Socializing the Human Factors Analysis and Classification System: Incorporating Social Psychological Phenomena Into a Human Factors Error Classification System

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Objective: The presence of social psychological pressures on pilot decision making was assessed using qualitative analyses of critical incident interviews. **Background:** Social psychological phenomena have long been known to influence attitudes and behavior but have not been highlighted in accident investigation models. **Method:** Using a critical incident method, 28 pilots who flew in Alaska were interviewed. The participants were asked to describe a situation involving weather when they were pilot in command and found their skills challenged. They were asked to describe the incident in detail but were not explicitly asked to identify social pressures. Pressures were extracted from transcripts in a bottom-up manner and then clustered into themes. **Results:** Of the 28 pilots, 16 described social psychological pressures on their decision making, specifically, informational social influence, the foot-in-the-door persuasion technique, normalization of deviance, and impression management and self-consistency motives. **Conclusion:** We believe accident and incident investigations can benefit from explicit inclusion of common social psychological pressures. **Application:** We recommend specific ways of incorporating these pressures into the Human Factors Analysis and Classification System.

INTRODUCTION

Accidents are usually caused not by a single-point failure but by a combination of unsafe acts, unfortunate coincidences, decision errors, and inherent vulnerabilities (e.g., Orasanu, Martin, & Davidson, 2002; Wiegmann & Shappell, 2003). A variety of investigation models exist to determine the proximal, contributing, and root causes of accidents. One of the most thorough of these, the Human Factors Analysis and Classification System (HFACS), was developed to identify and categorize the causes of human error in accidents and aviation accidents in particular (Shappell & Wiegmann, 2001; Wiegmann & Shappell, 2003). As such, HFACS is a widely used guide that offers a multilevel understanding of the factors that contribute to human errors. However, HFACS currently does not specifically identify social psychological causes of human error.

Although pilot weather-related decision making has been widely studied in general (e.g., Hunter, Martinussen, & Wiggins, 2003), and human factors texts often discuss social psychological principles (e.g., Green, Muir, James, Gradwell, & Green, 1991; Hawkins, 1993; Hobbs, 1997, Wiener, Kanki, & Helmreich, 1993), empirical aviation research examining fundamental social psychological pressures is rare (exceptions being Fischer & Orasanu, 1999; Orasanu et al., 1998; Wiener et al., 1993).

The two goals of this study were (a) to identify types of social psychological phenomena that are described as pressures to take risks and (b) to suggest how HFACS could accommodate

these social psychological factors. The goal of this study was not to determine *rates* of social psychological phenomena but to identify some of the *types* of social psychological phenomena that may lead to accidents. The methods involved examining self-reported critical incidents of challenging weather situations from Alaska pilots.

Human Error and HFACS

Reason (1990) proposed that accidents are not caused simply by the proximal actions of a person (or persons) operating a complex machine, such as an aircraft, but also by latent failures that are inherent in the organization surrounding that person. For the purposes of this article, we examine specifically social and psychological latent failures.

Shappell and Wiegmann (2001; Wiegmann & Shappell, 2003) have specified the latent and active failures inspired by Reason's (1990) theory at different levels to create a useful human factors accident analysis tool (HFACS). Beyond the immediate errors and violations of the person operating the equipment are preconditions for unsafe acts (Shappell & Wiegmann, 2001; Wiegmann & Shappell, 2003). These preconditions include environmental factors, substandard conditions of operators, and substandard practices of operators. Environmental factors include the technical and physical environment. Substandard conditions of operators comprise adverse mental states, adverse physiological states, and physical and/or mental limitations. Substandard practices of operators can be related to either crew resource management (teamwork, coordination, and communication) or personal readiness (fitness for duty). Beyond the actions and characteristics of the operator, unsafe supervision comprises inadequate supervision, planned inappropriate operations, failure to correct a known problem, and supervisory violations. At a still more distal level, organizational influences can lead to errors based on resource management, organizational climate, and organizational process. Organizational culture and climate are related to some social psychological phenomena (e.g., conformity; Asch, 1951, 1956) but are addressed in more detail elsewhere (Bearman, Paletz, & Orasanu, 2008).

HFACS has been shown to be an effective framework for examining accidents, particularly for the cognitive roots of errors and violations (e.g., Li & Harris, 2006; Shappell et al., 2007; Wiegmann & Shappell, 2003). However, although HFACS includes aspects of teamwork and coordination, it currently does not capture influences from the *social environment* that may lead to the erosion of safety.

Latent Vulnerabilities and Field Theory

Reason's (1990) concept of latent failures draws on a medical metaphor of resident pathogens in which the system suffers a series of breakdowns for a failure to occur. There are, however, other equally valid metaphors. For example, both Newtonian mechanics and electromagnetic field theory suggest ways in which forces can act on objects. Kurt Lewin (1936, 1938), in his groundbreaking work on field theory, took these two physics models and applied them to psychological motivation and influence. Forces in his theory may include any factor that causes a "tendency to locomotion" (Lewin, 1948/1997, p. 197; see also Lewin, 1936, 1938), where locomotion is physical, social, or psychological movement. Forces may have magnitude, direction, and a target who is influenced by the force (Lewin, 1938). Field theory, a seminal theory in social psychology, presumes that the forces that influence individuals act through that individual's perceptions (Lewin, 1948/1997). Forces are dynamic, potentially changing in strength and direction, and may interact with each other. Furthermore, a tendency to locomotion does not guarantee that the force will always result in movement.

Throughout this article, we use the more contemporary term *pressure* because in common usage, *force* implies a strong influence with probable coercion. *Pressure* can refer to influences that are strong or weak, subtle or coercive, direct or indirect. Conceptualized as such, pressures are subtly different from Reason's (1990) latent pathogens.

Social Psychological Pressures

The impact of the social environment on an individual's decision making and behavior has been well documented in the literature on

compliance, conformity, and cognitive dissonance. Social psychological concepts have been applied to a range of domains (e.g., smoking; Dubitzky & Schwartz, 1969; Johnson, 1968; and HIV, e.g., Pryor & Reeder, 1993) and are directly related to crew resource management (e.g., Wiener et al., 1993). In addition to the fact that individuals may have direct, explicit power over each other (Cartwright & Zander, 1968), as in the supervisory role, concepts from the social psychology literature may illuminate the subtle ways in which even highly trained, conscientious, and responsible pilots are led into situations in which unsafe acts may occur.

Flight Operations in Alaska

Pilots flying in Alaska may be particularly susceptible to the influence of social psychological pressures because they often fly in marginal, ambiguous, and deteriorating weather conditions; work within minimal infrastructure; and fly missions that others rely on for basic necessities. Therefore, influences from the social environment may be more frequent and more readily discernable in pilot reports of incidents that occurred in Alaska compared with other flying situations.

METHOD

Participants

In Alaska, 28 pilots were interviewed. No social, organizational, or psychological pressures were identified in the incidents reported in four of the interviews. The remaining 24 interviews were with male pilots 31 to 69 years of age (M = 48.6, SD = 10.0) who had a mean of 7,321 flight hours (SD = 6441, ranging from 250 to 25,000 hours) and 24 years of flying experience (SD = 11, range 3.5 to 43 years). All but 3 pilots held a commercial pilot's certificate and/or an airline transport pilot license; the remaining 3 held private pilot licenses.

Procedure

Critical incident interviews address specific events in which participants were involved and include the use of standardized probes to elicit information (Flanagan, 1954; Klein, Calderwood, & MacGregor, 1989). Three interviewers were trained in the critical decision method developed by Klein and colleagues (1989; Klein, Militello, & Crandall, 1999). The participants were asked to describe a decision situation involving weather when they were pilot in command and found their skills as a pilot challenged. Participants were asked to relate concrete situations rather than comment on aviation decision making in general. For each identified incident, participants were asked to identify decision points, critical cues that indicated a decision needed to be made, and goals and concerns at key points in the incident and to characterize the information that was used to make their decisions (whether the information was ambiguous, confusing, inaccurate, etc.). The semistructured interview script did not include explicit questions about pressures.

Participants were recruited via phone calls and flyers distributed through the Aviation Technology Department at the University of Alaska-Anchorage. Participants were assured of their confidentiality and were paid for their time. One or two interviewers were present at each 1- to 2-hr interview. In some cases, participants described multiple independent incidents during an interview session. Interviews were audiotaped and then transcribed and deidentified.

Analysis

From the transcripts, the first and second authors (who were not involved in interviewing) identified and categorized different types of spontaneously mentioned pressures based on Lewin's (1936, 1938) field theory concept of forces. Only pressures that were experienced or directly observed by the interviewee were included. The initial identification of pressures to fly in unsafe situations was conducted in a data-driven, bottom-up fashion. The process was iterative and transcripts were revisited multiple times as the low-level categories developed. At this stage, it was determined that four of the interviews contained no psychological pressures.

The detailed categories were then clustered into themes based on HFACS and the social psychological literature. The latter included four themes: informational social influence (Deutsch & Gerard, 1955), the foot-in-the-door persuasion technique (Freedman & Fraser, 1966),

normalization of deviance (Vaughan, 1996), and the internal self-motives of impression management and self-consistency (e.g., Beauregard & Dunning, 1998; Higgins, 1987). On the basis of this clustering, 16 of the interviews specifically revealed social psychological pressures (see Table 1). The 8 pilot interviews that did not include social psychological pressures nonetheless included other types of psychological or organizational pressures; those have been presented in detail elsewhere (see Bearman et al., 2008, 2009).

The initial coding was conducted by the first and second authors; disagreements were discussed until consensus was reached. An additional reliability check was conducted. The pressures from a random set of 7 of the 16 interviews (44%) were extracted, resulting in 31 distinct segments of text. These 31 pressures were independently coded by the first and fourth authors into five categories: informational social influence, foot-in-the-door, normalization of deviance, self-motives, and other. *Other* was included to capture the pressures in the interviews that were not strictly social psychological. The kappa reliability between the two coders was .77 (with 84% direct agreement). Disagreements at this stage were resolved through consensus.

RESULTS

Participants described a range of weather-related incidents in which their skills as a pilot were challenged by factors such as rapidly deteriorating in-flight weather and spotty, unreliable weather reporting. The participants recounted pressure from a range of individuals, including management, other pilots, passengers, the pilots themselves, and even local villagers, who often were their customers. Of the 24 pilots, 16 described pressures that were coded specifically as social psychological (see Table 1). Seven interviews contained informational social influence, three contained foot-in-the-door, five contained normalization of deviance, and five contained self-motives. Because our data collection method cannot establish rates of social psychological phenomena, little weight should be given to the number or relative frequency of reported pressures.

Informational Social Influence

Informational social influence is defined as "an influence to accept information obtained from another as *evidence* about reality" (Deutsch & Gerard, 1955, p. 629; italics in original). People observe others acting in some fashion, assume that these others have correct information about a situation, and then act on those assumptions accordingly. For example, if a person stands in front of a building and looks up, others will assume he or she must have noticed something and will also look up. Baron, Vandello, and Brunsman (1996) found that people are more susceptible to informational social influence in ambiguous situations and situations in which the accuracy of the information is especially important. People are also more likely to conform to informational social influence when confronted with experts (Cialdini & Trost, 1998). Aviation is a domain that includes all three of these factors (ambiguous situations, need for accuracy, and others who are experts), particularly when dynamic weather creates ambiguity.

Participants described situations in which they or someone else felt that it was safe to fly in an area because they had observed others flying there (see Table 1 for quotes). In each of these instances, knowing that pilots were flying at a specific location was not indicative of the weather conditions there or what the weather conditions would be a few minutes later, when the participant's airplane arrived at that location. The assumption of safety based on observation of others' flying may be incorrect because weather can change rapidly, the other pilots could be taking great risks, and/or the other pilots may be more experienced, equipped, or knowledgeable than the observer (see Table 1).

Pilot reports (PIREPs) were not coded as informational social influence: PIREPs involve actual communication between pilots rather than assumptions that it is safe to fly because others are doing so. In one of the incidents, the pilot entered an area after seeing a plane come out, only to find himself in poor weather conditions. Soon after entering that area, however, a second plane emerged from where he was thinking of going. The pilot communicated directly with that second pilot and obtained explicit information about the weather: "He said it's clear

TABLE 1: Categories of Social Psychological Pressures

Social Psychological Phenomena	Representative Quotes
	Informational Social Influence
Observing other pilots successfully flying	"He went through the pass and he got through it just fine, but the 10 minutes it took me to get to where he was, the pass had closed." "But it got hazy, misty, foggy-type weather. So we waited, and waited, waited, and waited, and finally somebody made it through so we thought, let's go look-see, and here we go. We got up in there, almost to the other end and you could see a little—it was getting worse down there in the corner."
Observing chief pilot successfully flying	"The chief pilot was flying in the [plane name removed] and he went. And I figured if he can do it—I can do it."
	Foot in the Door/Normalization of Deviance
Inured to risk through reinforcement/ Normalization of deviance	"It could stay that way for weeks and weeks, foggy and wet, rainy, and you get out there and fly and you get accustomed to it." ". . . and that's when it gets scary. When you start getting used to it [flying single engine in bad weather] . . . you always hear about pilots getting complacent as they get more experience and then they crash and die." "If you get 2 months without anybody getting killed—everybody kinda relaxes a little bit. . . . You'll see after somebody gets killed, everybody gets real cautious for a few weeks and then gradually everybody's tolerances start to go back down lower and lower. And then they get back to that level we were at before."
Foot in the door/Slippery slope during the course of an incident	"[A manager would say] 'Why don't you go take a look? See what it looks like. It's legal to leave—go look.' You get out there and generally you don't come back. You're already out there." "So you just keep skulking and skulking under this bad weather a little bit more, a little bit more, until all of a sudden you're in over your head, and I think that's what you see happen more often than not with weather-related accidents."
	Self-Motives
Not wanting to disappoint customers/Customer service attitude	"It takes a lot to look at these four people and go, well, I know you see the lake [his passengers wanted to visit] but I don't want to go in there because it's dangerous." [In a case in which passengers were late and the pilot waited, necessitating flying later in the day] "I confused the process of taking care of the client with the process of taking care of the airplane, and as I said, today I'd leave the client standing in the middle of the runway wondering where I went before I put myself in [that] situation."
Reluctance to admit defeat	"Ego plays a big role in pushing a pilot to do something that, you know, he doesn't want to come back and say I couldn't make it or the wind was too high. . . . He's got his reputation to live up to as far as, well, three other pilots made it; what's wrong with you?"
Maintaining reputation/ Not wanting to look bad	"[He] says, 'This guy's flying and I really look like a [expletive] 'cause I don't want to fly.'"

on the other side. No problem. . . . So I went on through." In this case, the pilot corrected his error of assuming the weather was good in that location by requesting a PIREP.

Foot in the Door

The foot-in-the-door technique is a method for obtaining compliance from another person: If a person has already agreed to a small request, that person is more likely to agree to a large one later, given a relatively short delay between requests (Freedman & Fraser, 1966). The mechanisms behind this technique include pressure from norms related to complying with requests, a need for self-consistency, and a tendency to infer one's attitudes from one's behavior (Burger, 1999; Cialdini, Trost, & Newsom, 1995; Guandagno, Asher, Demaine, & Cialdini, 2001). If these mechanisms are working in tandem, the foot-in-the-door technique is even more likely to be successful.

Participants mentioned that managers asked pilots to "go and take a look" to find out the state of the weather. In some cases, this was clearly not a deliberate ploy to manipulate pilots: "You didn't have the weather reporting in some of the passes, and with no pilot reports available, you're going out there to take a look a lot of times," one participant said. In other cases, however, managers were attempting to get their pilots to take a mission in dubious weather; after pilots had started the trip, they were sometimes reluctant to return, despite the conditions (see Table 1).

Normalization of Deviance

A phenomenon similar in its insidious reliance on small, progressive changes is the normalization of deviance. The normalization of deviance is an incremental acceptance of a progressively lower level of safety by a group of people (Vaughan, 1996). Individuals are not necessarily aware that they are consistently breaking rules or eroding a safety margin. It is simply that safety is slowly compromised to a point at which the end state is dramatically different than initially intended. Participants become desensitized to the risks they are taking (Hollnagel, Woods, & Leveson, 2006).

Pilots described becoming used to the risk of flying in bad weather and the dangers of

complacency (Table 1). Normalization of deviance occurred when the same risky behavior led to no negative consequences, so pilots kept performing the same behavior during the course of several days or flights. We considered situations to be illustrative of this category when information about weather was ambiguous or clearly trustworthy rather than when weather reporting was unreliable. If the weather information was known to be unreliable, pilots could reasonably discount it without becoming inured to risk.

Self-Motives: Impression Management and Self-Consistency

People are often motivated to enhance or maintain their self-esteem (e.g., self-affirmation theory; Aronson, Cohen & Nail, 1999; Steele, 1988; self-enhancement motives; Beauregard & Dunning, 1998). Simply put, most people in most situations do not like to look bad to themselves or to others. Many individuals are also motivated to act in ways consistent with their beliefs (e.g., self-discrepancy theory; Higgins, 1987; self-verification theory; Swann, 1983). These two motives may be in conflict or act together. Participants mentioned feeling pressure to avoid social disapproval and failure (e.g., reluctance to disappoint passengers). In such cases, the passengers did not necessarily *express* disappointment; the pilot was simply aware of the passengers' desires and wanted to fulfill them (see Table 1). This reluctance to face social disapproval was at times not very subtle, such as in situations in which the pilot might "lose face" or admit defeat in front of his or her peers (see Table 1). This phenomenon is distinct from having a "bush pilot" or "cowboy" attitude, although that was mentioned by participants as well.

DISCUSSION

Through our analysis of critical incident interviews with pilots in Alaska, it was possible to identify social psychological pressures that are likely to influence pilots' behaviors. The HFACS model includes some social psychological latent failures, such as team coordination and communication and the adverse mental state category of "misplaced motivation" (Wiegmann & Shappell, 2003, p. 57). However, as they

originate from two slightly different models of influence on human behavior (latent pathogens vs. field theory), the phenomena discussed in this article do not fit precisely into the HFACS scheme. Therefore, some recommendations will be made for reconciling the social psychological phenomena identified in this study with the HFACS model.

Placement of These Social Psychological Phenomena Into HFACS

It is important for accident analysis frameworks to adequately identify and describe the full range of human factors that contribute to operational errors and the erosion of safety. When necessary, we have proposed new categories to extend the HFACS framework to capture the social pressures we identified.

Informational social influence can be adaptive, as it enables individuals to act in accordance with others via indirect acquisition of knowledge. Flying in Alaska often involves dealing with ambiguous or incomplete information about weather, and it makes sense for pilots to use others' behavior to resolve that ambiguity. However, in the context of observing others flying in deteriorating weather, this social influence may have dangerous results, because the assumed knowledge may be based on faulty or changing information, or the other pilot may have higher levels of skill or aircraft capability. When an individual makes a premature decision in the face of ambiguity and dynamically changing risks, inappropriate confidence and the wrong action may result (Orasanu et al., 2002). Informational social influence could also partially explain the finding that pilots are more likely to fly into heavy weather when following another aircraft (Rhoda & Pawlak, 1999).

No elements in the current HFACS framework capture informational social influence. Lack of information search when necessary has been categorized as a failure of crew resource management (Wiegmann & Shappell, 2003), but this attribution ignores why the information search was not conducted. Categorizing this concept within "adverse mental states" or "crew resource management" would not teach accident investigators to be alert to informational social influence, nor would it point them in the
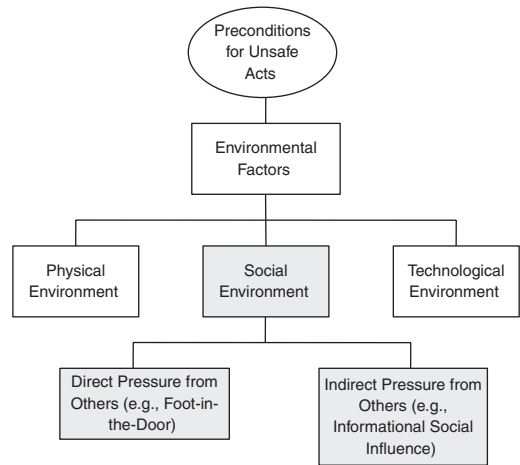

Figure 1. Inclusion of the social environment in the Human Factors Analysis and Classification System. Suggested additions are shaded boxes. From *A Human Error Approach to Aviation Accident Analysis: The Human Factors Analysis and Classification System* (p. 54, Figure 3.4), by D. A. Wiegmann and S. A. Shappell, 2003, Burlington, VT: Ashgate. Copyright 2003 by Ashgate. Adapted with permission.

direction of possible mitigations: Informational social influence is a basic psychological phenomenon, is not necessarily adverse, and is not directly related to communication and coordination. Similarly, it is not simply a matter of inexperienced or unqualified operators: Experience itself could lead pilots to assume that it is safe to fly if they observe another pilot flying on their planned route. Informational social influence is more subtle than peer pressure (which, although not addressed in this article, is another social risk factor not easily captured in HFACS).

We recommend that environmental factors as a precondition of unsafe acts be expanded to include the social environment. Informational social influence can then be included under that new factor as a type of indirect social pressure (see Figure 1).

When the foot-in-the-door technique is used by a manager to persuade a pilot to fly into worsening weather, it should be categorized according to HFACS as a mechanism of supervisory violations. However, the *foot-in-the-door technique* itself is a content-free means of persuasion that could potentially be used to increase safety

behaviors (e.g., by implementing increasingly restrictive or cautious procedures). In our study, the foot-in-the-door technique was a method by which the supervisory latent vulnerability came into play. However, this and other persuasive techniques described in the social psychology literature can be used by others in addition to supervisors: Passengers and customers also pressured the pilots to fly in unsafe conditions.

Direct attempts to persuade others to behave unsafely could be classified in a new HFACS category under social environment called "direct pressure from others" (see Figure 1). This category could be further refined on the basis of the persuasive techniques attempted (e.g., foot in the door) and by the types of others (e.g., supervisors, customers). The foot-in-the-door technique applied by a manager would then fall under both supervisory violations and as a direct pressure from others.

The *normalization of deviance* occurs at a more distal level than the foot-in-the-door technique and thus could be encompassed by the organizational culture subcategory of organizational climate in HFACS. From a cultural psychology perspective, culture is defined as a set of learned, shared meanings, norms, and expectations (Rohner, 1984) that can occur at the level of teams, locations, subgroups, organizations, regions, and nations. If organizational culture is seen as covering only the highest levels of the organization within the HFACS model (Shappell & Wiegmann, 2003), then normalization of deviance at any other level would not fit within the organizational culture category.

We recommend that the organizational culture category be expanded to include widespread cultural norms, even if they take place within a subculture of the organization. Additionally, the developmental nature of the erosion of safety is subtly different from a static culture of non-safety: It suggests both pressure originating from organizational culture and progressive deterioration of safety culture over time.

An additional type of pressure identified in our interviews was initially categorized as the foot-in-the-door technique, but the pressure was applied to oneself (see Table 1). We identify this as *progressive commitment*, defined as an "increasing bodily/psychological investment of a pilot through narrowing fields of
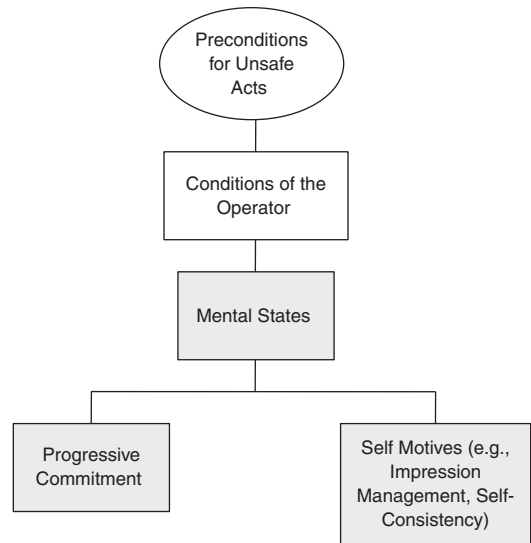

Figure 2. Inclusion of self-motives and progresive commitment in the Human Factors Analysis and Classification System. Suggested additions and alterations are shaded boxes; assumed to include current Adverse Mental States categories. From *A Human Error Approach to Aviation Accident Analysis: The Human Factors Analysis and Classification System* (p. 54, Figure 3.4), by D. A. Wiegmann and S. A. Shappell, 2003, Burlington, VT: Ashgate. Copyright 2003 by Ashgate. Adapted with permission.

choices" (McCoy & Mickunas, 2000, p. 27). This type of pressure does not truly fit within either the foot-in-the-door persuasion technique or normalization of deviance as they have been conceptualized by the literature, although this new pressure retains the flavor of the basic psychological mechanisms from both. Instead, we suggest that progressive commitment would fit under the mental states category of HFACS (see Figure 2).

Some instances of *impression management and self-consistency* can fit into the HFACS category of conditions of the operator, under adverse mental states (Wiegmann & Shappell, 2003) as a new category called "self-motives," but only if the underlying psychological mechanism is preserved. Impression management and self-consistency are considered fundamental psychological processes, putting them on a different conceptual level from the HFACS categories. They are not precisely attitudes, cognitive states, or traits. Both context and content are

important in determining whether these motives lead to safety vulnerabilities (i.e., are adverse).

In fact, self-consistency and self-enhancement may exert opposing pressures on a pilot, making it difficult to predict how he or she would respond in a given situation. It is the confluence of the specific issue and the surrounding situation that sets off a process that can lead to pressure and, ultimately, a vulnerability to error. An understanding of the psychological pressures that result from these self-motives, including how normal they are, could also help to deepen the explanatory power of the category of adverse mental states, perhaps reconceptualizing it simply as mental states (see Figure 2).

Social pressures can lead pilots to underestimate potential dangers, contributing to poor decision making in the face of potentially complicating factors, such as deteriorating weather. These proposed revisions to HFACS take into account some of these social pressures.

CONCLUSION

Participants in this study were not asked specifically about social psychological pressures but were asked to speak about their own impressions of their aviation decision-making experiences. Thus, although the findings from this study derive from a small sample of self-reports, our analysis benefitted from richly detailed descriptions of situations. This study provides suggestive evidence for the importance of social psychological phenomena in real flight operations and can be extended to pilots flying outside of Alaska.

The next step of practical application would be to address a broader array of social psychological pressures in the context of actual incidents and accidents to ascertain how common these phenomena are within a broader, representative population of pilots. The research reported here supports training to enhance the human factors knowledge of flight personnel, both pilots and managers. For example, pilots can be warned that rather than assuming a way is safe because they see another pilot in an area, they should contact that pilot for an explicit PIREP. The social psychological perspective also introduces a slightly different way of thinking about concepts such as operational risk, allowing operators and regulators (i.e.,

the Federal Aviation Administration) to focus on specific pressures that are known to lead to unsafe behavior. Hence, this research can also be used to enhance both safety management systems and regulatory tools to improve operational oversight.

Because these phenomena are generally overlooked in accident investigations and are difficult to ascertain when the actors are deceased, prevalence studies that include existing accident reports are not yet an appropriate way to study the role of these social psychological phenomena in accidents. It is therefore important to include even rare pressures in HFACS to highlight the possible role of these social psychological factors in accidents, to provide a suitable place for categorization, and to make the taxonomy more complete. Although it may be a challenge for investigators to uncover pressures on decision making and self-motives, evidence may still be found. For example, other pilots may recall the investigated pilot's reaction to observing other pilots' flying or whether a manager told him or her to "go up and take a look."

It should be noted that this article addresses only a small fraction of potentially relevant social psychological phenomena. Other persuasion techniques and influence mechanisms (e.g., normative social influence) could also be at work, and other social psychological phenomena could be relevant (e.g., competition, social comparison processes, and aggression). Future work should continue the evolution of HFACS by taking advantage of social psychological theories.

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