Human Error, Reliability, Resilience, and Performance, Vol. 213, 2026, 92–98
https://doi.org/10.54941/ahfe1007558

When Safety Regulation Discourages Safety: Human Factors Analysis of Mental Health Policy

Tasnim Hasan

Department of Human Centered Design & Engineering, University of Washington, Seattle, WA 98195, USA

ABSTRACT

Safety-critical industries such as aviation rely on regulatory frameworks to ensure operational reliability and public safety. However, human factors research suggests that certain regulatory approaches may unintentionally suppress the behaviors they seek to promote. This paper presents a qualitative policy analysis examining how mental health and fitness-for-duty regulations in aviation may discourage help-seeking, transparency, and early intervention, thereby increasing latent risk. Grounded in Human Systems Integration (HSI), sociotechnical systems theory, and Safety-II principles, the study analyzes publicly available regulatory documents from authorities including the Federal Aviation Administration (FAA) and International Civil Aviation Organization (ICAO), focusing on how policy language, certification requirements, and reporting structures shape behavioral incentives. Using qualitative document analysis, policy texts were coded for themes related to responsibility attribution, disclosure consequences, ambiguity, and reintegration. Three dominant patterns emerged: mental health is framed primarily as an individual liability rather than a system-managed performance factor; ambiguity in disclosure thresholds creates uncertainty that may encourage delayed reporting or concealment; and fitness-for-duty frameworks emphasize exclusionary controls more than structured reintegration, limiting pathways for supported recovery. These patterns reveal a "compliance paradox," where regulations intended to enhance safety may discourage transparency when fear, stigma, and career risk are not accounted for in policy design. The paper argues for reframing mental health governance toward system-supported resilience and proposes design-oriented policy principles that align psychological safety with operational safety, with implications for other high-reliability domains.

Keywords: Human factors, Human systems integration, Safety-II, Aviation regulation, Mental health policy, System resilience

INTRODUCTION

Safety-critical industries rely on structured regulation to maintain public trust and operational reliability. Aviation, often viewed as a model of regulatory rigor, embeds mental health disclosure within medical certification and fitness-for-duty standards to ensure safe performance (ICAO, 2018; FAA, 2023). These requirements reflect legitimate concerns about the impact of psychological impairment on decision-making and situational awareness.

Received February 21, 2026; Revised April 7, 2026; Accepted April 26, 2026; Available online July 20, 2026

However, regulation also shapes behavior. When mental health is framed primarily as a disqualifying liability, disclosure may be perceived as career-threatening rather than safety-enhancing. Research shows that stigma and fear of professional consequences significantly influence help-seeking among pilots (Brooks & Greenberg, 2018; Wu et al., 2016).

Safety science distinguishes between Safety-I, focused on hazard elimination, and Safety-II, which emphasizes adaptive capacity and resilience (Hollnagel, 2014). Policies that discourage early reporting may undermine the adaptive behaviors necessary for safe performance (Dekker, 2011). Frameworks that emphasize grounding or decertification without equally visible reintegration pathways may create uncertainty and fear, encouraging delayed disclosure or informal coping. Such adaptations reflect sociotechnical dynamics in which behavior emerges from structural constraints and human agency (Reason, 1997; Booher, 2003).

This paper examines how aviation mental health regulations frame responsibility, disclosure, and fitness, and how these structures shape behavioral incentives. Using qualitative analysis of publicly available regulatory documents, it identifies features that may generate a compliance paradox—where perceived adherence to regulation incentivizes non-disclosure. Reframing governance from fault prevention toward system-supported resilience may better align psychological safety with operational safety across high-reliability domains.

Human Systems Integration (HSI)

Human Systems Integration (HSI) conceptualizes performance as emerging from interactions among people, technology, tasks, organizations, and governance structures (Booher, 2003). Rather than treating humans as isolated risk factors, HSI frames capability and limitation as system design requirements across the lifecycle (Booher, 2003). Safety outcomes therefore depend on how workload, training, constraints, and support systems are structured.

Although often applied to engineering systems, HSI is equally relevant to regulation. Policy functions as system design by shaping incentives and behavioral boundaries. When mental health is framed primarily as disqualifying, responsibility shifts to the individual, potentially encouraging concealment. Systems-oriented models similarly demonstrate that safety emerges from interactions among work-system components rather than individual traits alone (Carayon et al., 2006). Defense HSI guidance further emphasizes evaluating second-order effects of design decisions, including unintended consequences (USAF, 2009; DoD, 2009). Applied to regulation, this implies assessing behavioral impacts alongside medical criteria.

Safety-I and Safety-II

Safety-I focuses on preventing failure by eliminating hazards and constraining variability (Hollnagel, 2014). Certification regimes emphasizing grounding or exclusion reflect this logic. However, complex systems require adaptation.

Safety-II reframes safety as the capacity to succeed under varying conditions (Hollnagel, 2014). Humans are adaptive resources whose well-being supports resilient performance. Policies that discourage early intervention may weaken adaptive capacity. Research shows that fear of blame suppresses reporting and learning (Dekker, 2011; Reason, 1997), while high-reliability organizations depend on trust and sensitivity to weak signals (Weick and Sutcliffe, 2007). Mental health governance must therefore support disclosure and recovery rather than equate help-seeking with jeopardy.

Sociotechnical Systems Perspective

Sociotechnical theory holds that outcomes emerge from interactions between social and technical systems (Trist and Bamforth, 1951). Modern safety scholarship extends this to layered control structures involving regulators, organizations, and operators (Rasmussen, 1997). Misaligned incentives can prompt adaptations that preserve local goals while reducing transparency.

Systems thinking further argues that losses stem from inadequate control in complex systems (Leveson, 2012). In mental health governance, disclosure rules and certification consequences form part of this control loop. If policy increases fear or ambiguity, concealment may become rational. Psychological safety research reinforces that reporting depends on perceived freedom from punishment (Edmondson, 1999).

Synthesis

Together, these frameworks position mental health governance as a sociotechnical design problem. HSI highlights system conditions for performance (Booher, 2003; Carayon et al., 2006), Safety-II emphasizes adaptive capacity (Hollnagel, 2014), and sociotechnical models stress incentive alignment within layered systems (Trist and Bamforth, 1951; Rasmussen, 1997; Leveson, 2012). Collectively, they provide a basis for examining how regulation may discourage transparency—and for aligning psychological safety with operational safety.

Methodology

This study employed qualitative document analysis to examine how aviation mental health and fitness-for-duty governance is constructed in regulatory language and how that framing may shape behavioral incentives. Document analysis is appropriate for interpreting meaning, assumptions, and institutional framing embedded in official texts (Bowen, 2009).

Document Corpus and Sampling

The corpus included publicly available aviation regulatory materials: (1) national guidance on medical certification and fitness-for-duty (e.g., FAA materials), (2) international standards and advisories (e.g., ICAO civil aviation medicine guidance), and (3) related oversight publications addressing reporting expectations, certification implications, and reintegration processes. Because the unit of analysis was policy framing, documents were included if

they explicitly addressed mental health, disclosure requirements, certification consequences, or reintegration pathways; non-official commentary, duplicates, and tangential references were excluded. A purposive sampling strategy was used to select information-rich documents aligned with the research objective (Bowen, 2009). Materials were retrieved from official authority websites and publicly accessible repositories, and a document log was maintained as an audit trail (Bowen, 2009).

Analytic Approach

The analysis combined thematic analysis and a two-cycle coding process. Following Braun and Clarke (2006), texts were read iteratively, coded, and synthesized into themes capturing patterned constructions of risk, fitness, disclosure, and accountability. Coding followed two cycles (Saldaña, 2021): (1) open coding using descriptive and latent codes to capture policy framing and normalization (Braun and Clarke, 2006), and (2) pattern coding to cluster codes into higher-order themes (Saldaña, 2021). The analytic focus examined how texts framed psychological well-being, accountability, fitness, and decision-making under uncertainty, consistent with sociotechnical perspectives on multi-level control and incentive environments (Rasmussen, 1997).

Trustworthiness and Ethics

Rigor was supported through audit trails and memos (Bowen, 2009), iterative theme refinement and reflexive memoing (Braun and Clarke, 2006), and comparison across document types (Bowen, 2009). All materials were publicly available and contained no personal data; the study examines system-level policy design rather than individual cases or compliance behavior.

Mental Health Framed as Individual Liability

Across the analyzed documents, mental health is positioned within a risk-containment paradigm. Regulatory language emphasizes disqualification criteria, certification eligibility, reporting obligations, and demonstration of psychological stability prior to operational clearance (FAA, 2023; ICAO, 2018). Fitness is framed as meeting defined thresholds, supported by documentation and evaluation.

This construction places responsibility primarily on the individual professional. While understandable in a high-consequence domain, the framing treats mental health largely as a potential hazard rather than a dynamic performance factor shaped by system conditions. Human Systems Integration (HSI) instead emphasizes distributing responsibility across interacting components of the work system (Booher, 2003). When psychological capacity is primarily screened rather than supported, contributors such as workload, fatigue, and organizational climate receive less structural emphasis, reinforcing a binary model of qualification versus disqualification.

Empirical research supports the behavioral implications of this framing. Studies show that fear of professional consequences influences disclosure decisions (Brooks and Greenberg, 2018; Wu et al., 2016). Wu et al. (2016) found that many pilots avoided formal treatment due to concerns about medical certification. Although regulatory texts do not explicitly discourage help-seeking, the asymmetry between clearly articulated consequences and less visible support may shape perceived career risk (Rasmussen, 1997).

Ambiguity in Disclosure Thresholds

A second theme concerns ambiguity in disclosure criteria. Regulatory language often references conditions that may "impair performance" or "affect safety" without consistently defining severity, duration, or functional thresholds (FAA, 2023; ICAO, 2018).

Such ambiguity increases interpretive burden. Behavioral decision research suggests that when consequences are severe and uncertain, individuals adopt loss-averse strategies (Kahneman and Tversky, 1979). In aviation contexts, this may manifest as delayed disclosure or informal coping, consistent with findings linking stigma and career fear to reduced help-seeking (Brooks and Greenberg, 2018).

From a sociotechnical perspective, unclear thresholds reduce transparency within the control structure (Rasmussen, 1997; Leveson, 2012). Variability in reporting can limit visibility into early-stage risks. Reason (1997) emphasizes that accidents often arise from latent conditions; diminished early reporting therefore weakens resilience. Policies intended to prevent impairment may inadvertently reduce early engagement.

Emphasis on Exclusion Over Reintegration

A third pattern involves asymmetry between exclusionary controls and reintegration pathways. Mechanisms for grounding or restriction are clearly defined (FAA, 2023), while structured return-to-duty processes are less prominently framed as resilience mechanisms.

This reflects a Safety-I orientation focused on hazard elimination (Hollnagel, 2014). In contrast, Safety-II emphasizes maintaining adaptive capacity under variability (Hollnagel, 2014). Transparent reintegration pathways are central to resilience.

Research on psychological safety indicates that reporting increases when individuals perceive institutional support rather than punishment (Edmondson, 1999). When sanctions are clear but support less visible, professionals may rationally perceive disclosure as high-cost. Trust—essential for high-reliability organizing—depends on open communication and sensitivity to weak signals (Weick and Sutcliffe, 2007). If disclosure is associated with uncertain career disruption, concealment becomes a predictable adaptation.

THE COMPLIANCE PARADOX

Together, these findings suggest a compliance paradox: regulations intended to enhance safety may discourage transparency.

Safety scholarship shows that systems drift when local incentives diverge from safety goals (Dekker, 2011). If disclosure triggers operational restriction, professionals may delay engagement with formal processes—an adaptive response to constraint (Rasmussen, 1997). The paradox arises when risk-reduction policies increase perceived personal risk.

Reason's (1997) model of latent conditions underscores that failures often stem from systemic blind spots. If policy design suppresses early signals, risk may accumulate outside institutional awareness. Non-disclosure, therefore, should be understood not solely as individual failure, but as a structural outcome of incentive design interacting with human decision-making under uncertainty.

DESIGN-ORIENTED POLICY IMPLICATIONS

Addressing the compliance paradox requires shifting mental health governance from fault elimination toward resilience enablement.

Reframe Help-Seeking as Safety Behavior.

Regulatory language should explicitly position help-seeking as aligned with safety objectives. Safety-II emphasizes supporting adaptive performance rather than eliminating variability (Hollnagel, 2014). Framing treatment as proactive risk management strengthens alignment between psychological and operational safety.

Operationalize Disclosure Thresholds.

Clearer definitions of severity and functional impact can reduce uncertainty and defensive self-assessment. Reducing ambiguity enhances transparency within the system control structure (Rasmussen, 1997).

Formalize Reintegration Pathways.

Predictable return-to-duty processes support resilience and maintain operational continuity. High-reliability theory underscores the importance of structured adaptation rather than exclusion alone (Weick and Sutcliffe, 2007).

Integrate Mental Health into HSI Models.

Mental health should be treated as a dynamic performance capacity shaped by workload, environment, and organizational support (Booher, 2003). Embedding psychological well-being into Human Systems Integration models shifts responsibility toward system design. Aligning psychological safety with operational safety strengthens resilience (Edmondson, 1999).

BROADER IMPLICATIONS

Although focused on aviation, similar dynamics exist in healthcare, emergency response, and transportation—domains where certification intersects with mental health disclosure. Research across safety-critical professions shows that fear of professional consequences influences help-seeking (Brooks and Greenberg, 2018). Designing regulatory systems with behavioral incentives in mind can reduce concealment and strengthen adaptive capacity.

LIMITATIONS

This study relies on qualitative document analysis and does not directly measure behavior. Future research should incorporate interviews or survey data to empirically test the compliance paradox. Internal oversight practices may also differ from publicly available documentation.

CONCLUSION

Safety emerges from the interaction between policy design and human behavior (Leveson, 2012). When governance emphasizes liability, ambiguity, and exclusion without visible reintegration and support, concealment may become rational.

Human Systems Integration and Safety-II provide a framework for aligning regulatory intent with adaptive performance. Reframing mental health as a system-supported resilience function—rather than solely a disqualifying defect—can strengthen both operational safety and human well-being. Effective safety systems must account not only for technical reliability, but for the psychological realities of those who operate within them.

REFERENCES

Booher, Harold, ed. (2003). Handbook of human systems integration. New Jersey: Wiley.

Booher, H.R., Minninger, J. (2003) "Human systems integration in army systems acquisition", in: Handbook of human systems integration, Booher, Harold (Ed.). pp. 663–698

Chapanis, A. (1996). Human factors in systems engineering. Wiley Series in Systems Engineering and Management. Andrew Sage, series editor. Hoboken, NJ: Wiley.

Folds, Dennis. Gardner, Douglas and Deal, Steve. (2008). Building Up to the Human Systems Integration Demonstration, INCOSE INSIGHT Volume 11, No. 2.

Friedenthal, S. Moore, A. Steiner, R. (2008) A Practical Guide to SysML: The Systems Modeling Language, Morgan Kaufmann; Elsevier Science.

Folds, Dennis. Gardner, Douglas and Deal, Steve. (2008). Building Up to the Human Systems Integration Demonstration, INCOSE INSIGHT Volume 11, No. 2.

Honour, Eric C. (2006) "A Practical Program of Research to Measure Systems Engineering Return on Investment (SE-ROI)", proceedings of the Sixteenth Annual Symposium of the International Council on Systems Engineering, Orlando, FL.

Meilich, Abe. (2008) INCOSE MBSE Initiative Status of HSI/MBSE Activity (Presentation)

Taubman, Philip. (June 25, 2008) Top Engineers Shun Military; Concern Grow. The New York Times Website: http://www.nytimes.com/2008/06/25/us/25engineer.html