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RESEARCH

Cabin crew startle and surprise: occurrence and impact

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Abstract
Startle and surprise are known to impair pilot performance during non-normal flight conditions. In the past years research has focused on developing strategies to help pilots mitigate startle and surprise responses to unexpected situations. However, no equivalent research exists for cabin crew. This study investigates the prevalence, impact on crew performance, and emotional consequences of startle and surprise among cabin crew, as well as the way in which it is currently trained. A survey was conducted among 348 European-based cabin crew to gather data on in-flight events that provoked startle, surprise, or both. Objective measures included stress ratings, perceived impact on performance, perceived emotional control, training exposure, and lasting anxiety. Qualitative data were also collected to assess crew responses and coping mechanisms. Out of 348 respondents, 79.3% reported having experienced startle, surprise or both. High stress levels were significantly correlated with perceived performance impairments and lasting anxiety. Current startle and surprise training improved perceived preparedness but did not reduce perceived stress or anxiety. Emotional control was deemed a key protective factor. Startle and surprise can cause operationally significant impact on cabin crew performance. Training that includes simple, effective emotional regulation strategies, such as those developed for pilots, is currently lacking and may help improve both immediate performance and long-term psychological resilience in the cabin environment, as may increased peer-support access.

Keywords Panic · Crew resource management · Cabin crew · Aviation psychology · Stress management · Cognitive performance · Self-efficacy · Non-technical skills · Peer support

1 Introduction

Research into startle and surprise (S&S) on the flight deck has revealed that it can cause distraction, attention tunnelling, and disruption of cognitive processes, negatively impacting performance of critical non-technical skills such as decision-making and communication (Landman et al. 2017a, b; Martin et al. 2016). In recent years techniques and procedures have been established in major airlines to help pilots manage their stress response and facilitate recovery of situation awareness during in-flight emergencies or adverse events (Field et al. 2018; Landman et al. 2020; Vlaskamp et al. 2025a, b). To our knowledge, such S&S management techniques have not yet been made available for cabin crew, which is remarkable because of their central role in safety-critical tasks. Also, scientific literature on startle and surprise management in cabin crew seems lacking.

Startle is defined as a sudden involuntary reaction to an intense stimulus, such as a sudden loud noise (Koch 1999). The initial startle reflex occurs rapidly, and includes contraction of face and neck muscles, arrest of ongoing behaviour and physiological arousal (Koch 1999). If a persistent threat is perceived, a sustained stress response will result. Surprise can occur together with, or in the absence of, startle. Surprise is an emotional and cognitive response to unexpected events that cause a mismatch between expectations and what is perceived (Meyer et al. 1997). The combination of stress and surprise can cause "cognitive lockup", as stress negatively impacts the cognitive processes required

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for making sense of the surprising situation, and the inability to make sense of the situation can, in turn, increase stress (Landman et al. 2017a). Cognitive lock-up is defined as the tendency to fixate on an ongoing task even when switching task would be more appropriate (Neerincx 2003). This state of cognitive lockup, instead of the initial startle reflex, is what is often designated as "startle" or S&S in operational practice (Rivera et al. 2014). Both startle and surprise can lead to rushed and incorrect actions and have been shown to impair pilot performance in simulator research (Martin et al. 2016; Landman et al. 2017b).

It is likely that emergency or non-normal situations can be equally disruptive for cabin crew as they can be for pilots. Accident and incident reports show that breakdowns of communication between the cabin and cockpit crew may impede effective action in scenarios such as aircraft evacuations (Zhu and Ma 2015; Chute and Weiner 1995).

Regulatory bodies expect operators to train cabin crew in the behavioural skills needed to manage emergencies under conditions of acute stress: for example, ICAO's Cabin Crew Safety Training Manual says training should build transferable recognition and response skills for emergencies, be both practical and scenario-based, and develop the ability to take correct action under time pressure and stress (International Civil Aviation Organization [ICAO], 2020). However, minimal guidance material exists, stating how that should be achieved in practice. This is normally integrated into Crew Resource Management (CRM) training, which is the only place S&S is explicitly mentioned in regulation (European Union Aviation Safety Agency [EASA], 2019). Consequently, the breadth and depth of current training provided is likely to vary between companies in both content and quality.

The range of potential safety incidents faced by cabin crew is extensive. Aviation website SkyBrary lists over 100 examples of cabin safety incidents from 1983 to 2024, including planned and unplanned evacuations, fire and smoke, turbulence and stowage injuries, cabin decompression, air contamination, and medical emergencies (SkyBrary, n.d.). Although the list provides a good cross-section, it is by no means complete.

Unlike flight crew, for cabin crew, one of the aspects of an emergency event is the management of people (Chute and Weiner 1995). Thus, for cabin crew, maintaining emotional control in high stress situations is not just about sustaining cognitive clarity, but also about being able to demonstrate calm, public-facing leadership. This can play a critical role in scenarios such as the handling of disruptive passengers, which is a frequent problem for cabin crew (Rösch et al. 2024).

The longer-term effect of these incidents is not limited to operational safety but could also impact upon the personal wellbeing of those involved. A study into fear of flying among crew (Dyregrov et al. 1992) found that experiencing critical events and emergencies can lead to flight anxiety, which they define as anxious feelings related to flying. Dyregrov et al. (1992) recommend teaching relaxation procedures and cognitive coping skills in the aftermath of incidents to mitigate their long-term effects. Research on cabin crews' experience of disruptive passenger behaviour has shown that it negatively impacts crew wellbeing (Rösch et al. 2024), sometimes with long term effects, even precipitating a career change. Peer support is one tool available to mitigate the long-term effects of stressful events and support cabin crew mental health more generally (Hazrati and Grant 2025). However, one contemporary study into disruptive passenger behaviour suggests these programs are often not used (Rösch et al. 2024).

Based on these findings it can be assumed that cabin crew can benefit from S&S management training, not only to improve performance during the incidents, but possibly also to prevent subsequent mental health issues. Multiple studies (Davis et al. 2000; Field et al. 2018) have highlighted how training in aviation can develop self-efficacy across technical, cognitive, and social skills. Self-efficacy is a foundational concept in cognitive psychology and refers to belief in one's own ability to successfully perform complex tasks or handle situations characterized by uncertainty (Bandura 1977). Self-efficacy helps to regulate cognitive processing and emotional arousal, counteracting rumination, catastrophizing, and other negative emotional responses such as panic or helplessness (Bandura 1997). Research shows that individuals with higher self-efficacy tend to perceive threats as more manageable, cope more actively with stress and recover more quickly from traumatic experiences (Benight et al. 2015; Lynch and Kaplan 2025). This also reduces long-term mental health effects (Benight and Bandura 2004).

This study examines the occurrence and consequences of S&S events in the cabin crew task environment, as well as the factors that shape short- and long-term responses. A survey was distributed among cabin crew to investigate the following main research questions:

(1) What is the prevalence of S&S in the cabin crew task environment and which types of events provoke them?
(2) What is the perceived impact of S&S incidents on cabin crew acute stress, long-term stress and task performance?
(3) What specific S&S training do cabin crew receive and what is its perceived influence on their feeling of preparedness and the impact on their response to incidents in flight?

(4) How does perceived emotional control (self-efficacy) affect stress levels and long-term emotional outcomes following S&S events?
(5) What is the level of uptake of peer-support and how does it affect long-term emotional outcomes?

The outcomes of this survey are expected to provide directions for the development of effective methods for mitigation of S&S in cabin crews, such as protocols, training scenarios, and peer-support programs.

2 Method

2.1 Participants

A total of 348 European participants provided valid responses to the survey. Respondents were required to be active cabin crew or have been so in the last 5 years. All participants provided informed consent, and the study was approved by the ethics committee of Cranfield University under number 25,723/2025. Table 1 shows a full breakdown of the demographic data from the sample.

Table 1 Demographic characteristics of the participants (n=348)

Experience (flight hours)	*n*	%
0-999	21	6.0
1000–1999	34	9.8
2000–4999	48	15.8
5000+	225	29.6
Rank		
Purser	148	42.5
Cabin Attendant	196	56.3
Other	4	1.2
Gender		
Male	75	21.6
Female	270	77.6
Other	1	0.6
Prefer not to say	2	0.3
Type of operations (multiple answers possible)		
Airline (short-haul/regional)	196	56.3
Airline (medium-haul)	207	59.5
Airline (long-haul)	317	91.1
Charter	1	0.3
Business aviation	7	2.0
Other	4	1.1
Age range (years)		
18–29	30	8.6
30–39	59	17.0
40–49	100	28.7
50–59	120	34.5
60–69	39	11.2

2.2 Survey content and procedure

An electronic survey for cabin crew was designed using Qualtrics software used a similar format previously used to investigate the prevalence and effects of S&S in airline and helicopter pilots (Vlaskamp et al. 2025b).The survey was distributed through the authors' network of airline contacts, who shared it on internal company message boards, via e-mail and promoted on LinkedIn.

The first questions requested consent and confirmed that respondents were employed as cabin crew or had been within the past five years. Demographic information was gathered (see Table 1). Because of the range of interpretations in aviation, participants were then presented with the following definitions of startle and surprise: *Startle* is defined as the response to a sudden, intense stimulus, such as a loud bang or a flash. It triggers an involuntary physiological reflex, such as blinking of the eyes, an increased heart rate and an increased tension of the muscles, preparing the body for flight or fight. Examples are sudden severe turbulence or a loud engine explosion. *Surprise* results from the mismatch between expectation and reality. The effects of surprise are comparable to those of startle, such as increased heart rate and blood pressure, confusion and loss of situational awareness. Examples are an unexpected fire that cannot be located immediately, or a technical fault that is unclear.

The main body of the survey focused on questions that were developed to elicit information about experiences that had triggered S&S in participants This included types of events, their effect, and the respondents' emotional response. If participants had experienced more than one S&S incident, they were asked to reflect on the event that they remembered best. Perceived effects on performance were measured using a bipolar, asymmetric scale designed to provide greater resolution for negative performance impact. All categories were explicitly labelled. Table 2 presents a full list of the survey questions. The survey was activated online on June 27th, and closed on July 15th, 2025, when response data were downloaded.

2.3 Data analysis

Non-parametric tests were used due to the ordinal or categorical nature of the survey items (see Table 3). SPSS version 29.0.2.0 was used for analysis., with $p<0.05$ as the threshold for significance.

Table 2 Survey questions and response options.

Question	Response options	Research question (RQ)
Demographics	Multiple choice, see Table 1	Prevalence of S&S, RQ1
Have you ever experienced an event during your flight where you were startled and/or surprised?	Yes, only startle Yes, only surprise Yes, S&S combined No -> survey ends	Prevalence of S&S, RQ1
How would you best describe the event?	Fourteen selectable options were given to the participants, based on common occurrences. If "other abnormal event" was chosen, participants were asked to describe the event in an open question. These events were: Dangerous goods incident Evacuation required (premeditated) Evacuation required (sudden) Decompression Emergency landing ("brace for impact") Bomb threat Emergency on ground (incl. rejected take off) Go around Premeditated emergency landing Sudden turbulence Unruly passenger Smoke/fire/fumes Medical emergency (pax/crew) Other abnormal event	Prevalence of S&S, RQ1
On a scale from 0 to 100, how stressed did it make you feel?	0–100, based on Houtman & Bakker's (1989) anxiety scale. Participants rated their level of anxiety on a continuous scale from 0 to 100, with higher scores indicating greater anxiety. No verbal anchors were provided at intermediate points.	Impact of S&S, RQ2
What was the effect of the startle and/or surprise reaction and the resulting stress on your performance?	5-point Likert scale: ("very negative", "negative", "somewhat negative", "no effect", "positive"). Asymmetric ordinal scale, clearly labelled.	Impact of S&S, RQ2
Please elaborate on the experienced effects of startle and surprise (positive or negative)	Open question	Impact of S&S, RQ2
How in control of your emotions did you feel while dealing with the event?	5-point Likert scale ("no control at all", "very little control", "moderate control", "substantial control", "complete control")	Impact of S&S, RQ2 and self-efficacy, RQ4
Does your training include startle and surprise management?	Yes/no	Current training, RQ3
How well prepared to manage the startle and/or surprise event did you feel your training made you?	5-point Likert scale ("not at all", "very little", "moderately", "substantially", "completely")	Current training, RQ3
After the event, did you feel a lasting increase in anxiety as a consequence of the experience?	5-point Likert scale ("no increase in anxiety", "small increase in anxiety", "moderate increase in anxiety", "substantial increase in anxiety", "very large increase in anxiety")	Long-term effects, RQ5
Did you receive any help from a peer-to-peer (or other, e.g. psychologist) support system after the event?	Yes/no	Long-term effects, RQ5

Table 3 Statistical tests used for analysis.

Test	Variables	H_0 (Null Hypothesis)
Chi square	Startle experienced (Y/N) vs. experience level	No association between experience level and having experienced a S&S event in flight
Kruskal–Wallis	Event type vs. stress score (0-100)	Stress scores do not differ across event types
Spearman ρ	S&S effect on performance (1–5) vs. stress score (0-100)	No correlation between S&S performance effect and stress scores
Mann–Whitney U	S&S training (Yes/No) vs. perceived preparedness due training (1–5)	No difference in preparedness ratings
Kruskal-Wallis	Emotional control vs. event type	No difference in emotional control across event types
Spearman's ρ	Perceived control over emotions (1–5) vs. stress score (0-100)	No correlation between perceived control and stress scores
Spearman's ρ	Lasting anxiety (1–5) vs. stress score (0-100)	No correlation between lasting anxiety and stress scores
Spearman's ρ	Perceived control (1–5) vs. lasting anxiety (1–5)	There is no monotonic relationship between perceived control and lasting anxiety
Mann–Whitney U	Received peer support help (Yes/No) vs. lasting anxiety (1–5)	No difference in lasting anxiety between groups
Mann-Whitney U	S&S training vs. preparedness	No difference in preparedness between the group that received current S&S training against the group that did not
Mann–Whitney U	S&S training (Yes/No) vs. lasting anxiety effects (1–5)	No difference in lasting anxiety
Kruskal–Wallis	Rank vs. perceived stress (0–100), perceived impact on performance (1–5 Likert scale), perceived emotional control (1–5 Likert scale), and lasting increase in anxiety (1–5 Likert scale)	No difference in perceived stress, perceived impact on performance, perceived emotional control and lasting anxiety between ranks

3 Results

3.1 Prevalence of S&S among cabin crew

In total 79.3% (276) of respondents (n=348) reported having experienced startle and/or surprise. "Startle only" was experienced by 12.9% (45) of all respondents. "Surprise only", was experienced by 10.6% (37). "Startle and surprise combined" was reported by 55.7% (194). The remaining 20.7% (72) of respondents reported not having experienced either. Only one event per participant was evaluated, the one they recalled best.

A Chi square test of independence examined the relation between total flying hours (0–999, 1000–1999, 2000–4999, 5000+) and experience of startle or surprise (yes vs. no). The association was not significant, χ^2 (3, n=348)=7.07, p = 0.070.

3.2 Categories of event types

The most frequently reported S&S event by cabin crew (n=78, 29.7%) was experiencing a medical emergency onboard. Other notably high-frequency events affecting the cabin were: smoke/fire/fumes (18.3%), unruly passengers (13.3%) and sudden turbulence (12.5%). All the reported event frequencies are displayed in Fig. 1. Under "other abnormal events", 11.4% (30) of respondents selected this option. Participants offered details of these events in a corresponding open-answer question. These responses were categorized by one of the authors and triangulated by another. Some responses were added to the existing categories. As almost half (n=14) of the answers represented the experience of a lightning strike, "lightning strike" was added as its own S&S event category. The remaining "other abnormal events" (n=16) represented miscellaneous events that fitted none of the categories provided and included, for example, engine failures, an unidentified loud bang or a traffic warning from the Traffic Collision Avoidance System (TCAS) while in the cockpit. No evacuation was reported.

3.3 Reported impact on acute stress

Figure 2 shows the event mean stress scores and their distribution A Kruskal-Wallis H test indicated that there was no statistically significant difference in perceived acute stress between the 12 reported event categories, $H(11)$=7.99, p = 0.714.

3.4 Reported impact on performance

Figure 3 shows the results of the reported impact of acute stress on the performance during the incident. On average, this rating amounted to M=3.64, SD=1.10, on a 1–5 scale. A Spearman's rank-order correlation revealed a small significant negative correlation between the reported perceived stress rating and impact on performance, $\rho(251) = -0.18$, p=0.004, indicating that events with high reported stress levels were associated with a negative perceived impact on task performance, while lower stress events reported more positive effects on performance. Figure 3 also shows that 54 respondents reported positive effects of stress on their performance. According to a follow-up question in free text the

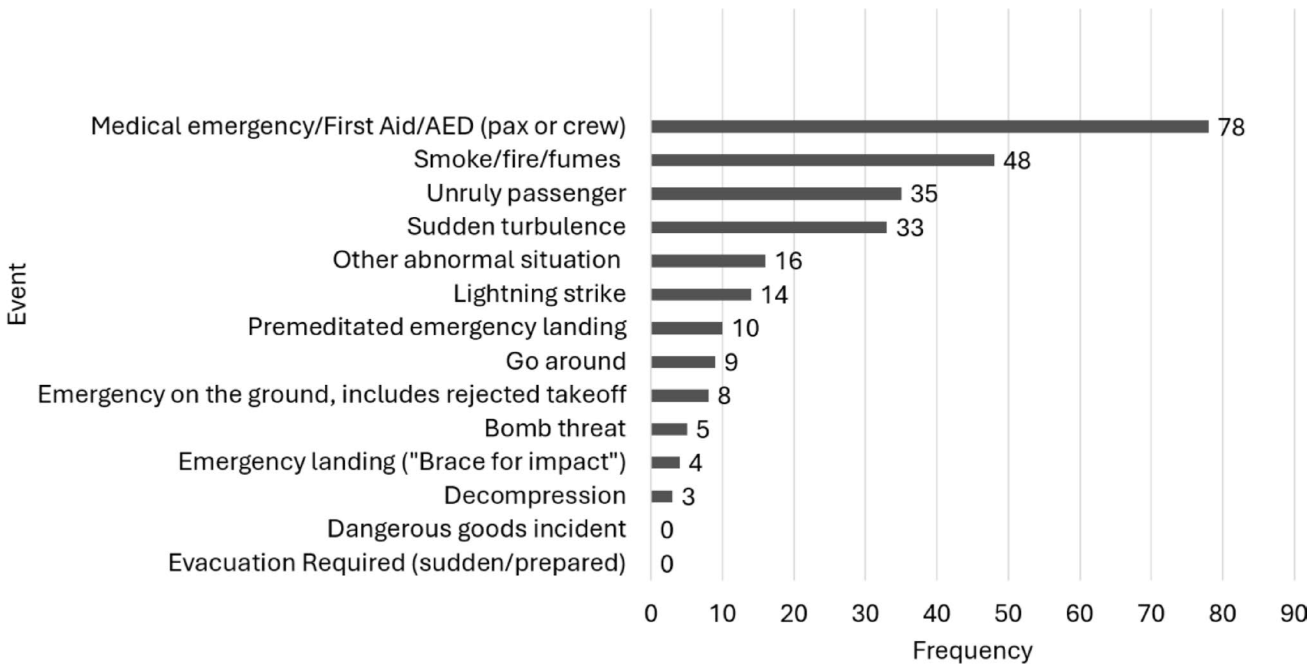

Fig. 1 Number of respondents reporting each S&S event category (total $n=263$). Thirteen respondents did not specify the event.

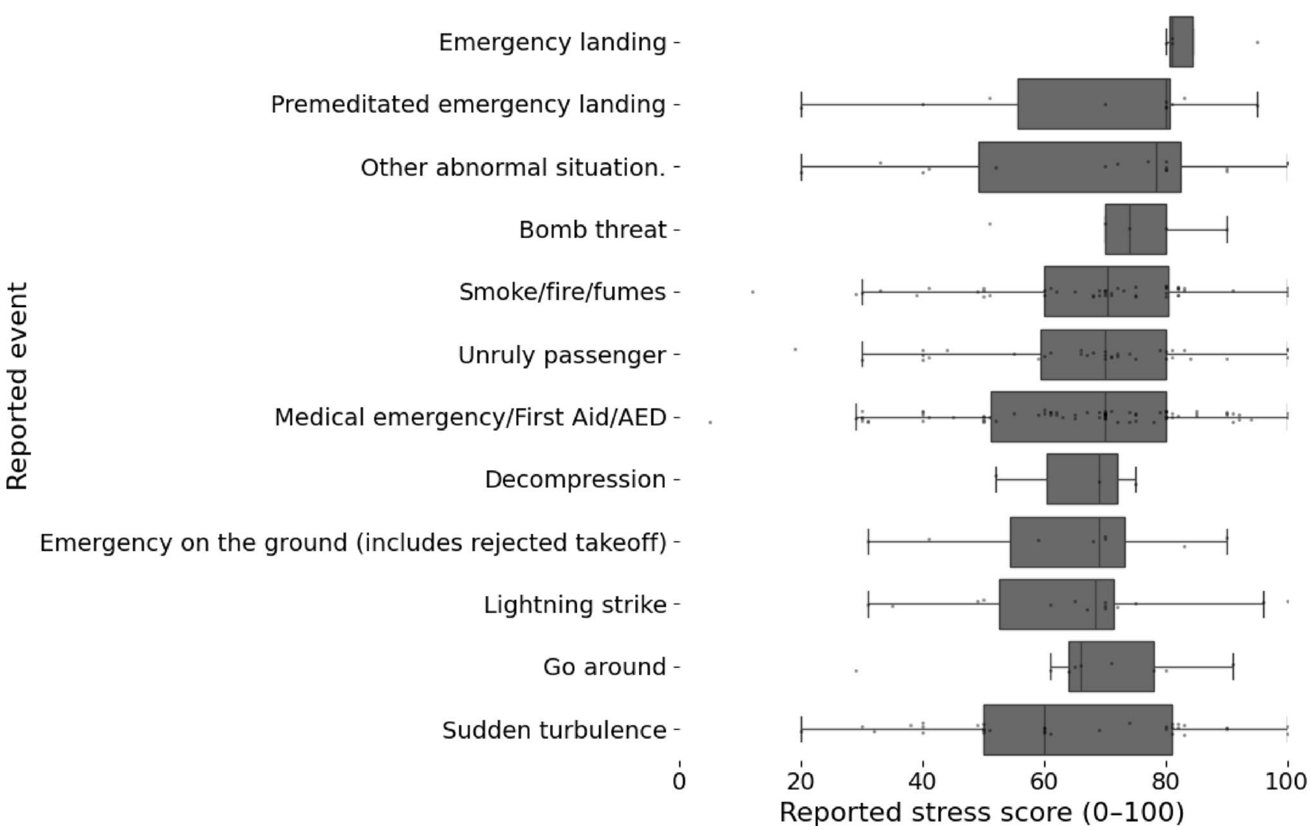

Fig. 2 Ratings of acute stress experienced during the reported S&S event, separated for event category (total $n=263$).

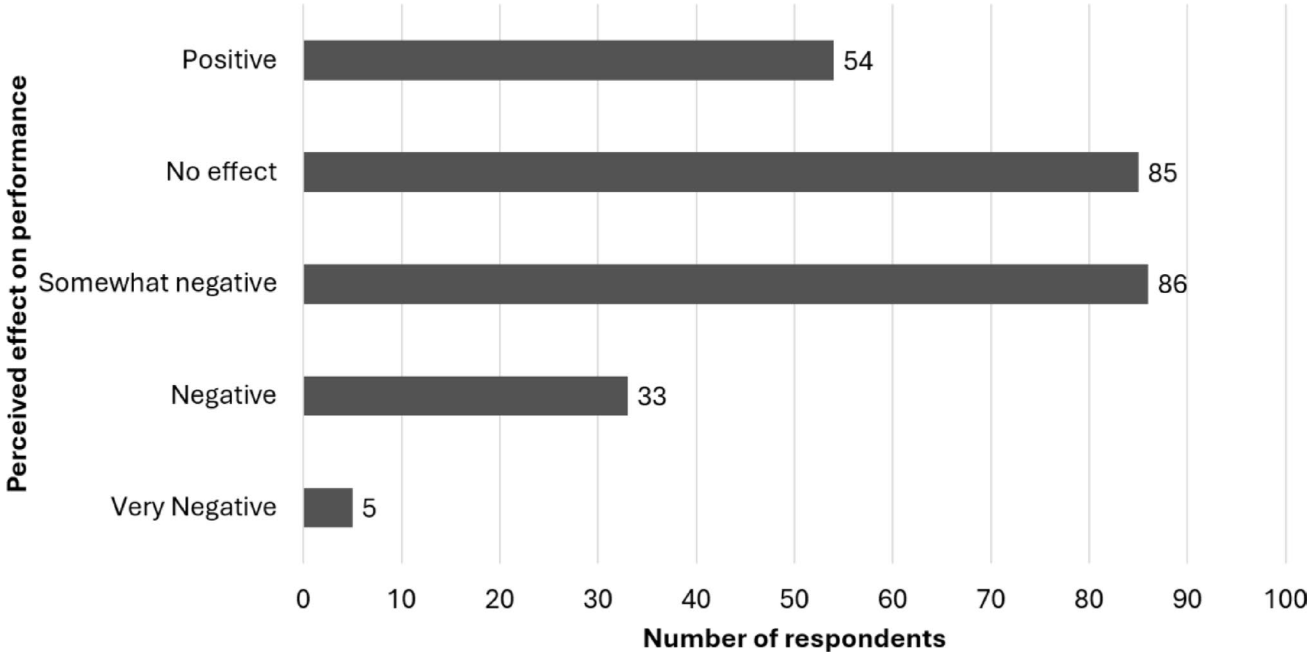

Fig. 3 Perceived impact of acute stress on performance during the incident (total $n = 253$).

Table 4 Reactions to S&S experienced by respondents ($n = 202$). (Note that some respondents described more than one reaction type)

Reaction to startle & surprise	Frequency of description	Percentage
Relied on training/teamwork/procedures	38	17.9
Increased focus/concentration	28	13.2
Freeze	25	11.8
High stress	22	10.4
Acted and trusted in self-efficacy	18	8.5
Emotional	17	8.0
Confusion	16	7.5
Delayed reaction (post event)	12	5.7
Calm	8	3.8
Await explanation from flight crew	8	3.8
Physical (heart rate, adrenaline)	7	3.3
Take deep breaths	5	2.4
Shock	4	1.9
Rushed action	4	1.9
Totals	212	100

arousal felt from the stress response led to an increased focus and ability to concentrate. Example comments included, "*it helped me perform because of the adrenaline" and "it made me awake and alert"*. Other explanations for positive ratings in the comments referred to the way individuals felt they had overcome the S&S effects leading to a positive resolution of the incident, rather than the immediate impact on their performance. The most commented factor contributing to this (17.9% −38 participants) was the role of SOPs and training in overcoming the initial surprise: "*It calmed me that I realised I had procedures*". 8.5% (18 participants) said that they had believed in themselves to take action and had done so appropriately, for example *"we immediately knew what to do"*. Others commented that they had taken a deep breath before acting and managed to remain calm.

The most mentioned reaction associated with negative performance effects described by 11.8% of respondents was a freeze prior to taking action. Typical comments shared were: "*I was so overwhelmed I didn't know what to do" and "I went into freeze mode.* Other mentioned effects included high stress (10.4%), becoming emotional (8%), feeling confusion (7.5%), and shock (1.9%). The reported reactions were coded into categories. These are listed along with their prevalence in Table 4.

3.5 Reported emotional control

Mean levels of perceived emotional control during the reported S&S event were 3.70 ($SD = 0.87$); between moderate control (3) and substantial control (4), $Mdn = 4$, $IQR = 1$. Results are shown in Fig. 4. Although 90% of respondents said they felt moderately to completely in control during the incident they reported, only 5% elaborated on this in the follow-up free text question. A Kruskal–Wallis H test was conducted to examine differences in perceived emotional control (0–5 scale) across 12 event categories that were reported at least once. The test showed no statistically significant differences between groups, $H(11) = 14.60$, $p = 0.201$.

A Spearman's rank-order analysis showed a significant negative correlation, $\rho = -0.24$, $p < 0.001$, (effect size small

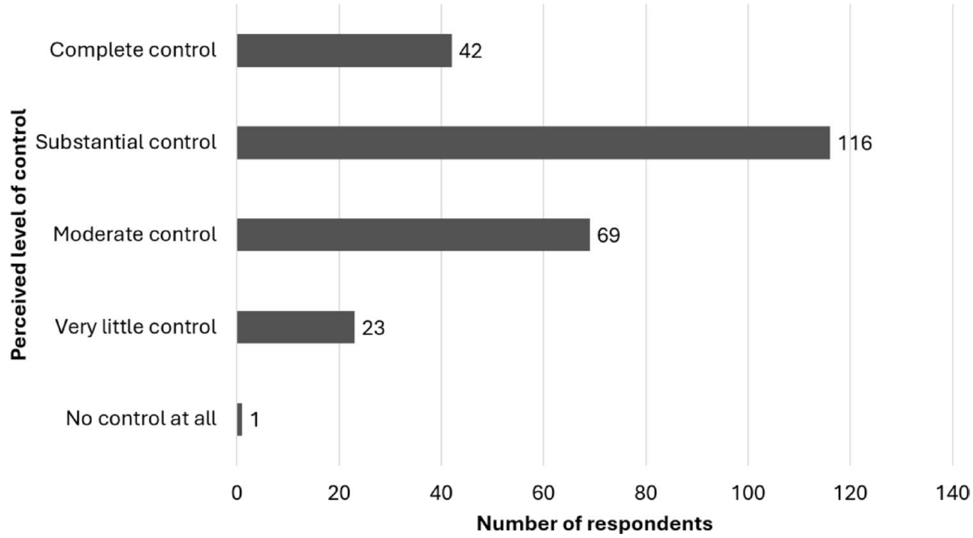

Fig. 4 Perceived level of emotional control in dealing with the event ($n=251$).

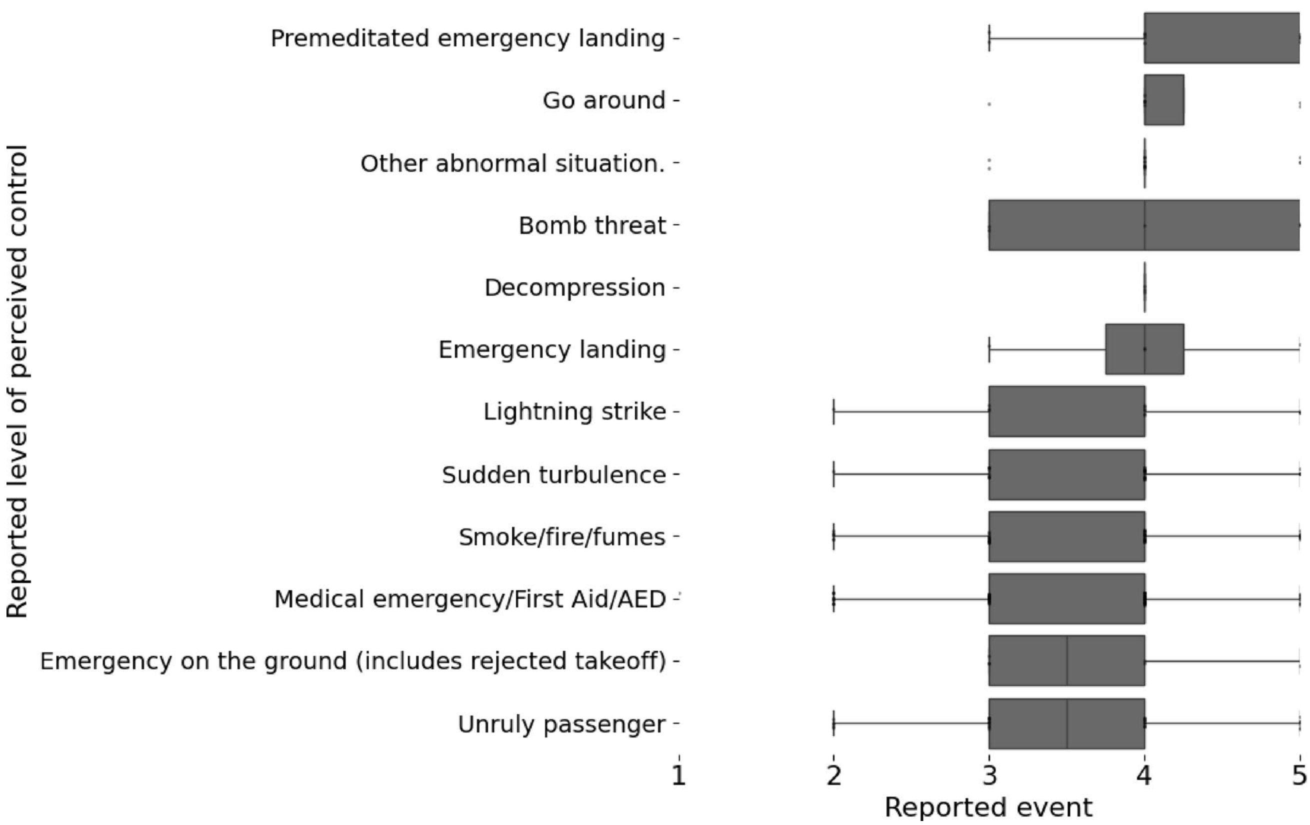

Fig. 5 Perceived emotional control by event type.

to medium) indicating that those who reported higher emotional control tended to report lower levels of stress. The boxplots (Fig. 5) illustrate that while median control levels were generally high across events, distributions varied in spread. Events such as *Bomb Threat*, *Unruly Passenger* and *Lightning Strike* showed a wider range of responses, whereas *Decompression* and *Go Around* were more tightly clustered. These results suggest that although participants typically felt in control during in-flight incidents, the type of event may influence the consistency (rather than the central level) of perceived control.

3.6 Reported effects on long-term anxiety

Of a total of 251 participants that experienced S&S and answered this question, 62.9% (158) reported a long-term

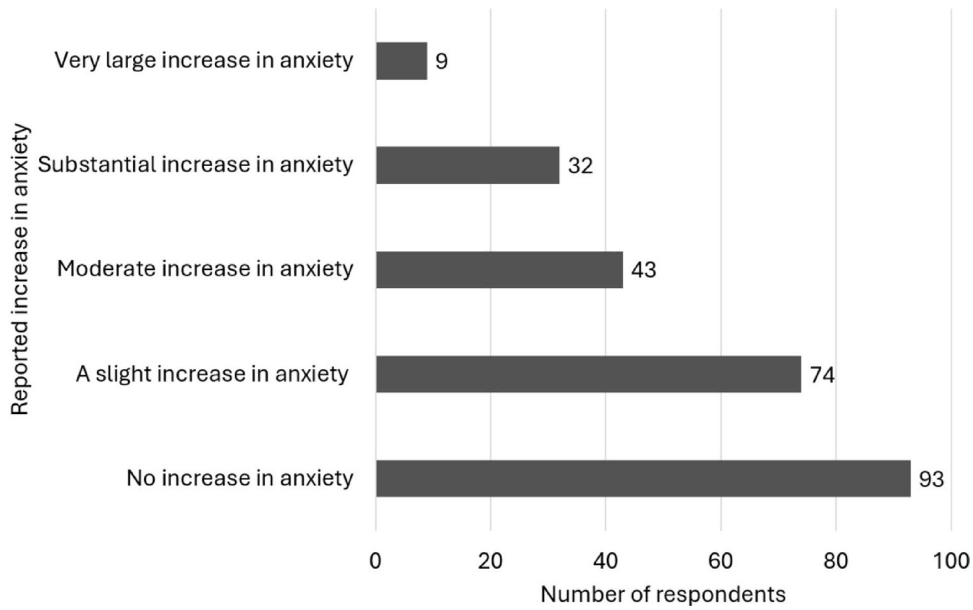

Fig. 6 Reported effects of the S&S event on lasting anxiety (n=251).

increase in anxiety following the event. Participants reported a median response of *"a slight increase in anxiety"* following the event. The interquartile range (IQR) spanned from *"no increase in anxiety"* to *"a moderate increase in anxiety"*. The distribution is shown in Fig. 6. Examples of reported effects included: "*For more than 2 years [afterwards] I experienced a very high stress level while opening an airplane door*," and "*Since then*, *my biggest fear is any kind of fire or smoke. Sounds in the cabin may trigger me*." One commented *"[Afterwards] I realised what could have happened in flight*, *which made me very nervous*."

The Spearman's rank-order correlation analysis between reported acute stress and lasting anxiety revealed a moderate, statistically significant positive correlation, $\rho=0.355$, $p < 0.001$. This indicates that participants who reported higher acute stress levels during the event also reported higher lasting anxiety after the event.

The Spearman's rank-order correlation between lasting anxiety and perceived emotional control showed a significant negative correlation, $\rho = -0.28$, $p<0.001$. This indicates that participants who felt more in control of their emotions during the event were less likely to report lasting increases in anxiety afterward.

3.7 Peer support

Of all respondents that experienced a S&S event and answered the question on long term effects, 35.1% (88) received help from a peer-support program and 64.9% (163) did not. A Mann–Whitney U test indicated that participants who received peer-to-peer or professional support (Mdn=2, IQR=1–4, n=88) reported a significantly greater lasting increase in anxiety than those who did not receive support (*Mdn*=2, *IQR*=1–3, n=163), U=6023.0, $z = -2.19$, p=0.029, r=0.14. Effect size was small. General practice in most airlines is that crew members are actively offered peer support in the more severe events, whereas in other cases the crew member will have to contact peer support themselves.

The impact of some of the more severe experiences shared by participants are worthy of note and highlight the importance of peer and psychological support. One respondent commented: "[*I was] shocked and [suffered] a breakdown two days after the attack. [I felt] the urge to find help with the Critical Support Team*."

3.8 Current S&S management training

Of the total of 348 participants, 64.4% (224) reported having S&S management training while 35.6% (124) had not. Responses to the open question where they described their training were coded into categories by two authors, and triangulation was carried out until agreement was reached. Six categories emerged from the data describing the types of S&S training and methods taught recalled by participants. (Only replies that did not mention other techniques were placed in category 2). The emerging categories were:

(1) Scenario-based training, including simulator and role-play with an actor (mentioned by 49%)
(2) General classroom or training discussion (mentioned by 35%)
(3) To 'take a deep breath', or other breathing technique (mentioned by 3%)
(4) To take a pause before acting (mentioned by (7%)

(5) To refer to SOP or follow procedures (mentioned by 3%)
(6) The use of mental rehearsal (mentioned by 3%)

Participants rated how well they felt their training prepared them for managing S&S events on average at $Mdn = 4$, $IQR = 1$, on a 1–5 scale. A Mann–Whitney U test indicated that participants whose training included S&S training rated themselves as significantly better prepared, ($Mdn = 4$, $IQR = 1$), compared to those without such training, ($Mdn = 3$, $IQR = 1$), $U = 5221.50$, $z = -3.88$, $p < 0.001$, $r = 0.25$.

A Mann–Whitney U test indicated no significant difference in reported lasting anxiety between participants whose training included S&S training and those whose training did not, $U = 7186.0$, $z = -0.04$, $p = 0.965$, $r < 0.01$.

3.9 Influence of rank

Finally, differences between crew ranks (cabin attendant, purser, other) were examined using Kruskal–Wallis tests for four outcomes: perceived stress (0–100), perceived impact on performance (1–5 Likert), perceived emotional control (1–5 Likert), and lasting increase in anxiety (1–5 Likert).

No statistically significant differences between ranks were observed for perceived stress, $H(2) = 2.49$, $p = 0.288$, or lasting anxiety, $H(2) = 1.28$, $p = 0.529$. For perceived impact on performance and perceived emotional control, differences between ranks approached but did not reach statistical significance, $H(2) = 5.47$, $p = 0.065$, and $H(2) = 5.45$, $p = 0.065$, respectively. Effect sizes were small to negligible across all outcomes ($\varepsilon^2 \leq 0.02$).

4 Discussion

4.1 S&S prevalence and impact on performance

The study examined the prevalence and triggers of S&S among cabin crew, their impact on stress and performance, the effectiveness of existing training, and the role of emotional control in mitigating their effects.

The results show that 79.3% of the respondents experienced an S&S event during their duties, which confirms our assumption that these reactions are not limited to the cockpit. Cabin crew reported a wide range of serious operational events that had provoked S&S and stress, posing significant cognitive demands. The events that participants reported the most often were medical emergencies, fire/smoke and unruly passengers.

The results of the performance impacts of S&S showed. 21.3% of respondents answered that the stress induced by the incident they reported had a positive effect on their subsequent performance. 49% reported negative effects on performance, in some cases leading to a suboptimal response that could potentially impact flight safety. Examples of negative effects reported were impairments such as freezing, confusion, shock, becoming emotional when they did not want to be, or acting too slow or too fast.

4.2 Perceived stress and lasting anxiety

Results showed that events provoking the highest levels of stress were significantly correlated with negative performance effects. A subset of crew appeared to channel the stress response into focused action and attributed this to confidence in their training, team support, or personal efficacy. This suggests that emotional and cognitive resilience, rather than the absence of stress, also has an important role to play in preserving performance during high-pressure situations.

Previous research shows that people with higher self-efficacy manage threats better, cope better with stress, and recover more easily from traumatic experiences (Benight et al. 2015; Lynch and Kaplan 2025). In our study, having received specific training in S&S was found to significantly increase perceived ability to cope with an incident, suggesting that crew training had a role in increasing self-efficacy. However, although current S&S training made crew members feel better prepared, it had no statistically significant effect on the reported acute stress, or on lasting anxiety after the event.

S&S training is unlikely to be able to prevent initial acute stress provoked by incidents suggesting that future training should focus more on mitigating their effects. Only 6% of participants reported having discussed specific techniques such as a breathing technique to manage these effects, which suggests that there is scope for including evidence-based interventions as part of training that are integrated with existing procedures, as have been introduced for flight crew.

A number of participants (62.9%) described that they suffered from lasting anxiety after experiencing an S&S event. This is in line with Rösch et al. (2024) for example, who described that stressful passenger interactions can have lasting consequences Our findings show that the stressfulness of the event was moderately correlated with lasting anxiety, suggesting that acute stress caused by S&S during operations can lead to meaningful psychological consequences. However, participants who reported a higher perception of emotional control during an incident had a significantly reduced likelihood of lasting anxiety. This is in line with previous findings from Bandura (1997) and Benight and Bandura (2004) on the protective role of self-efficacy and emotional regulation in traumatic or high-stress environments, although the correlation found in our study could also be confounded by seriousness of the S&S event.

Despite these suggested long-term effects, only one-third of affected participants received peer or psychological support after their incident. Those that did receive support reported slightly but significantly more lasting anxiety. This is likely because only the more severe cases receive or seek peer support. A growing body of literature on peer support in aviation shows positive effects (Bråstad et al. 2024; McCall 2023). The low percentage of peer support uptake might reflect the fact that only a proportion of the incidents reported were severe enough to warrant this kind of follow up, however, it could also suggest either that access to such programs is limited, or their importance is not widely recognized. Given the increasing awareness of occupational mental health in the aviation, this finding could support calls for more systematic peer support and structured debriefing processes following critical incidents (EPPSI, 2019).

4.3 Limitations and further research

This study has several limitations. Participants were asked to self-describe their experiences during and after one S&S event (they best remembered). This means that the answers are unlikely to reflect average experiences during S&S events, as more negative experiences are more likely to be recalled (Hamann 2001). Additionally, several correlations between aspects of experiences and responses could be moderated or confounded by differences in seriousness between reported events, limiting the possibilities to draw conclusions on causal connections. There are many variables that can impact the amount of startle, surprise or stress scaused by an event, including its typicality or dynamism (Clewley and Nixon 2022). In addition, events within the same category may vary substantially in severity. The data were self-reported and retrospective, individual differences in reporting, and variability in stress perception may have influenced the results.

Although the sample was broad and diverse in experience, it was restricted to European-based participants, employed at a few large EASA-based airlines, meaning the respondents were drawn from a homogeneous background in terms of regulation, training and operational cultures. Future research into the impact of stress provoked by S&S could incorporate more objective physiological measures (e.g., heart rate/cortisol), real-time scenario simulation, or longitudinal follow-up to real events to assess the longer-term effects in greater depth.

Practical measures to manage and mitigate the effects of S&S in cabin crew would benefit from further research into, and development and assessment of a standardised and tailored management method, possibly similar to those that have been adopted for flight crew in recent years. Introducing simple, context-appropriate methods may help cabin crew sustain performance during high-pressure events, particularly those requiring leadership and calm in passenger-facing roles.

5 Conclusion

The findings from this study suggest that S&S present significant cognitive and emotional challenges for cabin crew, similar to what has been reported in the literature for pilots. These events can disrupt task performance, trigger strong emotional responses, and, for some, lead to lasting anxiety with longer-term implications. Our results also show that the stress perceived during S&S can sometimes be beneficial for cabin crew performance. Informing cabin crew of this during S&S training could possibly facilitate a positive appraisal of one's own stress response and increase self-efficacy.

The results also show that current training approaches for cabin crew are diverse, and in some cases lack effective strategies to help the crew cope with these events. For pilots, formal techniques have been developed and introduced operationally to mitigate these effects. These techniques can possibly be adapted for the cabin crew context and could possibly mitigate performance impairments and stress and thereby prevent or reduce lasting anxiety after the event. Further research is needed to compare if a structured S&S management method provides additional benefits for cabin crew. Peer-support uptake shows room for improvement and will remain a valuable tool to mitigate mental health effects.

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Data availability Data is available from the corresponding author on request.

Declarations

Conflict of interest The authors declare no competing interests.

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