Embry-Riddle Aeronautical University Scholarly Commons

Journal of Aviation/Aerospace Education & Research

Volume 28
Number 1 *JAAER 2018*

Article 1

2018

Called to Safety? Individual and Combined Effects of Safety Climate and Occupational Callings on Aviator Safety Performance

Michele W. Gazica
Embry-Riddle Aeronautical University, gazicam@erau.edu

Erin E. Bowen
Embry-Riddle Aeronautical University, erin.bowen@erau.edu

Michael A. McCarson
Embry-Riddle Aeronautical University, michael_mccarson@aol.com

Kristen A-M. Chadwell
Embry-Riddle Aeronautical University, chadwellkristen@gmail.com

Scholarly Commons Citation

Gazica, M. W., Bowen, E. E., McCarson, M. A., & Chadwell, K. A. (2018). Called to Safety? Individual and Combined Effects of Safety Climate and Occupational Callings on Aviator Safety Performance. *Journal of Aviation/Aerospace Education & Research, 28*(1). https://doi.org/10.15394/jaaer.2018.1763

Maintaining a safe work environment is a priority for many industries. For the aviation industry, this is especially true because technology failures and human error can result in catastrophic loss of equipment and life (e.g., Evans, Glendon, & Creed, 2007). While technological advances have increased safety within aviation (e.g., Evans et al., 2007), aviation-related injuries and illnesses remain relatively high when compared to other industries. According to the U.S. Department of Labor Bureau of Labor Statistics (BLS, 2017), the rate of occupational injuries and illnesses per 100 full-time air transportation workers was 6.2 in 2015. For that same year, the rate of injuries and illnesses requiring days away from work, job restriction, or transfer was 5.1. These rates exceed the average incidence rates across all industries, state and local government (3.3 and 1.7, respectively). Given these statistics, it is important to identify antecedents to aviation-related injuries and illnesses to better inform workplace interventions designed to improve the safety performance of those employed within the aviation industry. Thus, the purpose of this study is to examine the individual and combined effects of two potential antecedents to aviation-related safety performance in a sample of aviators in flight training: safety climate and occupational callings.

Safety Climate

Organizations have traditionally assessed their safety performance using lagging indicators. Lagging indicators are unwanted safety events that have already occurred, such as accidents and system failures (e.g., O'Connor, O'Dea, Kennedy, & Buttrey, 2011). Because the aviation industry qualifies as a High Reliability Organization (HRO; succeeds in avoiding catastrophes in high-risk environments), accident and incident rates are often too low to be useful indicators of safety performance (e.g., O'Connor et al., 2011). Instead, O'Connor et al. (2011) encouraged the use of leading indicators of safety as more proactive and informative alternatives.

Leading indicators of safety are defined as processes or inputs required to deliver desired safety outcomes (Health and Safety Executive [HSE], 2006). One of the most commonly used leading indicators of safety is safety climate (e.g., O'Connor et al., 2011).

Safety climate is defined as employee perceptions of organizational policies and practices designed to reduce accidents and related injuries (e.g., Beus, Payne, Bergman, & Arthur, 2010). A favorable safety climate exists when an organization promotes safety through the development of safety policies and procedures that are interpreted, enforced, and encouraged through managerial practices and behaviors (Zohar, 2000; Zohar & Luria, 2005). On the other hand, if safety climate is poor, safety protocols may be overlooked or are non-existent, which contributes to an increase in work-related accidents and related injuries. Indeed, research has established a link between safety climate and these important safety outcomes (see meta-analysis by Beus et al., 2010).

Neal and Griffin (1997) developed a theoretical model to help explain how safety climate might influence employee safety performance. They theorized that safety climate has an effect on an employee's safety performance through their safety motivation (Neal & Griffin, 2006; Wallace & Chen, 2006). Safety motivation is defined as an employee's intention to adhere to safety policies, practices, and procedures. Safety performance, on the other hand, consists of two components: safety compliance and safety participation. Safety compliance requires adhering to an organization's safety policies, procedures, and practices, whereas, safety participation requires actively promoting safety within the workplace (i.e., going beyond that which is required). In support of this model, Neal and Griffin (2006) found that safety climate predicted subsequent changes in individual reports of safety motivation, and safety motivation, in turn, predicted subsequent changes in safety performance. Block, Sabin, and Patankar (2007) found a similar

DOI: https://doi.org/10.15394/jaaer.2018.1763

link between climate and safety performance in their analysis of data from a flight operations environment that had gone nearly a decade without a reportable accident.

There is a lack of published research on the relationship between safety climate and indicators of safety performance within the aviation industry. In fact, a recent review (O'Connor et al., 2011) of 23 studies examining safety climate within commercial and military aviation found that the majority of those studies did not link safety climate to safety performance. Studies such as that conducted by Block et al. (2007), in which aviation performance, climate, and other psychological variables are evaluated are much needed in aviation. Such research is required to establish the concurrent validity of existing safety climate tools and to facilitate the support of, and use for, such tools in aviation organizations (Bowen & Sabin, 2016). Only then can the aviation industry use those tools with confidence to identify, in advance, the strengths and weaknesses within the aviation industry that may influence accident and incident rates. Thus, we propose the following hypotheses:

Hypothesis 1: Safety climate is positively related to (a) safety motivation, (b) safety compliance, and (c) safety participation.

Hypothesis 2: Accidents are negatively related to (a) safety climate, (b) safety motivation, (c) safety compliance, and (d) safety participation.

Occupational Callings

Extensive research supports safety climate as an important antecedent to safety performance across many industries (e.g., Beus et al., 2010); however, perceptions of safety climate are necessarily influenced by interactions among existing organizational members. Identifying antecedents to safety performance on which employees may be selected into jobs is a worthwhile research endeavor and may, overtime, improve an organization's safety climate and thereby result in reduced work-related injuries and accidents (e.g., Andel, Pindek, & Spector, 2016). The extent to which people have a calling to a particular occupation may be one such antecedent.

The definition of an occupational calling is multifaceted and can be defined as follows: it is an occupation that a person finds intrinsically motivating, meaningful, and as central part of his or her identity (Gazica & Spector, 2015). “Intrinsic motivation” is defined as an individual's motivation to engage in work because he or she finds the work itself (i.e., no external rewards required) engaging, enjoyable, satisfying, or interesting (Amabile, Hill, Hennessey, & Tighe, 1994). Within the specific context of work, meaningfulness has been narrowly defined as “the value of a work goal or purpose, judged to the individual's own ideals or standards” (May, Gilson, & Harter, 2004, p. 11). Thus, the participation in meaningful work is a deeply personal and subjective experience that may have far reaching positive impacts on one's life (e.g., Steger & Dik, 2009). Finally, when an occupation is central to one’s identity, the work therein aligns with her or his broader sense of purpose in life (Duffy & Dik, 2013). Thus, an occupational calling is a fairly stable set of core beliefs that form an occupational orientation of meaning, engagement, and passion, and is often viewed as a primary source of work motivation (Dik & Duffy, 2009). Indeed, the extant literature on occupational callings has consistently shown that living one’s calling is positively related to various forms of work related well-being, commitment, engagement, and decision-making (e.g., Dik, Sargent, & Steger, 2008; Duffy, Allan, Autin, & Bott, 2013; Duffy, Allan, Autin, & Douglass, 2014; Duffy, Bott, Allan, Torrey, & Dik, 2012; Duffy, Dik, & Steger, 2011). Most of this work, however, has focused on employee attitudes and intentions, while paying very little attention to work-related behaviors (e.g., safety performance), a research gap highlighted by a recent review (Duffy & Dik, 2013).

The extent to which someone identifies an occupation as his or her calling may have relevance to the safety domain. The first (and only, to the authors' knowledge) study to link safety to occupational callings was Andel et al. (2016) who found that the relationship between safety climate and safety performance was stronger in emergency medical technicians for whom emergency medicine was their calling. These authors argued that employees who are living their calling might be more committed and engaged in all aspects of their job, including safety performance. Thus, assessing the extent to which someone is living his or her calling within the aviation industry may serve two laudable purposes: (1) strengthening the existing safety climate; and (2) explaining variance in safety performance above that which is explained by safety climate alone. With this in mind, we propose the following hypotheses:

Hypothesis 3: Living an occupational calling is positively related to (a) safety climate, (b) safety motivation, (c) safety compliance, and (d) safety participation.

Hypothesis 4: Living an occupational calling is negatively related to accidents.

Hypothesis 5: Living an occupational calling explains variance above safety climate in (a) safety motivation, (b) safety compliance, (c) safety participation, and (d) accidents.

It is worth noting that scoring low on living a calling may mean an individual has: (1) a calling that he or she is unable to pursue; or (2) no calling at all. Distinguishing among these individuals is important as organizational scholars have suggested that outcomes associated with occupational callings may be a function of the calling group in which any given individual falls (e.g., Dik & Duffy, 2009; Duffy et al., 2012; Gazica & Spector, 2015). Potential calling groups include those (a) living a calling (answered calling group); (b) perceiving but not pursuing a calling (unanswered calling group); (c) for whom a calling is irrelevant (no calling group); and (d) experiencing both an answered calling and an unanswered calling (dual group) (e.g., Dik &

Duffy, 2009; Duffy et al., 2012; Gazica & Spector, 2015). For example, Gazica and Spector (2015) found that academics who reported an unanswered calling also reported poorer physical and psychological health than those who reported an answered calling or no calling at all. Thus, we propose the following hypotheses:

Hypothesis 6: Those within the answered calling group report higher levels of (a) safety climate, (b) safety motivation, (c) safety compliance, and (d) safety participation than those within any other calling group.

Hypothesis 7: Those within the answered calling group report lower levels of accidents than those within any other calling group.

Method

To address the above hypotheses, we administered a self-report survey (see the Measures subsection below) to fulltime university students who also were in flight training (see the Participants subsection below). We chose a self-report survey method because our focal study variables (e.g., individual perceptions of safety climate; occupational calling) are abstract concepts and difficult to assess via other methods, e.g., observation (Hinkin, 1998). Prior to administration, we pretested the survey on a smaller sample of the target population (N = 5 fulltime students in flight training) to ensure that the items were unambiguous and applicable to flight line practices and procedures. For a full discussion of limitations to the chosen methodology, please see the Limitations section below.

Participants

We recruited 64 members of this study's target population: fulltime aeronautical science students from a private southwestern university, all of whom were participating in flight training. The population of interest (flight students in a collegiate aviation program) was selected for two reasons. First, the authors focused the present study on aviation safety climate and its antecedents (specifically, occupational calling as a potential component); selecting collegiate flight students allowed for a reduction in population demographics and other potential confounding variables that may have created noise in sample analysis. Second, the structure and consistency of organizational safety climate training and expectations within the narrow bands of a collegiate aviation organization, also reduced potential variability in the sample in order to clarify analysis of the variables of interest. Of the 64 participants, 15 were female and 49 were male, which reflects the current gender distribution of the university. The average age of the participants was 20.7 years (*SD* = 2.6).

Recruitment

Participants were recruited: (1) via university issued student email addresses; (2) in aeronautical science courses contingent on prior instructor approval; and (3) student word-of-mouth. To participate, students had to be 18 years of age or older, fulltime students in the Department of Aeronautical Sciences, and currently participating in flight training. Prior to participation, all participants were informed of the nature and content of the survey measures and that participation was completely voluntary and anonymous. The survey was administered online via Survey Monkey. The authors received IRB approval for the research protocol prior to data collection (IRB#17-079).

Measures

All measures had six response options ranging from 1 (*strongly disagree*) to 6 (*strongly agree*) unless otherwise specified below. All measures chosen are well established in the extant organizational literature with supporting validity and reliability evidence (see measurement specific citations below).

Answered (i.e., living an) occupational calling. To measure the extent to which each participant perceives being a pilot as his or her occupational calling, we used an adapted version of the Dobrow and Tosti-Kharas's (2011) 12-item answered occupational calling measure. As originally developed, Dobrow and Tosti-Kharas's measure was specifically designed to tap into a particular occupation, for example, business or music. Thus, we adapted each item of this measure to specifically attend to the profession of a pilot. An example item is "The first thing I often think about when I describe myself to others is that I'm a pilot."

Unanswered occupational callings. The extent to which participants perceive, but are not currently pursuing an occupational calling was measured by a 6-item scale developed by Gazica (2014). An example item is "I personally identify with a career that I'm not currently pursuing."

Safety climate. Safety climate was assessed with an adapted version of Zohar and Luria's (2005) 16-item scale. Each item prompted the participant to indicate the extent to which he or she agreed that his or her flight instructor promoted aviation safety practices and procedures. Example items include "my instructor makes sure I receive all the equipment needed to operate aircraft safely," and "my instructor says a 'good word' to me when I pay special attention to safety."

Safety motivation. To assess the willingness of participants to adhere to safety practices and procedures within aviation, we used an adapted version of a 3-item scale developed Neal and Griffin (2006). We adapted one item to pertain specifically to aviation safety, i.e., "I believe that it is important to reduce the risk of accidents and incidents at the flight line." The remaining two items remained unchanged from the original measure, e.g., "I feel that it is worthwhile to put in effort to maintain or improve my personal safety."

DOI: https://doi.org/10.15394/jaaer.2018.1763

Safety compliance. To assess the extent to which participants perform essential aviation safety behaviors (e.g., wearing personal protective equipment), we used an adapted version of a 3-item scale developed by Neal and Griffin (2006). We adapted each of the three items to refer specifically to safety within aviation, e.g., "I use all necessary safety equipment while flying aircraft."

Safety participation. To assess the extent to which participants contribute to a culture that supports safety within aviation, we used an adapted version of a 3-item scale developed by Neal and Griffin (2006). We adapted each of the three items to refer specifically to aviation safety, e.g., "I voluntarily carry out tasks or activities that help to improve flight safety."

Accidents. Exposure to accidents during flight training was assessed using a 5-item measure adapted from Hayes, Perander, Smecko, and Trask (1998). An example item includes "I had an accident that resulted in an injury serious enough that I needed medical treatment." This scale had five response options ranging from 1 (*never*) to 5 (*four or more times*) over the past year.

Results

Table 1 presents the inter-correlations among this study's variables as well as the mean, standard deviation, and internal consistency reliability (Cronbach's alpha) estimate for each of this study's measurement instruments. The data supported the reliability of each measure chosen, with alphas ranging from .80 to .93 (see Table 1).

Correlational Analyses

Hypotheses 1 through 4 proposed linear relationships between two study variables; thus correlational analyses were employed as the most appropriate method to test such hypotheses (Howell, 2012). All four hypotheses were fully supported by the data. In explanation, safety climate is positively related to safety motivation ($r = .57$, $p < .01$), safety compliance ($r = .62$, $p < .01$), and safety participation ($r = .47$, $p < .01$). Accidents are negatively related to safety climate ($r = -.39$, $p < .01$), safety motivation ($r = -.45$, $p < .01$), safety compliance ($r = -.48$, $p < .01$), and safety participation ($r = -.25$, $p < .05$). Occupational calling is positively related to safety climate ($r = .32$, $p < .05$), safety motivation ($r = .49$, $p < .01$), safety compliance ($r = .44$, $p < .01$), and safety participation ($r = .57$, $p < .01$). Finally, occupational calling is negatively related to accidents ($r = -.42$, $p < .01$).

Regression Analyses

Hypothesis 5 proposed that occupational callings would explain variance in safety motivation, compliance, and participation above that which is explained by safety climate alone, requiring stepwise regression analyses (Howell, 2012). Thus, we ran a series of stepwise regression analyses in which safety climate was entered in the first step and occupational calling in the second step. As shown in Table 2, Hypothesis 5 was fully supported by the data. Occupational calling explained variance above safety climate in safety motivation ($\beta = .27$, $p < .01$), safety compliance ($\beta = .24$, $p < .05$), safety participation ($\beta = .46$, $p < .01$), and accidents ($\beta = -.36$, $p < .01$).

DOI: https://doi.org/10.15394/jaaer.2018.1763

Table 1

Correlations Among and Descriptive Statistics for All Study Variables

Variables	M	SD	1	2	3	4	5	6	7	8
1. Gender	--	--	--							
2. Unanswered Calling	1.96	1.18	-.07	(.93)						
3. Answered Calling	5.29	0.66	.04	-.28*	(.88)					
4. Safety Climate	5.22	0.72	.03	-0.15	.32*	(.93)				
5. Safety Motivation	5.65	0.71	-.17	-.29*	.49**	.57**	(.90)			
6. Safety Compliance	5.49	0.67	-.15	-.28*	.44**	.62**	.76**	(.80)		
7. Safety Participation	4.91	0.93	.11	-.33**	.57**	.47**	.46**	.49**	(.84)	
8. Accidents	1.17	0.52	.08	0.12	-.42**	-.39**	-.45**	-.48**	-.25*	(.89)

N = 64

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Gender: Female = 1; Male = 2

Coefficients along the diagonal are Internal Consistency Reliability Estimates

Table 2

Regression Analyses

		Safety Performance		
	Safety Motivation	Safety Compliance	Safety Participation	Accidents
Step 1	β	β	β	β
Safety Climate	.57**	.62**	.47**	-.39**
R^2	.32**	.39**	.22**	.15**
Step 2				
Safety Climate	.48**	.55**	.32**	-.27*
Answered Calling	.27**	.24*	.46**	-.36**
ΔR^2	.07**	.05*	.19**	.12**

N = 64

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

DOI: https://doi.org/10.15394/jaaer.2018.1763

ANOVA Analyses

Hypotheses 6 and 7 proposed that those within the answered occupational calling group would report higher means on safety climate, motivation, compliance and participation, and a lower mean on accidents than other occupational calling groups. To test for these group mean differences, one-way analysis of variance statistical (ANOVA) tests were used (Howell, 2012). To do so, we first placed participants into four distinct occupational calling groups. Each participant was categorized by where he or she fell in relation to the median on both the answered occupational calling scale (*Mdn* = 5.34; AOC) and the unanswered occupational calling scale (*Mdn* = 1.5; UOC). In explanation, participants who fell above the median on the UOC but below the median on the AOC were placed in the "unanswered occupational calling group" (N = 18). Participants who fell above the median of the AOC but below the median on the UOC were placed in the "answered occupational calling group" (N = 17). Those who fell below the median on both scales were placed in the "no calling group" (N = 14). Finally, those who fell above the median on both scales were placed in the "dual group" (N = 15). Those within the dual group were experiencing both an answered calling and an unanswered calling.

Once the groups were created, we conducted a series of ANOVA tests using SPSS software. As summarized in Table 3, the results indicated that there were significant group differences on each of this study's outcome variables except for safety climate and accidents. We also tested the ANOVA's homogeneity of variance assumption for each outcome variable using the Levene's statistic (Field, 2009). Homogeneity of variance across groups can be assumed only for the following outcomes: safety motivation, safety participation, and accidents. Because of this and the fact that the groups have unequal sample sizes, we also inspected two alternative versions of the F-ratio: Welch's F and Brown-Forsythe's F, both of which are more rigorous and reliable when the homogeneity of variance assumption is violated and groups have unequal sample sizes (Field, 2009). These tests supported the ANOVA results without exception.

We next conducted a series of Duncan's tests to compare the four groups on those outcome variables on which they differed significantly. Hypothesis 7 was not supported by the data because there were no group mean differences in accident reports. Hypotheses 6 was partially supported by the data. First, there were no group mean differences in safety climate perceptions. Second, those within the answered calling group reported significantly higher levels of safety motivation and safety compliance than the unanswered calling group only, and they reported higher levels of safety participation than both the unanswered calling and no calling groups but not the dual calling group.

https://commons.erau.edu/jaaer/vol28/iss1/1
DOI: https://doi.org/10.15394/jaaer.2018.1763

Table 3

Summary Results for One-Way ANOVAs

	ANOVA		
Outcome Variables	F-ratio	p <	Group Mean
Safety Motivation	3.195	0.03	
AOC			5.94[b]
UOC			5.26[a]
No Calling			5.64[ab]
Dual			5.78[b]
Safety Compliance	3.300	0.03	
AOC			5.67[b]
UOC			5.09[a]
No Calling			5.62[b]
Dual			5.64[b]
Safety Participation	9.846	0.00	
AOC			5.43[b]
UOC			4.22[a]
No Calling			4.62[a]
Dual			5.40[b]

AOC = Answered Occupational Calling; UOC = Unanswered Occupational Calling.

Based on Duncan's tests, group means bearing the same alphabetical superscript do not significantly differ from each other.

Discussion

This research supports the concurrent validity of the study-specific safety climate and occupational calling instruments within the aviation industry. That is, safety climate and occupational callings were significantly related to safety motivation, safety performance, and accidents (collectively, safety indicators) in the expected directions. This study further suggests that occupational callings can explain variance in all three safety indicators above that which can be explained by safety climate alone. Thus, assessing the extent to which an applicant is called to a particular occupation within the aviation industry prior to employment may not only serve to bolster the existing safety climate but also provide additional information on an industry's potential for future safety mishaps.

This study further explored whether grouping pilots into occupational calling groups can inform safety indicators more accurately than simply assessing the extent to which a pilot is currently living his or her occupational calling. In explanation, someone scoring low on an answered calling assessment may be suffering from an unanswered calling or have no calling at all. Our data suggests that only those suffering from an unanswered calling – that is, called to an occupation other than flying aircraft – reported significantly lower levels of safety motivation and safety compliance than any other calling group. Furthermore, those fortunate enough to be living their calling as a pilot (i.e., answered calling and dual calling groups) were more likely than all other groups to actively promote aviation safety beyond simple compliance. Failing to understand these group distinctions may result in a loss of information or faulty decision-making.

Contrary to expectations, there were no occupational calling group differences on safety climate or accidents. Failure to find group differences on accidents might be explained by the low base rate of accidents reported in this study. However, the failure to find group differences on safety climate might be explained by theory. Safety climate is defined as the employees' perceptions of their organization's policies, procedures, and practices designed to reduce accidents and related injuries (e.g., Beus et al., 2010). Safety climate can be measured at the individual, work-unit, or organizational levels (e.g., Zohar, 2000). Safety climate at the work-unit level should reflect shared perceptions of that unit's safety practices (e.g., Zohar, 2000). Unlike other studies comparing the safety climate of different organizational units and the effects of those differences on relevant safety outcomes (e.g., Zohar, 2000; Zohar & Luria, 2005), the groups created for this study operated within the same organization unit – a collegiate flight department. Theoretically then, safety climate should vary little between occupational calling groups within the same organizational unit.

Limitations

While this study offers new insights into the concurrent validity of safety climate and occupational calling assessments within the aviation industry, it is not without limitations. First, validity evidence is instrument-specific and the results of this study should not be generalized to other instruments of assessment for either safety climate or occupational callings. The instruments used in data collection are parsimonious in item numbers per scale, but the use of previously published and validated instruments to measure our constructs of interest facilitated use of these more parsimonious scales rather than the larger item numbers that a novel questionnaire would require. While this parsimony does limit some potential avenues of research in the study, it also aided in reducing potential survey fatigue. Second, our data is cross-sectional, thus, limiting our ability to infer the temporal sequence of safety climate, occupational callings, and safety indicators. While there is some support in the extant literature that safety climate precedes rather than follows relevant outcomes (e.g., Spector, Yang, & Zhou, 2015; Yang, Spector, Chang, Gallant-Roman, & Powell, 2012), more work is required to support the same for occupational callings. Third, all data were collected via self-report measures raising a concern that common method variance upwardly biased the results of this study. Spector (2006), however, found that common method variance is often overstated and that an appropriate study design is one capable of answering the study's research questions. This study's primary focus was on how individual perceptions of safety climate and occupational callings influence safety indicators. Individual perceptions are internal states that are best collected via self-report measures. While we recognize that self-report is not the only means to collect data on safety performance (i.e., observation methods), we chose to limit the burden of labor on those external to this study (e.g., flight-line supervisors; flight instructors).

Finally, this study is based on a relatively small sample of the population of interest – beginning pilots, possibly affecting the generalizability of our results to more diverse samples within the aviation industry. While sample size limitations may limit the larger generalizability of the present study's results, the intent of the research was to test and pursue whether there is a link between occupational callings and potential safety issues in the high-consequence environment of aviation. The authors' assessment is that the unique nature of the hypotheses explored here warrant dissemination of the available data, so that additional reliability and validation testing in broader and more diverse samples could refine understandings of the variable relationships. The use of a sample with reduced demographic variance (collegiate flight training students) aids in improving the power of the sample, even a moderate-to-small sample size in use.

Conclusion

The ability of safety climate and occupational calling assessments to inform the potential for safety mishaps within the aviation industry was investigated and supported. First, both instruments were related to safety motivation, safety performance, and accidents in the expected directions. Second, pilots who were living their calling also reported higher levels of safety motivation and safety performance than those who felt called to different occupations. Finally, this study suggests that assessing both safety climate and occupational callings can inform the potential for safety mishaps better than either alone. As such, there is potential for aviation safety managers, organizational leaders, and others to incorporate data on occupational callings into a comprehensive safety management system (SMS) or safety assessment program.

References

Amabile, T. M., Hill, K. G., Hennessey, B. A., & Tighe, E. M. (1994). The work preference inventory: Assessing intrinsic and extrinsic motivational orientations. *Journal of Personality and Social Psychology*, *66*(5), 950–967. https://doi.org/10.1037/0022-3514.66.5.950

Andel, S. A., Pindek, S., & Spector, P. E. (2016). Being called to safety: Occupational callings and safety climate in the emergency medical services. *Journal of Occupational and Environmental Medicine, 58*(12), 1245-1249.

Beus, J. M., Payne, S. C., Bergman, M. E., & Arthur, W., Jr. (2010). Safety climate and injuries: An examination of theoretical and empirical relationships. *Journal of Applied Psychology*, *95*(4), 713–727. https://doi.org/10.1037/a0019164

Block, E. E., Sabin, E. J., & Patankar, M. S. (2007). The structure of safety climate for accident free flight crews. *International Journal of Applied Aviation Studies, 7,* 46-59.

Bowen, E. E., & Sabin, E. J. (2016). This is your captain speaking: I/O's role in aviation safety. *Master Tutorial, Society for Industrial and Organizational Psychology 31st Annual Conference.* Anaheim, CA.

Dik, B. J., & Duffy, R. D. (2009). Calling and vocation at work: Definitions and prospects for research and practice. *The Counseling Psychologist*, *37*(3), 424-450. https://doi.org/10.1177/0011000008316430

Dik, B. J., Sargent, A. M., & Steger, M. F. (2008). Career development strivings: Assessing goals and motivation in career decision-making and planning. *Journal of Career Development*, *35*(1), 23–41. https://doi.org/10.1177/0894845308317934

Dobrow, S. R., & Tosti-Kharas, J. (2011). Calling: The development of a scale measure. *Personnel Psychology, 64*(4), 1001-1049. https://doi.org/10.1111/j.1744-6570.2011.01234.x

Duffy, R. D., Allan, B. A., Autin, K. L., & Bott, E. M. (2013). Calling and life satisfaction: It's not about having it, it's about living it. *Journal of Counseling Psychology*, *60*(1), 42-52. https://doi.org/10.1037/a0030635

Duffy, R. D., Allan, B. A., Autin, K. L., & Douglass, R. P. (2014). Living a calling and work well-being: A longitudinal study. *Journal of Counseling Psychology*, *61*(4), 605-615. https://doi.org/10.1037/cou0000042

Duffy, R. D., Bott, E. M., Allan, B. A., Torrey, C. S., & Dik, B. J. (2012). Perceiving a calling, living a calling, and job satisfaction: Testing a moderated, multiple mediator model. *Journal of Counseling Psychology*, *59*(1), 50-59. https://doi.org/10.1037/a0026129

Duffy, R. D., & Dik, B. J. (2013). Research on calling: What have we learned and where are we going? *Journal of Vocational Behavior, 83*(3), 428-436. https://doi.org/10.1016/j.jvb.2013.06.006

Duffy, R. D., Dik, B. J., & Steger, M. F. (2011). Calling and work-related outcomes: Career commitment as a mediator. *Journal of Vocational Behavior, 78*(2), 210-218. https://doi.org/10.1016/j.jvb.2010.09.013

Evans, B., Glendon, A. I., & Creed, P. A. (2007). Development and initial validation of an Aviation Safety Climate Scale. *Journal of Safety Research, 38*(6), 675-682. https://doi.org/10.1016/j.jsr.2007.09.005

Field, A. (2009). *Discovering statistics using SPSS*. SAGE. ISBN 9781847879073

Gazica, M. W. (2014). *Unanswered occupational calling: The development and validation of a new measure*. Unpublished master's thesis, University of South Florida, Tampa, FL.

Gazica, M. W., & Spector, P. E. (2015). A comparison of individuals with unanswered callings to those with no calling at all. *Journal of Vocational Behavior*, *91*, 1-10. https://doi.org/10.1016/j.jvb.2015.08.008

Hayes, B. E., Perander, J., Smecko, T., & Trask, J. (1998). Measuring perceptions of workplace safety: Development and validation of the workplace scale. *Journal of Safety Research, 29*(3), 145–161. https://doi.org/10.1016/S0022-4375(98)00011-5

Health and Safety Executive (HSE). (2006). Developing process safety indicators. London: UK.

Hinkin, T. R. (1998). A brief tutorial on the development of measures for use in survey questionnaires. *Organizational Research Methods*, *1*(1), 104-121. https://doi.org/10.1177/109442819800100106

Howell, D. C. (2012). *Statistical methods for psychology*. Cengage Learning.

May, D. R., Gilson, R. L., & Harter, L. M. (2004). The psychological conditions of meaningfulness, safety and availability and the engagement of the human spirit at work. *Journal of Occupational and Organizational Psychology*, *77*(1), 11-37. https://doi.org/10.1348/096317904322915892

Neal, A., & Griffin, M. A. (1997, April). Perceptions of safety at work: Developing a model to link organizational safety climate and individual behavior. In *12th Annual Conference of the Society for Industrial and Organizational Psychology.* St. Louis, MO.

Neal, A., & Griffin, M. A. (2006). A study of the lagged relationships among safety climate, safety motivation, safety behavior, and accidents at the individual and group levels. *Journal of Applied Psychology*, *91*(4), 946. https://doi.org/10.1037/0021-9010.91.4.946

O’Connor, P., O’Dea, A., Kennedy, Q., & Buttrey, S. E. (2011). Measuring safety climate in aviation: A review and recommendations for the future. *Safety Science*, *49*(2), 128-138. https://doi.org/10.1016/j.ssci.2010.10.001

Spector, P. E. (2006). Method variance in organizational research: Truth or urban legend? *Organizational Research Methods*, *9*(2), 221-232. https://doi.org/10.1177/1094428105284955

Spector, P. E., Yang, L-Q, & Zhou, Z. E. (2015). A longitudinal investigation of the role of violence prevention climate in exposure to workplace physical violence and verbal abuse. *Work & Stress*, *29*(4), 325–340. https://doi.org/10.1080/02678373.2015.1076537

Steger, M. F., & Dik, B. J. (2009). If one is looking for meaning in life, does it help to find meaning in work? *Applied Psychology: Health and Well-being*, *1*(3), 303-320. https://doi.org/10.1111/j.1758-0854.2009.01018.x

U.S. Department of Labor Bureau of Labor Statistics (BLS). (2017, November 9). Employer-reported workplace injuries and illnesses, 2016. Retrieved from https://www.bls.gov/news.release/pdf/osh.pdf

Wallace, C., & Chen, G. (2006). A multilevel integration of personality, climate, self-regulation, and performance. *Personnel Psychology*, *59*(3), 529-557. https://doi.org/10.1111/j.1744-6570.2006.00046.x

Yang, L-Q, Spector, P. E., Chang, C-H, Gallant-Roman, M., & Powell, J. (2012). Psychosocial precursors and physical consequences of workplace violence towards nurses: A longitudinal examination with naturally occurring groups in hospital settings. *International Journal of Nursing Studies*, *49*(9), 1091. https://doi.org/10.1016/j.ijnurstu.2012.03.006

Zohar, D. (2000). A group-level model of safety climate: Testing the effect of group climate on microaccidents in manufacturing jobs. *Journal of Applied Psychology*, *85*(4), 587–596. https://doi.org/10.1037/0021-9010.85.4.587

Zohar, D., & Luria, G. (2005). A multilevel model of safety climate: Cross-level relationships between organization and group-level climates. *Journal of Applied Psychology*, *90*(4), 616–628. https://doi.org/10.1037/0021-9010.90.4.616