

Aviation Employees' Intentions to Report Safety Concerns

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Abstract

Following investigation of the Air Adventures accident in New Zealand, it was found that, prior to the accident occurring, a number of people had held concerns about the pilot in charge, but had not communicated their concerns to those with authority to intervene. The regulatory body claimed that had they been informed of people's safety concerns prior to the accident occurring, they could have had an opportunity to do more so that an accident is averted. This study explored what aviation employees would do if they had safety concerns, or became aware of wrongdoing, in the context of aviation. The findings of a survey of 116 aviation businesses suggested that under-reporting of safety concerns and wrongdoing in aviation may be widespread. There was also evidence that the manner in which observers become aware of wrongdoing or safety concerns may affect their reporting intentions (e.g., do nothing vs. report to a manager), and that a participant's gender and position within their organisation (management vs. staff) may interact with their reporting intentions.

Introduction

In the aftermath of the Air Adventures accident, in which eight people died, the Civil Aviation authority of New Zealand (CAA NZ) (2006a) reported that, "had information about the pilot's behaviour been disclosed before the tragedy, more could have been done to scrutinise the performance of the operator, and potentially avoid the accident that ultimately occurred" (CAA NZ, 2006a). For example, the pilot, Michael Bannerman, had been referred to by a senior CAA medical assessor as "an accident waiting to happen"; a group of businessmen feared for their lives after the aircraft ran out of fuel; and an anaesthetist with a mobile surgery unit had twice feared for her life; the pilot had even been heard boasting about his own 'close-calls' (New Zealand Herald, 2004). The Air Adventures accident and subsequent comments from the CAA NZ suggested that a lack of effective communication of concerns within the aviation industry may have negatively affected safety. Specifically, it is proposed that a problem potentially exists within the aviation industry, whereby concerns about behaviour that could potentially avert future accidents may not always be communicated to those with the authority to intervene. For the purpose of the current research, safety concerns are defined as any act, in the context of aviation, that participants perceived as unsafe, unethical, illegal or foolhardy, or that is, quite simply, wrongdoing.

There are, however, a number of reasons why issues concerning safety may not be communicated to the regulatory authorities. First, people may simply not become aware of a safety issue. For example, they may observe a pilot enter an aircraft and then take-off without a pre-flight check because it was raining, but not be aware that a pre-flight check was required.

Second, the way in which people may become aware of questionable behaviours that are inconsistent with safety, may affect the way in which the latter are reported. For example, a person may have 'heard' about wrongdoing (e.g., during a chat with a friend they heard about a pilot called Dave, who regularly flies after a beer or two at lunch time), whilst another person may directly witness it first-hand (i.e., they watched Dave drink two beers before jumping into his light aircraft). It has been suggested that the way in which people become aware of wrongdoing may affect how they act. Whilst researching the phenomenon of 'bystander intervention', Darley and Latané (1968) discovered that the more people witness an event,

the less likely they are to respond or otherwise become involved, an effect which the authors named 'diffusion of responsibility'. In the context of the current research, because those who hear of wrongdoing (indirectly involved in wrongdoing, referred to as indirect hereafter) may be more likely to assume someone else will take any necessary action, or will know better how to react, they may be less likely to feel they are personally responsible or required to get involved, than if they directly witness wrongdoing (referred to as direct hereafter). In other words, a different pattern of actions might reasonably be expected between those that are indirectly and those that are directly involved in wrongdoing.

Third, it is possible that, at least some of the people who believed that they had safety concerns about the pilot-in-charge before the Air Adventures accident had occurred (CAA NZ, 2006a), were in reality exhibiting hindsight bias. Hindsight bias is defined as the tendency for people considering a past event, to overestimate their likelihood of having predicted its occurrence (Arkes, Guilmette, Faust & Hart, 1988). In the context of the current study, only after the accident had occurred, people realised that they were aware of information, which perhaps could have been used proactively by the regulatory authority to prevent the accident. In other words, people may have believed that they had information which could have been used to improve safety, but in reality, they were exhibiting hindsight bias.

Five research questions were derived from the broad research problem: i) do people know what to do if they hear of wrongdoing (indirect)?; ii) if yes, what would they do?; iii) do people know what to do if they find themselves in a situation where they witness wrongdoing (direct)?; iv) if yes, what would they do?; and v) have people ever heard of, or observed, any behaviour or action about which they later wondered if they should have done something? (Yes responses to this question would indicate that hindsight bias was not an explanation for why reports were not made to the regulatory authority).

In view of the theory of diffusion of responsibility, it was hypothesised that people who directly witness wrongdoing are more likely to report or communicate it to third party, than people who indirectly become aware of wrongdoing.

Additionally, if it is assumed that at least some people who did not communicate their concerns, were genuinely aware of wrongdoing before the accident occurred (i.e., they were not displaying hindsight bias) then one contributing factor may be a lack of clear guidelines or reporting channels through which concerns could be raised. Therefore, two additional research questions were included: vi) within their working environment, do people have any written procedure to report wrongdoing? And if so, vii) would they use such internal reporting channels to raise concern?

In the broader context of wrongdoing, reporting guidelines provided by the CAA NZ may not be as clear as they could be. For example, whilst the regulatory authority defines accidents as 'injuries to people or damage to aircraft'; and incidents as 'anything that affects or could affect the safety of aircraft operation', and insists that incidents and accidents must be reported to the regulator (CAA NZ, 2006b), it makes no mention of what a person should do if they become aware of wrongdoing of a more subtle nature. One could argue that unlike clearly perceptible accidents, people are more likely to avoid reporting smaller incidents, and more likely to hide evidence of smaller occurrences that at the first instance, do not affect the safety of aircraft operation, but may affect the safety of the aircraft operator, or could build up to become the sort of accidents the CAA NZ encourages individuals to report. Therefore the research question: viii) would participants see value in clearer guidelines being provided by the regulatory authority? No hypothesis was raised due to the exploratory nature of this question. Finally, to enable between-group comparisons to be explored, participants were asked their gender, position in the organisation, and whether they had flying experience.

Method

Participants

One hundred and sixteen aviation businesses in New Zealand were approached to participate in the current study. This included flight clubs, flight training schools, air charters, aviation associations and air services. In total, 110 participants were recruited (25 females and 85 males). Participants were 88 pilots (16 females and 72 males), of whom 24 were also managers (6 females and 18 males), and 22 non-pilot participants (9 females and 13 males), of whom 12 were also managers (1 female and 11 males).

Materials

Nine questions were administered via a telephone interview of NZ aviation industry employees.

Question 1: Do you know what to do if you 'hear' of wrongdoing (indirect)? (Yes/No)

Question 2: If the answer to question 1 was Yes, would you talk to the person involved in wrongdoing, report wrongdoing to someone senior, report wrongdoing to the CAA, or do nothing?

Question 3: Do you know what to do if you 'witness' wrongdoing (direct)? (Yes/No)

Question 4: If the answer to question 3 was Yes, would you talk to the person involved in wrongdoing, report wrongdoing to someone senior, report wrongdoing to the CAA, or do nothing?

Question 5: Have you ever heard of, or observed, any behaviour or action that you later wondered if you should have done something about? (Yes/No)

Question 6: In the place where you work, do you have any, or do you know whether you have any, written procedure to report wrongdoing? (Yes/No)

Question 7: If the answer to question 6 was Yes, would you follow your internal procedure to report concern? (Yes/No)

Question 8: Would it be useful to have a more detailed directive from the CAA about reporting procedures? Response options were useful, may be useful, not necessary, or not sure.

Question 9: Finally, is there anything you can think of that you believe may influence whether you would report your concerns? Question 9 was an open question where participants expressed what factors they believed would affect their intentions to report their concerns.

Participants were also asked to provide the following demographic information: gender (Female/Male) and their position in the workforce (Staff/Management).

Procedure

Telephone numbers of New Zealand aviation businesses were collected using the search engines Google and Yahoo (with the domain extension for New Zealand), using the keywords 'aviation' AND 'schools', 'aviation' AND 'clubs', and 'aviation' AND 'businesses'. Telephone numbers were extracted from the first 100 search results for each keyword pair (duplicate numbers would be used once only). Aviation businesses were contacted by telephone during the weekdays of November, 2006, between 10 a.m. and 5 p.m., or between 5.30 p.m. and 7 p.m. if not available during the daytime hours.

Participants were first informed about the aim of the research and its independence from the regulatory authority, and were explained the ethical review process it has undergone. Participants were then asked for their voluntary participation, and were guaranteed confidentiality (i.e. no personal or identifiable information, if disclosed by a participant, would be recorded on the data sheet). Next, participants were provided with the context in which the term wrongdoing was used (any act that participants felt was unsafe, unethical, or illegal). The researcher read each of the nine questions in turn, and recorded the participants' answers.

Results

The level of statistical significance, alpha, was set at $p = .05$ for all statistical tests, and all tests were conducted as two-tailed.

Inspection of the demographic data suggested that there was no evidence of a relationship between participants' gender and the position (Staff/Management) that they held in the establishment being surveyed, $\chi^2(1, n = 110) = .33, p = .567$.

Responses to Q1 indicated that all participants ($n = 110$) believed that they knew what they would do if they heard of wrongdoing (*indirect*). Responses to Q2 showed that overall, 61 (56%) participants believed that they would *report* wrongdoing that they heard of *to someone senior*, 44 (40%) would *talk to the person concerned*, and 5 (5%) would *do nothing*. No participant responded that they would *report* wrongdoing they heard of directly *to the CAA*.

Due to low expected cell counts, participants' responses *talk to person* and *do nothing* were collapsed into a single heading of 'safety inconsistent', and the responses *report wrongdoing to someone senior* or *report to the CAA* were collapsed into a single heading 'safety consistent' to enable comparison of responses to Q2 by position and gender. Chi-square test of independence suggested that the intended action upon hearing about wrongdoing (safety inconsistent vs. safety consistent) differed according to the participants' position in the company (Staff/Management), $\chi^2(1, n = 110) = 23.93, p < .001$, with management less likely than staff to make safety consistent responses and that responses (safety inconsistent vs. safety consistent) differed according to the participants' gender (Female/Male), $\chi^2(1, n = 110) = 21.53, p < .001$, with females more likely than males to make safety consistent responses. A summary of participants' safety consistent and safety inconsistent responses, by position and gender is shown in Table 1.

Table 1. Responses to Q2 by gender and position (Data collapsed into safety inconsistent and safety consistent responses)

Factor title	Factor level(s)	Response modality	
		Safety inconsistent <i>n (%)</i>	Safety consistent <i>n (%)</i>
Position	Management	28 (26%)	8 (7%)
	staff	21 (19%)	53 (48%)
Gender	Female	1 (1%)	24 (22%)
	Male	48 (44%)	37 (34%)

Note: Where percentages do not add up to 100%, this is due to rounding-up of figures.

Responses to Q3 showed that all participants ($n = 110$) believed they knew what they would do if they witnessed wrongdoing (*direct*). Responses to Q4 showed that 72 (66%) participants reported that they

would report wrongdoing that they witnessed to someone senior, 35 (32%) would talk to the person concerned, 2 (2%) would do nothing and 1 (1%) would report to the CAA.

Due to some low expected cell counts, participants' responses *talk to person* and *do nothing* were collapsed into a single heading of 'safety inconsistent', and the responses *report wrongdoing to someone senior* and *report to the CAA* were collapsed into a single heading 'safety consistent', to enable comparison of responses to Q4 by position and gender. Chi-square test of independence, suggested that the intended action upon directly witnessing wrongdoing (safety inconsistent vs. safety consistent) differed according to the participants' positions in the company (Staff/Management), $\chi^2 (1, n = 110) = 15.937, p < .001$, with management less likely than staff to make safety consistent responses and that that responses differed according to the participants' gender, $\chi^2 (1, n = 110) = 6.31, p = .012$, with females more likely than males to provide safety consistent responses. Participants' responses to Q4 by gender (Female/Male) and position (Staff/Management) are shown in Table 2.

Table 2. Responses to Q4, by gender and position (Data collapsed into safety inconsistent and safety consistent responses)

Factor name	Factor level(s)	Response modality	
		Safety inconsistent n (%)	Safety consistent n (%)
Position	Management	21 (19%)	15 (14%)
	Staff	15 (14%)	59 (54%)
Gender	Female	3 (3%)	22 (20%)
	Male	33 (30%)	52 (47%)

Note: Where percentages do not add up to 100%, this is due to rounding up of figures.

McNemar's test of symmetry was used to test if there was a relationship between how participants became aware of wrongdoing (*indirect* vs. *direct*) and their intention to report. There was evidence of a significant relationship between the safety responses for Q2 (*indirect*) and their responses for Q4 (*direct*). McNemar's test (1, n = 110) = 4.68, p = .015 suggested that participants who directly witnessed wrongdoing were more likely to make safety consistent responses than participants who heard of wrongdoing. Participants' responses to Q2 and Q4 are shown in Table 3.

Table 3. Participants' responses to Q2 and Q4 (safety inconsistent vs. safety inconsistent)

Mode of becoming aware of wrongdoing (i.e., Q2 vs. Q4)	Response modality	
	Safety inconsistent n (%)	Safety consistent n (%)
Indirect (Q2)	49 (45%)	61 (56%)
Direct (Q4)	36 (33%)	74 (67%)

Note: Where percentages do not add up to 100%, this is due to rounding up of figures.

Q5 tested whether participants believed that they had heard or observed any behaviour or action, that they later wondered if they should have done something about. This question therefore, sought to test whether hindsight bias could explain some instances of under reporting. Fifty-four (49%) participants claimed to have heard of, or observed, wrongdoing that they later thought they should have done something about, while 56 (51%) participants did not. Chi-Square test for goodness of fit suggested that there was no difference between the number of participants answering *Yes* and *No*, $\chi^2 (1, n = 110) = .036, p = .849$. Test of independence revealed no evidence that responses (*Yes/No*) differed according to the participants' positions in the company (Staff vs. Management), $\chi^2 (1, n = 110) = .895, p = .344$, nor evidence that

responses (*Yes/No*) differed according to the participants' gender (Female/Male), $\chi^2 (1, n = 110) = 1.07, p = .301$.

For Q6, participants were asked if the aviation establishment where they worked had an internal reporting procedure in place that they knew how to/or could use to report their safety related concerns. Responses to Q6 showed that 109 participants believed they had a written procedure to report wrongdoing, and 1 believed they had not. Responses to Q7 suggested that all 109 participants would be prepared to follow their internal procedure to report safety concerns.

Q8 asked participants how useful it would be to have much more detailed directives from the CAA NZ, about what actions or behaviours must be reported. Responses showed that 63 (57%) participants expressed that they thought it would be *useful* to have a much more detailed directive from the CAA NZ, listing what actions or behaviours must be reported, 38 (35%) thought it *may be useful* to have, while 4 (4%) thought it *not necessary*, and 5 (5%) were *not sure* of the usefulness of much more detailed directive from the CAA NZ around reporting procedures.

Due to the low expected cell counts, data for the response, *not necessary* and *not sure* were excluded from the following analyses for Q8. Test of independence revealed no evidence that the perceived usefulness of further guidelines from the CAA (*useful* vs. *may be useful*) differed according to the participants' positions in the company (Staff/Management), $\chi^2 (1, n = 101) = .03, p = .855$ and no evidence that responses (*Yes/No*) differed according to the participants' gender (Female/Male), $\chi^2 (1, n = 101) = .02, p = .890$.

Chi-Square test of independence was used to explore if the reporting intentions (safety consistent vs. safety inconsistent) for Q2 (*direct*) and Q4 (*indirect*) differed, according to whether participants believed further guidelines from the regulatory authority would be *useful*, and participants who believed further guidelines *may be useful*. Chi-square test of independence suggested that there was no relationship between participants' intended actions for Q2 (safety consistent vs. safety inconsistent), and whether they believed that further guidelines from the CAA NZ would be *useful*, $\chi^2 (1, n = 110) = .01, p = .980$, and no evidence of a relationship between participants' actions for Q4 (safety consistent vs. safety inconsistent) and whether they believed that further guidelines from the CAA NZ would be *useful*, $\chi^2 (1, n = 110) = 1.157, p = .282$.

Finally, for Q9, 49 (45%) participants named factors that they believed may affect whether they would report concerns. Of these, 38 (35%) stated that the perceived seriousness of the wrongdoing, would affect whether they reported their concerns (e.g., one participant stated they would not report someone who consistently arrived late for work, but they would report someone who smelled of alcohol). Seven (6%) participants reported that they would let someone else make a report if at all possible, and that they felt it was other people's responsibility rather than theirs; that is, they would defer their personal responsibility to others. Four (4%) participants said that they would avoid making reports to avoid making trouble. Two participants (2%) stated that they would not report someone senior, as presumably their seniority and work experience implies they have a justifiable reason for their actions, which may not be easily understood by individuals in lower positions, and two participants (2%) stated that they would not report someone who is a new employee with little experience in the field. (Note: Three participants gave more than one reason).

Discussion

All participants reported that they would know what to do if they either indirectly (heard), or directly (witnessed) become aware of wrongdoing in their workplace. This demonstrated that participants were confident in how they would act, irrespective of whether they indirectly or directly witnessed wrongdoing in an aviation context. However, it was shown from answers to Q2 and Q4 that information would not always be communicated to a level where it would likely be used to improve safety. For example, when

hearing about wrongdoing, only 61 (56%) respondents stated that they would report the behaviour to someone senior, and none said that they would report to the regulatory authority (i.e. CAA NZ). As senior employees may still do nothing with information given to them, this suggested that at least 44% of wrongdoing would unlikely be communicated to a level where it could be used to proactively improve safety. Even when directly witnessing wrongdoing, only 74 (67%) respondents stated that they would report the behaviour to senior personnel, and just 1 (1%) said that they would report their concerns to the regulatory authority.

Participants who indirectly became aware of wrongdoing were less likely to give safety consistent responses, than those who directly became aware of wrongdoing. The hypothesis that people who *directly* witness wrongdoing will be more likely to report or communicate concerns, than people who *indirectly* become aware of wrongdoing was therefore supported. This suggested that perceived diffusion of responsibility may indeed play a part in the under-reporting of wrongdoing. Although this finding would require replication, in principle, it suggested that aviation employees could be encouraged to 'take ownership' of wrongdoing situations in which they find themselves, rather than assuming someone else is responsible for doing the right thing.

Fifty-four (49%) respondents believed that they had heard or observed behaviour or actions, in which they later wondered if they should have intervened. This confirmed our suspicion that at least some of those who could have communicated concerns to the regulatory authority could have done so, although they did not. This finding was interpreted as consistent with the CAA NZ's statement that "had information about the pilot's behaviour been disclosed before the tragedy, more could have been done to scrutinise the performance of the operator, and potentially avoid the accident that ultimately occurred" (CAA NZ, 2006a). That is, the findings of the current research supported the possibility of the research problem, whereby behaviour that could potentially avert future accidents may not always be communicated to those with an authority to intervene.

All except one participant believed that the place where they were employed had an internal reporting procedure for reporting concerns, and all of those who had an internal reporting procedure stated that they would be prepared to follow it. However, the extent to which reports through internal procedures would be communicated beyond the level of the employer (i.e., to the regulatory authority) is unclear. Given the pattern of responses to Q2 and Q4, it seems reasonable to assume that many concerns known internally would be unlikely to be communicated to a higher level (e.g., to the regulatory authority).

Consistent with the possibility that deciding what to do with information about wrongdoing is a difficult decision to make, 107 (91%) participants thought that further guidelines from the regulatory authority on the reporting of wrongdoing would be useful.

An interesting finding was that female aviation employees appeared more likely to behave in a way likely to improve aviation safety, as they reported being more likely than males to communicate their concerns regarding wrongdoing to someone senior. Studies in other disciplines have also reported a relationship between gender and the likelihood of reporting wrongdoing; for example, females were believed to be more ethical than males (Ricklets, 1983), more morally developed than males (Shaub, 1994; Sweeney, 1995; and Sweeney & Roberts, 1997), and less likely to break the rules to achieve success than males (Gilligan, 1977; Ameen et al., 1996). The current research therefore suggested that there may be a need for males to be educated about the need to communicate wrongdoing, rather than attempt to resolve issues with the person concerned.

The current research also found evidence that participants who identified themselves as 'management', were less likely to make safety consistent responses upon becoming aware of wrongdoing than were employees who identified themselves as 'staff'. However, this may be an artefact of the way in which management and staff might be expected to act. Indeed, a potential explanation for this finding could be that participants who reported that they were 'management', perceived themselves as being more able to

judge the importance of a wrongdoing situation, and concluded that talking to the person involved in the wrongdoing would be a better response than reporting the wrongdoing to someone senior. It could also be possible that in some of the establishments approached, the participant was the most senior person and therefore, the only options available were to talk to the person, or to report to the CAA NZ. Contrarily, it is possible that making the decision to talk to the person involved in the wrongdoing is simply more difficult for staff than for management. Nevertheless at face value, the current findings suggested that the problem of under-reporting in aviation may warrant further investigation of why there exists a difference between management and staff difference reporting behaviours.

When asked what other factors could affect whether participants reported concerns about safety, the main reason was perceived to be the seriousness of wrongdoing. In principle, this would be logical and would avoid, for example, the regulatory authority or management being overwhelmed with trivial concerns about matters irrelevant to safety. However, in practice, it is possible that the average employee is not best placed to determine what is, and what is not serious. For example, on its own, a pilot who arrives a little bit late for a flight may not seem serious, but it could be that the pilot was not getting enough sleep due to personal or health issues. Whilst at face value such example may seem far-fetched, such scenario could have conceivably occurred with the pilot of the Continental Connection flight that crashed on 12 February 2009, where the pilot was believed to have commuted across the country overnight to make the flight (National Transportation Safety Board, 2010).

Other factors that participants mentioned included the seniority of the wrongdoer. Two participants stated that they would not report someone senior to them, as presumably senior staff have reason for taking certain actions that the observer may not understand, and two participants stated that they would not report a junior person, as the limited experience of the wrongdoer may justify their wrongdoing act. The effect of seniority on intention to report wrongdoing might be expected to feature even more highly in cultures where there is a high power gradient, such as in Asian countries (Schultz, 2002). Furthermore, seven participants reported that they would leave reporting to someone else, if at all possible. That is, they would deny their personal responsibility and leave it to someone else to make a report. Lastly, four participants stated they would avoid making reports to avoid making trouble.

There were potentially three limitations to the current research that could reduce its validity. First, as in most studies of ethics, it is important to note that the findings here are based on proposed responses to a survey, rather than on actual behaviour. Although such responses tend to reflect the direction and relative magnitude of behaviour, they are not always consistent with actual behaviour (Jones, Gerrity & Earp, 1990). Second, as this was a telephone based research, the gender of the experimenter was impossible to hide from the participants, which might conceivably have interacted with the gender of participants. Therefore, although there were clear benefits of using a telephone based methodology, in hindsight this could have led to a risk of interaction due to gender. Third, it was possible that participants' answers were confounded by their wish to provide socially desirable responses, rather than answers that were true. Indeed, this possibility might be more likely given the implied safety context of the research. Although social desirability is likely to affect any research in which opinions are sought, some evidence (De Vaus, 2002) suggested that social desirability may be greater with more personalised methods of questionnaire administration.

The findings of this study clearly provided a pathway via which the CAA NZ's question can be answered 'How could accidents such as Air adventures have happened?' First, there appears to be variation in the way that people would act, were they to have concerns about safety in aviation, that is, not all concerns may be reported to those in a position to use them proactively to improve aviation safety. Second, of those who identify an issue which they perceive as a problem for aviation safety, some may do nothing.

It is suggested that training may be a route via which aviation employees learn the importance of communicating any concerns that they may have about aviation safety. This could, for example, be incorporated into general aviation ethics training programmes. Incorporated in such training could be

scenarios based on information that might be useful to the regulatory authority. In the absence of a better solution, or perhaps in the interim period before the benefits of ethics training could be explored, it is recommended that aviation employees should err on the side of caution if they have a concern about safety; that is, they should do something. As Sir Edmund Burke (1770) once stated, “All that is needed for evil to prosper is for people of good will to do nothing”.

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