

Clipped Wings: The Impact of the COVID-19 Pandemic on Airline Pilots and Influence on Safety Climate

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Clipped wings: The impact of the COVID-19 pandemic on airline pilots

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Abstract. COVID-19 has led to thousands of pilots being grounded. The return-to-flying post-COVID affected thousands of pilots, significantly impacting airline training systems. Previous research has suggested that the airline safety climate has been negatively impacted during the COVID-19 pandemic, mostly because of suddenly loss of revenue and borders closure. This context led to thousands of pilots being furlough or dismissed, increasing their stress and anxiety due to financial hardship and resource constraints. However, the influence of the pandemic on how pilots maintained their proficiency while stood down and how they kept engaged with the airline, and therefore the safety climate, has not yet been researched. Hence, this study sought to evaluate the impact that the COVID-19 pandemic has had on grounded pilots. We evaluated the operational distractions caused by the pandemic, external stressors influencing motivation and morale towards work and how this affected safety climate A questionnaire study was conducted with 105 airline pilots who were grounded for longer than three months, requiring refresher training and then returned to operational flying. The research found that approximately half of the participants did not engage in any skill and knowledge upkeep whilst grounded. COVID-19 measures restricted the access to training facilities for many participants, negatively influencing their motivation to skill-upkeep. Uncertainty with sudden and indefinite grounding periods made it challenging to maintain engagement and motivation. Job-reattachment was further aggravated by the additional financial and personal stress. The pandemic led to distractions in effectively applying their skills to the job. Physical and mental health concerns were mentioned by many participants as a factor influencing their job performance. The study proposes recommendations for airlines to improve engagement of grounded pilots and pilots in isolation.

Keywords: Flight proficiency, flight safety, safety culture, skill retention, COVID-19

1 Introduction

The COVID-19 pandemic has impacted the airline industry globally, causing domestic and international borders to be closed and an unprecedented drop in passenger numbers. In Europe alone, Albers found that at least half the airlines went into a 'retrenchment mode', with several airlines such as Air Italy, Flybe and Norwegian Air Shuttle ceasing operations, entering administration or filing for bankruptcy [1]. By April 2020, 66% of the world's commercial air transport fleet was grounded [2], and by a year later, only 64% of the airlines had more than 80% of their pilots back on duty [3]. The reduction in flying led to many pilots being stood down, made redundant or furloughed, leading to a loss of proficiency and recent operational experience. The organisational engagement of these pilots while they are 'grounded' has varied from airline to airline. While some airlines have retained their employees on full pay, others have ceased paying their salaries or relied on government payments to support their staff during the pandemic. The impact that redundancies can have on organisational culture, morale and motivation is well known [4]. However, the pandemic's effect on airlines' safety climate is unknown.

Provan defines safety as "the ability of a system to perform its intended purpose, whilst preventing harm to persons" [5]. As a derivative of organisational culture, safety culture is understood by Turner as "the set of beliefs, norms, attitudes, roles, and social and technical practices that are concerned with minimising the exposure of employees, managers, customers and members of the public to conditions considered dangerous or injurious" [6]. It is crucial to define its relationship with safety climate when discussing safety culture. Safety climate is considered a 'snapshot' of safety culture [Error! Hyperlink reference not valid.], which focuses on employees beliefs about management commitment to safety. In this context, safety climate is a more appropriate discussion point concerning the COVID-19 pandemic [8-10]. Five safety climate themes were identified by O'Connor [Error! Hyperlink reference not valid.], which were designed upon research by Flin [11], and include management and supervision, safety systems, risk, work pressure and training and education, provide the categorical basis to examine the pandemic's impact on the safety climate in flight operations.

{Include here one paragraph including recent studies on how the pandemic influenced pilots and other aviation employees. You can bring from your thesis/paper. And the last sentence should be about the gap in the literature}

As the pandemic continues, the purpose of this study was to understand the influences it has made on the safety climate within an airlines' flight operations, which is essential for the safe recovery to normal operations.

Grounded airline pilots have endured the brunt of operational changes and associated stress of being stood down, making worthy research subjects understand the full impact on safety climate.

An online survey with pilots who have been stood down and have returned to the flying duties aimed to answer the following specific research questions:

1. How did external stressors manifest in airline pilots during the COVID-19 pandemic?
2. What operational distractions exist with the COVID-19 pandemic?
3. How can this influence the safety climate within airlines?

2 Literature Review

As a result of the pandemic, quieter air traffic, airports closing runways for maintenance, portions of airports closed for aircraft parking and routing shortcuts offered by air traffic control, complexity in the environment airline pilots operate within has increased [12]. These changes in the environment has influenced the safety of flight operations. Research into atypical approaches into Charles de Gaulle airport in Paris found an increase in riskier landing approaches, such as steeper vertical glide path intercepts and final approach track shortening [13]. Adding to this, Olganathan and Amihan [14] found that a lack of practice affected pilots' proficiency during the COVID-19 pandemic. They analysed pilots' reports submitted to NASA's Aviation Safety Reporting System (ASRS), finding that some incidents were attributed to this lack of proficiency. This early research indicates that the operational nature of an airline pilot's work has changed during the pandemic and increased safety risk.

Significant assistance for airlines has come from industry organisations providing recommendations in managing operational recovery. IATA [2, 15] published risk assessments to guide airlines in managing operational risk and pilot training during the pandemic. Recommendations included mitigations such as raising operational thresholds, rejecting voluntary route shortcuts, and management of COVID related PPE and social distancing measures. Whilst operational conservatism was recommended, the resulting impact on departure and arrival delays was minimised, potentially due to decreased overall air traffic [16].

Research into a flight training organisation impacted during the COVID-19 pandemic suggests that various safety culture and safety climate variables were negatively affected [17]. For instance, 'production versus protection' variables showed decreased worker agreement. Some of the decrease in employee engagement was attributed to

the pressure the flight training organisation faced with the pandemic, particularly in its management of social distancing. However, this management of pandemic related issues results in the prevailing safety climate associated with flight operations changing. Work led stress from the pandemic has been found to influence safety culture. Saleem [18] found that the pandemic harmed task and contextual performance. They found that a positive safety culture would provide the foundation to moderate adaptive performance and resilience.

Conversely, Schwarz [19] found that psychological stress positively influences resilient behaviour but has a negative effect on safety culture development. When this stress impacts the philosophy, policies, procedures, and practices that govern an airline pilot's role, is combined with inconsistencies or changes, research shows that it can lead to weaker safety climates [20]. There is limited research conducted into the influence on the safety climate of airline pilots because of a grounded or furloughed workforce, particularly during a pandemic. For airlines battling financial difficulty due to the pandemic, financial and resource constraints are increasing stress on pilots, negatively impacting the organisation and safety culture. Job reattachment can also be challenging when airline pilots return to face operational policy and procedure changes, along with demanding practices related directly to the pandemic [21].

The pandemic has led many pilots to face personal and financial stressors that influence their motivation towards work whilst grounded. Peyrat-Guillard and Grefe [Error! Hyperlink reference not valid.] found that whilst pilots idealise their employing airline, this bond is fragile, particularly in the face of grounding or furlough. Majuarsa [23] found that the work environment positively affects pilot professionalism and that this profession seeks to continually create and improve its professional quality. Leveraging this trait, airlines may expectations on their pilots to study, even though they were stood down without pay in many cases. For airlines battling financial difficulties, an expectation to work without full remuneration can impact their organisational culture [24, 25]. Airline downsizing, a frequent consequence of the pandemic [1], has been directly linked to negatively impacting performance. Fraher [26] found an increase in stress, distraction, and mistakes, which led to a decrease in trust, morale and organisational commitment. Shore [27] found evidence of a 'post-downsizing stress syndrome' typified by impacting health, personal life, and attitude towards work, fostering a sense of desperation. The effect on safety climate can be significant if not corrected [28].

3 Research Methodology

An online survey was conducted to gather data from the participants. The survey method allowed access to a large participant group from many countries, which was particularly useful given border closures and travel restrictions at the time. Participants conducted the survey anonymously. The questionnaire consisted of two parts which focused on different pilots' operational status and roles within the airline.

The questionnaire was completed with research also seeking to understand aspects of competency decay and training activities on grounded pilots during the pandemic [29].

3.1 Questionnaire Design

Demographic data were collected on the participant and an understanding of their time grounded and expectations on a return to operation. The impact of COVID-19 related restrictions, such as social distancing and its impact on airline training resources, was questioned, gauging the airlines' engagement with their grounded pilots. Participants were asked to describe how the pandemic has increased distractions to their everyday work and how social distancing, border closures and related pandemic measures required them to modify their actions.

3.2 Data Collection

The survey hyperlink was shared through the authors' LinkedIn network, in addition to industry-specific groups in the platform, such as the Royal Aeronautical Society's Human Factors Group, Flight Safety Foundation, and Human Factors in Aviation. Several pilot unions, safety organisations, and airlines were contacted to share the survey link with pilots via email. The questionnaire remained available for participation throughout August 2021.

The inclusion criteria of a grounded pilot are defined as an airline pilot who, during the COVID-19 pandemic, lost recent experience requirements and are required to undergo training before returning to active operational status. This provides a reasonable classification to capture participants who had not flown for at least 90 days as per ICAO [30] requirements and, most likely, who also had other training requirements lapse.

A total of 391 individuals participated in the research study. Those participants who did not meet the inclusion criteria were excluded via a zero-quota option within the questionnaire logic, and incomplete surveys were also

excluded from the sample. This research used 105 valid results (286 excluded surveys) specific to the research questions.

3.3 Respondents Profile

Of the 105 participants, there were one Training/Check Captain, 49 Captains, one Check/Training Officer, 37 First Officers, five Second Officers, and two Management Pilots. Most participants usually operate passenger flights (81%, $n = 86$), while a small number typically operate both passenger and cargo flights (9%, $n = 9$) or cargo-only flights (10%, $n = 10$). Most participants hold Air Transport Pilot Licences (92%, $n = 97$). Australian participants represented the highest proportion of pilots within the sample (47%, $n = 49$), likely due to the promotion of the survey by the Australian and International Pilots Association (AIPA) and the Australian Airline Pilots' Association (AusALPA). Many participants were also from Hong Kong (19%, $n = 20$) due to the internal circulation of the questionnaire by a Hong Kong airline.

The participant sample mainly was experienced pilots with an average total flying experience of 11,471 hours ($SD=5,852$). Participants were grounded on average eight months ($SD=5$), with a minimum of one month and a maximum of 35 months, even though they expectation of grounding was four months ($SD=7$), with most participants (30%, $n = 32$) expecting to not be grounded at all, as shown in Figure 1. Participants grounded for longer than 18 months (5%, $n = 5$) include those on annual or medical leave before the pandemic.

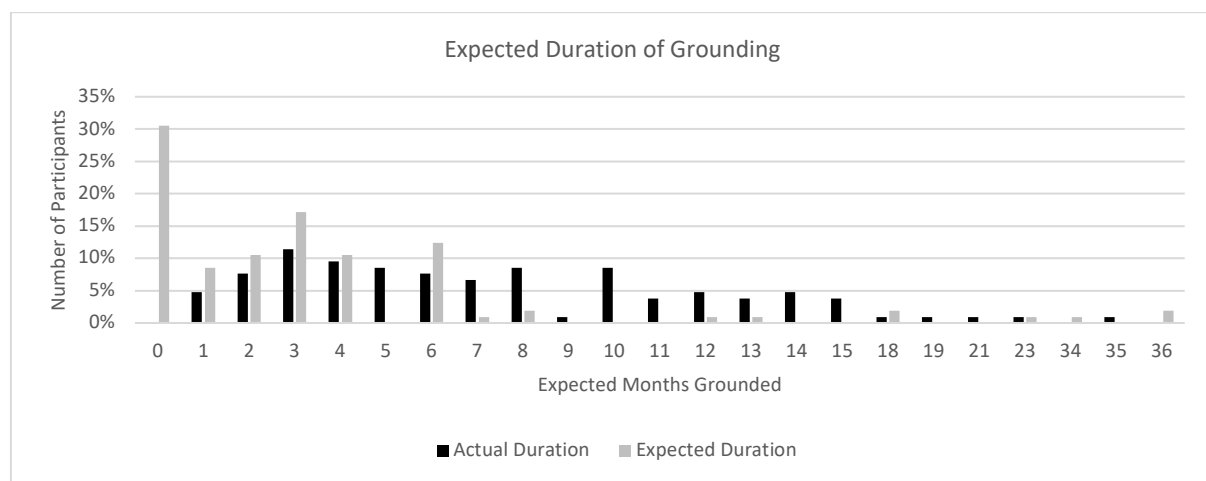


Figure 1. Expected Duration and Duration of Grounding.

3.4 Data Analysis

The questionnaire data was cleaned and organised with OpenRefine and analysed with Tableau, Excel, and SPSS. Open-ended questions were thematically analysed through NVivo into categories related to employee engagement (e.g., culture and climate), external stressors and operational distractions.

4 Results

4.1 Work Activities Whilst Grounded

Almost half of the participants (47%, n = 49) had not completed any work preparation study whilst they were grounded. We assume this happened in part due to the fact that third of them (30%, n = 32) were not expecting to be grounded in the first place. The second was the uncertainty created by the situation, which ended up being longer than expected, as suggested in the other of one of the respondents:

"Fatigue and demotivation from consistent negative news in both my local community, and worldwide gave little motivation to continue studying when the following thought was constantly at the forefront of my mind - Why should I study if I'm nowhere near getting back into a flight deck? Why waste my mental energy and time trying to commit the following to memory again when I can't even step foot in a simulator or aircraft yet to solidify the content I am studying?"

Participants were asked whether their airlines set any explicit or implicit study expectations while they were grounded; however, the majority (63%, n = 66) said no expectation was placed upon them. For some participants, intrinsic professionalism traits influenced study habits. As explained by one participant, *"regardless of the company providing training opportunities, the pilots are required to demonstrate a high level of self-discipline and pursue the self-study on their initiative. Sort of like a professional ethos"*. However, social distancing and border closures measures had some influence on how participants studied. These measures restricted 21% of participants (n = 22) from conducting self-study activities they otherwise wished to accomplish because of closed or limited access to training facilities.

A small number of participants said they were expected to complete online training (6%, n = 6) and remain up to date with notices to crew/procedure changes (5%, n = 5). The majority (70%, n = 73) of participants did not receive any study programs or voluntary training opportunities from their airline. The lack of training investment in grounded pilots resulted in a more significant effort to return them to proficiency. If coupled with experienced

pilots leaving the industry due to groundings, the resulting 'brain drain' can lead to a reduction in safety, as feared by one participant *"I fear there will be a massive skill deficit when we return requiring much more training than the industry is currently planning. This could lead to poor safety outcomes in the long run."*

Upon the return to flying, the majority of participants (64%, n = 64) received some training from their airline, supplementary to the regulatory requirements of [30], with most (n = 33) explaining that specific simulator training designed for the return to operations was beneficial in re-developing their confidence. However, 15% (n = 15) of the pilot participants who had returned to operations reported that training programs insufficiently prepared them for regaining confidence. Participants mentioned that airlines were only training to the minimum required by their state regulator; *"Trained minimum competence, not confidence"* and *"there was very little scope to let me develop confidence"*. Classroom or ground-school training was provided to 13 participants (12%) and most commonly involved human factors or mental health welfare training and familiarisation with revised company procedures.

4.2 External Stressors Impacting Airline Pilots

Whilst some had undertaken other employment, 84% (n = 89) still sourced their primary income from their work as an airline pilot, waiting to return to operational status. Pilots' motivation has varied significantly. As one participant described, *"during the first 6-12 months of stand down, I felt zero interest in study or preparation for my eventual return to flying. I felt [a] disconnect and disengaged from the airline and felt frustrated"*. Other stressors have influenced grounded pilots during the pandemic. *"Mental and financial stress, uncertainty over [the] tenure of employment"* was a standard narrative described by the pilots. The disconnection those grounded pilots felt with their airline and the stressors they have been subject to will only continue to grow as pilots remain grounded. As a participant summarises:

"My main concern is for the mental health of professionals who may be stood down for a period greater than two years, and how to deal with the return to work. Many have lost houses, marriages and moved their children from school. Minimal assistance has been provided by the company they work for, yet they spend millions every month maintaining the grounded aircraft. The long-term damage done to the employer-employee relationship may never be recovered, and how that, in turn, reflects upon professional standards is of great concern".

The majority (61%, n = 62) of participants believe the pandemic-induced safety protocols are imposing extra demands on pilots, with around 22% of participants (n = 23) mentioning health screening measures as one of the most demanding. For participants who returned to work, *"on top of the return-to-duty-stress, there were all these new COVID regulations to comply with"*. New requirements included *"the constant changing of government rules and regulations dealing with crew of international aircraft"* and *"hygiene procedures (masks, social distancing, etc.) [which] were distractions, mainly on ground - i.e., meeting crew, planning, pre-flight, turnarounds"*. As one of the pilots explain, some *"airfields [are] taking the opportunity to conduct repairs and upgrades"* in their runways, taxiways and facilities due to the reduced air traffic. Consequentially pilots have to deal with *"many more NOTAMS"*, increasing their workload and risks to the operation. Two pilot summarises well the sentiment of the participants by stating that *"flying has almost become secondary to the "COVID stuff" and "the flying itself, from pushback to on blocks, has not changed too much; it is all the other things around it that are making things difficult or unpredictable."*

4.3 Operational Distractions

Perhaps for some airlines, the concern of skill retention on grounded pilots is secondary to trying to maintain a viable business. It prompted comments such as *"the airline is stretched so tight they can't invest in training to return to work, so relying on pilots to prepare at home the best they can individually"*. Utilising a core group of Training Captains to operate much of the flying schedule was reported as a frequent method to ensure that this crucial group is ready to assist in the recovery of line pilots to operational status. However, prioritising groups has left many other pilots on the fringe or outside of this group with uncertainty on when (or if) they will return to work. It has been frustrating for some participants who stood down with no pay because *"my fleet manager said it was up to us to keep revising or risk losing our professional knowledge...he was on full pay"*. This sentiment reflects that crew engagement in voluntary training programs is one of the most significant hurdles airlines face whilst pilots are grounded. Some participants reported the introduction of a 'Pilot Preservation Program', which provided a non-jeopardy simulator session and ground training every few months. However, these efforts were flanked by domestic border closures making it difficult for pilots to participate.

According to the participants, mitigation to reduce the complexity and risk in flight operations as recommended by IATA were not adopted by their airlines. Instead, operational normality was being encouraged by airlines, as

described in the pilots' narratives such as *"it has been a year of introducing new things just at a time when it would be helpful to fall back on familiar and established procedures"*. Some participants reported changes to procedures, the introduction of new tools such as Electronic Flight Bags (EFB), changes to fuel policies, aircraft performance calculations, and departure and approach briefing standards. As described by one participant:

"[Airline] expected crew to remain up to date with all of the regulatory and manual amendments. Despite long periods away from flying, there was no reduction in the number of manual/procedural changes made. A sensible approach, in my opinion, would have been to provide crew returning to work with an up to date document detailing the changes made over the last 3, 6, 9, 12 months etc. and why the changes were made, where to find the new procedures etc. This was not and is not being done."

This type of situation was a catalyst of stress for some participants, one of which stated, *"after a long period away, I found the sheer volume of information to re-familiarise myself with was overwhelming and contributed to a lot of stress and anxiety before the refresher course began"*. More than being overwhelmed by information overload, the participants believe that reducing the flying schedule had a subsequent impact on organisational culture. *"Erosion of culture, loss of familiarity with other crew members, [and] loss of confidence to exert command authority which is already a challenge under Airbus operational philosophy"*, as stated by one of the respondents.

5 Impact on Safety Climate

This discussion is broken down into safety climate themes [**Error! Hyperlink reference not valid., 11**], which are broad common themes developed by Gibbons [31] in the context of airline flight operations. Their creation of these themes was important in recognising the need to account for an atypical employee-employer relationship in flight operations departments and its influence on safety climate.

5.1 Management/Supervision

Management and supervision are essential within the context of the safety climate. It drives the perceptions and beliefs of safety from a top-down perspective, particularly concerning the trade-off between production and protection. Stemming from the COVID-19 pandemic, this research found that the disconnect between grounded pilots and airline management significantly influences employee engagement. While some airlines have tried to motivate and engage their grounded pilots, the impact of the pandemic both personally and financially has hampered efforts. These stressors have played a prominent role in demotivating grounded pilots to prioritise skill

and knowledge retention. Whilst airlines have focused on providing mental health support to pilots who have returned to operations via classroom training, pilots who are not actively engaged in training with their airline may not be receiving the support they require.

Primarily related to pilots' psychological stress, airline management needs an emphatic approach to personnel and performance management and ensure that wellbeing programs are in place for all crew. The research found that wellbeing programs were not commonly offered to grounded pilots until they returned to work, leaving them on the fringe without adequate support. These actions can leave those pilots feeling abandoned by their managers, negatively influencing their attitude towards management commitment to work and safety. Research has already identified a growing divide in pilots' professional standing and long-term career aspirations [25, 32], and the pandemic is likely bringing a further decline to the occupation to the forefront. It is particularly relevant as many grounded pilots have already left the industry to reskill and find alternative employment and careers. For those who intend to return to their profession, without airlines investing early and regularly in skill retention, the resultant cost of an extensive training volume will hamper airlines from recovering already decimated profit.

5.2 Safety Systems

The perception of the state of the safety system by participants was not frequently captured in this research and reflects that operational and industrial matters of their continued employment received a higher emphasis in participant responses than engagement with the safety management system.

5.3 Risk

IATA [2] provided extensive risk assessments and guidance into flight operations, personnel management, human factors and crew resource management, and aircraft cleanliness. Whilst participants did not mention any of the flight operation mitigations being utilised, such as increasing operational thresholds, each airline likely conducted risk assessments where appropriate, particularly in collaboration with their state regulator.

Several human factor items foreseen by IATA are congruent with this research findings. Increased distraction in tasks was found amongst participants, along with a breakdown in crew communication and alignment due to procedural and operational changes. These were mainly considered tolerable risks by IATA, with existing controls and mitigations utilised to manage. However, it is noted that IATA and participants pointed out reliance upon

their check and trainers to provide some or all the necessary support for pilots return-to-operations journey. Risk assessments must ensure that personnel are also duly supported and protected from the resulting stressors of the pandemic to ensure that they can adequately provide their expertise.

5.4 Work Pressure

Work pressure is the balance maintained between production pressure and safety. Work pressure is regulated and managed through stringent standard operating procedures and highly regulated procedures in aviation. During the COVID-19 pandemic, airlines faced difficulties needing to remain competitive by adapting their operations with new technologies. Airlines introduced new electronic flight bags, performance optimisation, fuel policies and aircraft operation changes. However, the researchers discovered that pilots found it difficult to keep up with procedure and policy changes whilst grounded and upon their return. The drive for returning to 'Ops-normal' whilst still managing a workforce with diminished proficiency due to a lack of flying has a subsequent negative effect on safety climate [11].

5.5 Training/Education (Competence)

The workforces' general perception of the competence of its fellow employees is the essence of this safety climate theme. For pilots grounded, inadequate opportunities to retain competencies in their skills, knowledge and attitude can lead to increased difficulties for airlines to return their pilots to operational flying quickly. Personal and financial stressors have played a significant role in engaging pilots to remain engaged in study whilst grounded. Given that close to half of the participants did not study whilst grounded indicates that an impact to safety climate may occur when they return to operational flying and that confidence in the pilot workforce's competence may linger for some time, particularly until regular flying schedules return to pre-pandemic levels.

5.6 Recommendations

Airline management should recognise the significant mental and physical stress pilots have endured during the pandemic. Internal and external stressors' influence on flight operations will impact the safety climate. Operational distractions, such as avoiding numerous changes to the operational procedures and issuing constant internal memos, should be minimised until a significant level of pre-pandemic operations has been regained and pilots are adequately prepared to manage their competency and work pressure. Also, providing ways to keep the pilots informed about the organisation and the operational environment, particularly for those who are still grounded,

can reduce the disengagement and anxiety. Meetings with the pilots, updates on the operational setting and topics of training are all suggestions that require minimal effort and will keep the group informed and engaged.

6 Conclusion

The purpose of this study was to evaluate what stressors and distractions airline pilots have faced during the COVID-19 pandemic and how these can influence safety climate. Many participants explained a disconnect between them and their employing airlines and disengagement can manifest into the safety climate, particularly around work pressure and competency. Mental and financial stress upon grounded pilots negatively influenced motivation and engagement towards work, and for some, they felt disengaged and frustrated.

This research had several limitations. The study focused on pilots who had been grounded for longer than 90 days, which subsequently excluded pilots who faced stressors and distractions throughout the pandemic whilst remaining operational. This also limited the survey to airline pilots who suffered more protracted periods of groundings than some who retained a large percentage of their existing flying schedule. Additionally, as found in this research, motivation varied between participants, influencing participation in employment-related research.

As the COVID-19 pandemic continues, with many pilots still operationally grounded, additional studies should consider the measurement within flight operation departments and how the various airline and regulator interventions impact safety climate, consider the consequence of pilots leaving the industry and the detrimental impact on both the profession's future and impact on pilot shortage. It may provide influences that can be reversed.

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