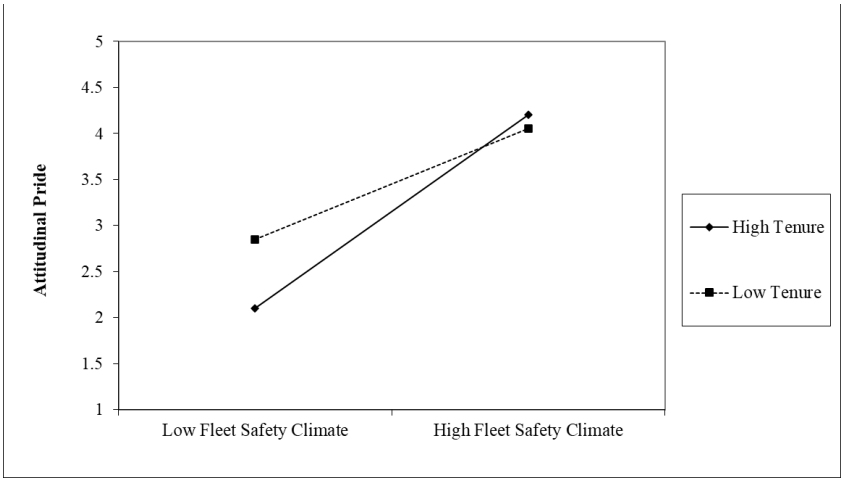

Figure 2 Interaction Effect of Fleet Safety Climate and Tenure on Attitudinal Pride

via the mediating role of safety knowledge were stronger when tenure was high. Therefore, hypotheses 3-4 were supported.

As shown in Figure 2, simple slope tests were analyzed to provide a graphical depiction of the interactive effects (Dawson, 2014). In particular, the level of 1 standard deviation below and above the mean of tenure (high and low) was used for plotting the graph. The results showed that

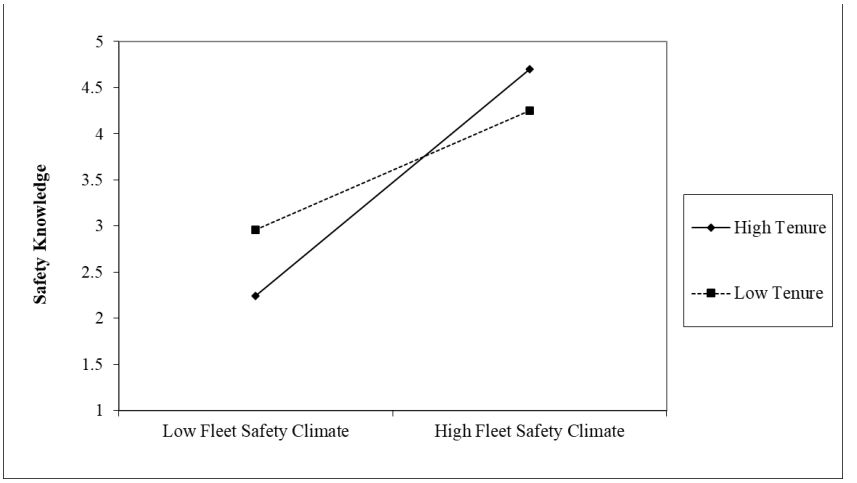

Figure 3 Interaction Effect of Fleet Safety Climate and Tenure on Safety Knowledge

when tenure was high, the conditional indirect influence of fleet safety climate on attitudinal pride and safety knowledge was positive and strong ($\beta = .58$, $p < .00$, $\beta = .36$, $p < .00$, respectively). Meanwhile, when tenure was low, the conditional indirect influence of fleet safety climate on attitudinal pride and safety knowledge remained positive but was less strong ($\beta = .81$, $p < .00$, $\beta = .51$, $p < .00$, respectively).

DISCUSSION

This study proposed and found that the use of fleet safety climate had a positive effect on pilots' safety behavior by amplifying their perceptions of attitudinal pride and safety knowledge. The indirect effect of fleet safety climate on safety compliance and safety participation were also found to be stronger when pilots have higher tenure. High tenure also had a positive effect on safety compliance and safety participation via perceptions of attitudinal pride and safety knowledge.

According to the interaction effect of fleet safety climate and tenure on attitudinal pride and safety knowledge, it was found that, in the low tenure group, when fleet safety climate was low, attitudinal pride and safety knowledge were higher than in the high tenure group. This could be explained in that new pilots, freshly graduated from flight school had a fresh positive attitude and knowledge in flying. They were eager to learn more and had a positive attitude at work. In addition, according to previous studies, low-tenure pilots were also less complacent than high-tenure pilots, while new pilots were also found to be satisfied and proud of their job compared to veteran pilots (Bebenroth & Berengueres, 2020; Shuch, 1992). Moreover, it is well-known that newcomers often like to be good members of the group. With good safety standards within the fleet, new hires would try their best to

improve themselves in various ways such as studying hard or flying according to strict standards and operating procedures, proving their suitability for the group. This phenomenon is also incongruent with Social Identity Theory (Tajfel & Turner, 1985).

Theoretical Implications

This study adds to the concurrent knowledge in the behavioral science and safety literature by focusing on the significance of the fleet safety climate on pilots' safety behavior. Even though several past studies provide obvious benefits of tenure in relation to several organizational behavior concepts, regarding the implications on fleet safety climate, there are few studies to be referenced. This research demonstrates that, apart from the organizational climate as a whole, the fleet safety climate can also contribute to positive safety behavior among pilots, possibly helping to promote safer flight operations. This study also responds to calls for more studies on safety behavior at different levels of the safety climate, such as at company level or group level (Alruqi et al., 2018). Based upon the results, the fleet safety climate can be considered as an essential aspect of teamworking relationships that makes team members feel that they are on the same boat and must work together in order to ensure better operations as stated in past studies (Chen & Chen, 2013, 2014). The results also indicate that through the social learning process, a positive fleet safety climate, leads to pilots being exposed to positive safety working practices. The socializing process of the work environment incorporates the knowledge and attitudes of workers, and can positively determine favorable work behavior as confirmed by previous studies (Bunner et al., 2018; Curcuruto et al., 2019). As the current findings portrayed, a work fleets can be considered as an important social environment, which can also indicate the safety performance of workers. This finding is consistent with the results revealed by previous researchers indicating that there can be significant variation in safety perceptions at different levels (Sexton et al., 2006).

This study contributes to behavioral safety literature in three aspects. Firstly, the significance of aviation fleets has been scrutinized in this study, as fleets can present an essential work context in which pilots' work-related behavior is shaped, with the results indicating that a positive fleet safety climate has a positive effect on pilots' safety behavior. Secondly, the mediating role of attitudinal pride provides an additional explanation for the influence of the fleet safety climate by positively and significantly mediating the relationship between the fleet safety climate and safety behavior. Thirdly, pilots' tenure significantly moderates the relationship between fleet safety climate and attitudinal pride and safety knowledge. When tenure was high, the conditional indirect influence of fleet safety climate on attitudinal pride and safety

knowledge is positive and stronger than the relationship in pilots with lower tenure. This means that the longer the pilots fly, the greater the positive effect of the fleet safety climate at work, on safety knowledge and attitudinal pride, will be.

Practical Applications

According to the results, fleet safety climate positively affects attitudinal pride and safety knowledge. The more the fleet safety climate is promoted, the more attitudinal pride and safety knowledge of pilots will be enhanced. Therefore, airlines should promote a positive fleet safety climate by encouraging a high safety environment within the fleet. This can be promoted by issuing safety policies and procedures within the fleet and encouraging pilots to conform to these policies and procedures. A safety rewards program can also be used to promote safety within the fleet such as 'Safety Man of the Month Award'. This can improve safety motivation and pride among pilots (Alshmemri et al., 2017). Moreover, encouraging a positive fleet safety climate can also promote positive safety knowledge as pilots will need to review aviation knowledge to reflect their higher fleet safety standards. Ultimately, safety compliance and safety participation among pilots will be improved through attitudinal pride and safety knowledge, in turn ensuring safer flights.

Regarding tenure, pilots always spend most of their flight time engaging in collaborative flying activities in the cockpit and feel that, as part of the team, no one will ever understand what they do except for their teammates. Moreover, piloting an aircraft requires skill and this can be improved only through real action. This study found that tenure plays an important role in facilitating the safety relationship, promoting pilots' perceptions of safety behavior. The results were congruent with a previous study that looked at the relationship between flight experience and flight performance, with the results showing that highly-experienced pilots could better cope with unforeseen events (Taylor et al., 2007). The results of the current study were also in line with past studies that focused on the relationship between pilots' experience and the chance of air accident. The results of past studies found that the greater the experience gained by a pilot, the lesser the chance that a flight accident would occur (Golaszewski, 1983; McFadden, 1997). Therefore, it is essential for airlines to consider a pilot's level of work experience as one of the most influential factors in promoting safer operations. If pilot manpower is in shortage, it is advisable that the airline give first priority to pilot candidates with higher tenure. According to the results, high tenure pilots tend to have greater safety behaviors. If higher tenure pilots, are however rare and cannot be procured easily, an airline should assign less experienced pilots to the flight deck as much as possible. Apart from flying, an airline should assign other non-flying jobs to those

less experienced pilots, such as ground operations, flight dispatchers, or even paperwork and bookkeeping tasks, for these are considered as aviation-related tenure.

LIMITATIONS

Despite these findings, several limitations can be identified. Firstly, in this study, it was hypothesized that attitudinal pride was attributable to the fleet safety climate. However, there may be other factors, such as the reputation of the airline or having a high-reliability profession such as piloting that might be attributed to greater attitudinal pride. Future studies should scrutinize other factors that might be attributable for attitudinal pride. Secondly, this study considers the formation of individual perception, future research might extend the results of this study by using a multilevel method, as it will allow perceptions of psychologically-related variables to be more efficiently interpreted at both the individual and group levels of analysis (Pohl & Galletta, 2017). Thirdly, the results were obtained by analyzing the quantitative data. There might be some hidden implications that quantitative analysis cannot delve into. Future research might adapt the qualitative research method to further enhance the analysis results into richer and deeper aspects.

CONCLUSION

This study examined the causal relationship between pilots' perception of the fleet safety climate, their tenure, attitudinal pride, safety knowledge, safety compliance, and safety participation. The results imply that perceptions of the safety climate play an essential role in motivating pilots to perform safety behaviors. Furthermore, the higher the level of tenure, the higher their attitudinal pride and safety knowledge in connection to the fleet safety climate. These perceptions lead to amplify safety behavior. The partial mediating effects of attitudinal pride and safety knowledge on the causal relationship among pilots' perceptions of the safety climate has also been affirmed.

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