

The Impact of the COVID 19 Pandemic on the Health and Wellbeing of Aviation Workers Employed by Irish Registered Airlines.

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This study reports on the findings of an anonymous online survey (n=1,010) undertaken between October and December 2021 addressing the impact of the COVID 19 pandemic on the health and wellbeing of aviation workers, including those employed by Irish registered airlines. The survey incorporated several standardised instruments measuring levels of common mental health issues. Survey analysis indicates that a significant number of aviation workers are suffering from the symptoms of depression and anxiety. The prevalence of psychological anguish for aviation workers is higher than what is reported in the general population. Logistic regression was used to assess the probability of certain health outcomes for two groups – namely, participants working for Irish registered airlines and all other participants. The outcomes included reaching the threshold for clinical levels of depression and anxiety, suicidal ideation, and a life satisfaction/happiness rating greater or equal to the population average reported by the Organisation for Economic Co-operation (OECD). Statistical analysis indicates that the probability of having major depression and anxiety is higher for those working for Irish registered airlines. Employees of Irish registered airlines are less likely to rate their life satisfaction and happiness level the same or above the OECD average, as compared with all others. However, statistical analysis indicates that working for an Irish registered airline does not either increase or decrease the probability of suicidal ideation. Given that wellbeing is a factor in safe performance, aviation organisations need to develop new approaches to integrating wellbeing and safety culture, and associated safety management processes.

Keywords: COVID, Mental Health, Aviation Workers, Safety, Wellbeing, Culture.

1. Introduction

Worker wellness and mental health (MH) is very important in safety critical systems such as aviation. Common MH illnesses includes both depressive and anxiety. According to data from the 2010 Global Burden of Disease and Injury (GBD) study, MH illnesses and substance use were the leading cause of years lost to disability (YLDs) globally (Whiteford et al, 2013). Life satisfaction measures how people evaluate their life, rather than just their current feelings. According to research undertaken by the Organisation for Economic Co-operation and Development (OECD), when asked to rate their life satisfaction using a ten-point scale (with 1 [low] and 10 [high]), the average rating was 6.5. (OECD, 2021).

A 2020 global study of the prevalence and burden of depressive and anxiety disorders due to the COVID-19 pandemic identified an increase of 27.6% in major depressive disorder, and an increase in 25.6% in anxiety disorders (Santamauro et al, 2021). A study of the general adult population of the Republic of Ireland undertaken in February 2019 (i.e., prior to the outbreak of COVID 19 in Ireland), and again at two intervals during the early phase of the COVID-19 pandemic (i.e., March-April 2020 and April-May 2020), reports that the numbers of adults screening positive on the Patient Health Questionnaire (PHQ-9) for major depression fell from 29.8% in 2019, to 22.8% in 2021. In addition, the numbers of adults screening positive for anxiety on the Generalised Anxiety Disorder Assessment (GAD-7) fell from 22.8% in 2019, to 20% in 2021.

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Other research indicates heterogeneity in mental health responses to the COVID pandemic. Research published by the COVID-19 Psychological Research Consortium (C19PRC), identifies subgroups of individuals with different trajectories of change in anxiety and depression (Shelvin et al, 2021). Three high level classes of MH response were reported. This includes (1) stability, (2) improvement and (3) deterioration (Shelvin, 2021).

Prior to the COVID 19 pandemic, there was growing evidence of eroded wellbeing for pilots and other aviation workers. In a 2016 study of pilot mental health, 12.6% of respondents screened positive for depression on the PHQ 9, while 4.1% screened positive for suicidal ideation (Wu et al., 2016). In a later 2018/2019 study, 17% of respondents screened positive for depression on the PHQ 9, while 7.9% screened positive for suicidal ideation (Cahill et al, 2021). The COVID-19 pandemic has put increased stress on aviation workers and the aviation industry. This has led to concerns about the impact of reduced levels of wellbeing for aviation workers on aviation safety. In a 2020 survey addressing the impact of COVID on the wellbeing and mental health of aviation workers, 29.6% of the 1,076 participants who completed the PHQ 9 screened positive for depression. In addition, 24.1% of respondents who completed the GAD 7 screened positive for anxiety (Cahill et al, 2020; Cahill et al, 2021). Currently, there has been no research comparing the probability of different health outcomes for aviation workers across different regions.

2. Methodology

An anonymous online survey using the Qualtrics Survey Platform was administered to address the impact of the COVID 19 pandemic on (1) job and employment, (2) wellbeing and morale, (3) performance and safety behaviour, and (4) safety oversight. The survey was run over two months (from October 2021 to early December 2021).

The survey elicited basic profile information. As part of this, participants were invited to give the name of their airline and/or the company that they worked for.

The survey incorporated several standardised instruments to measure levels of common mental health issues which have been widely validated and have good psychometric properties. These includes the PHQ-9 (Kroenke, Spitzer & Williams, 2001) and the GAD 7 (Spitzer RL, Kroenke K, Williams, 2006). Further, the survey included a single measure of life satisfaction and happiness (OECD, 2021). For more on this, please see Appendix 1.

The survey protocol was approved by the Ethics Committee of the School of Psychology, Trinity College Dublin (TCD) Ireland. The data protection impact assessment was approved by the Data Protection Officer at TCD.

Survey results were downloaded from the Qualtrics Platform in excel format. Data analysis addressed the four health measures (depression, suicidal ideation, anxiety, and life satisfaction). All descriptive statistics were obtained using R. The PHQ 9 total score was scored in R (a programming language/tool for statistical computing). The GAD 7 total score was scored in excel. In relation to both the PHQ 9 and GAD 7, respondent feedback was analysed in terms of numbers reaching the threshold for the presence of clinical levels of anxiety (≥ 10) and clinical levels of depression (≥ 10). In relation to life satisfaction, respondent feedback was analysed in relation to numbers reaching or above the OECD average rating (6.5).

Respondents were classified into two employment groups. Group 1 referred to respondents who gave the name of their company and it was an airline registered in Ireland. Group 2 referred to all others. This included respondents who gave the name of their company, and it was not an Irish registered airline. Further, it included those working for non-Irish registered airlines, or those who work for an Air Traffic Management (ATM) operator, or an airport operator, and/or those who did not give the name of their company.

Total scores were calculated for three overall groups

- All survey respondents (n=1,010)
- Group 1 (n=288)
- Group 2 (n=722)

Logistic regression was used to assess the odds ratio (OR) of different events (scores or responses) for the two groups of respondents. Logistic regression enables the evaluation of a predictor’s ability to increase or decrease the probability (or the odds) of an event happening (or success) (Osborne, 2015). In this case, the predictor was being in group 1 (i.e., an employee of an Irish registered airline). The outcome is measured with a dichotomous variable, in which there are only two possible outcomes – success or failure. In this case, success was defined as

1. Probability of having a PHQ 9 total score equal to or above 10 (presence of depression)
2. Probability of having a PHQ 9 Question 9 score equal to or above 1 (presence of suicidal ideation)
3. Probability of having a GAD 7 total score equal to or above 10 (presence of anxiety)
4. Probability of having a life satisfaction and happiness rating equal to or above OECD average

This provides evidence as to the impact of being in group “1” on health and wellbeing. In relation to 1, 2 and 3, success corresponds to a negative impact on health and wellbeing, while 4 corresponds to a positive impact on health and wellbeing.

Interpretation of results addressed the OR. An OR greater than 1 indicates that the event is more likely to occur in the first group (i.e., higher odds of outcome). And an odds ratio less than 1 indicates that event is less likely to occur in the first group (i.e., lower odds of outcome). The WALD test of statistical significance was undertaken to determine the probability of finding an odds ratio as strong as, or stronger than the one observed, if the event is due to chance along (and not truly related to the independent variable - being in the first group/employee of an Irish registered airline) (Osborne, 2015). The p-value was calculated using the same numbers used to calculate the odds ratio. Statistical significance was set at $p=0.05$.

3. Results

27% of all respondents met the threshold for clinical levels of depression ($PHQ \geq 10$). The prevalence of depression was higher for those respondents working for an Irish registered airline (31% versus 25%). Statistical analysis indicates that the probability of having major depression is 34% higher for those working for an Irish registered airline. Statistical tests indicate that the probability of these being the case is borderline/close to significant (0.0569). For more, please see Appendix 2.

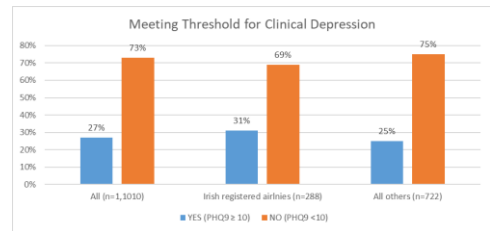


Fig. 1. Meeting Threshold for Clinical Depression & Groups.

11% of all respondents met the threshold for suicidal ideation (≥ 1). The prevalence of suicidal ideation was similar for both groups (12% versus 11%). Statistical tests indicate that there is no difference in the odds of having suicidal ideation for both groups (p value =0.456). For more, please see Appendix 2.

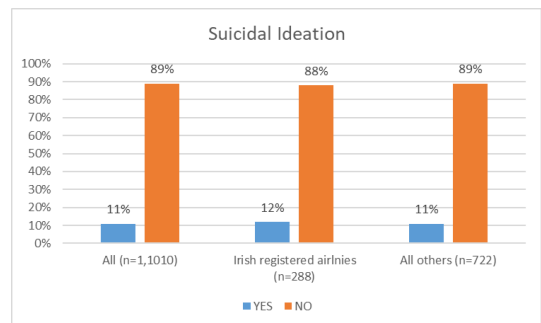


Fig. 2. Suicidal Ideation & Groups.

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23% of all respondents met the threshold for clinical levels of anxiety (PHQ ≥ 10). The prevalence of anxiety was higher for those identifying as working for an Irish registered airline (28% versus 21%). The probability of having anxiety is 50% higher for those working for an Irish registered airline. Statistical analysis indicates that the difference in probability between both groups is very statistically significant (p value 0.0107). For more, please see Appendix 2.

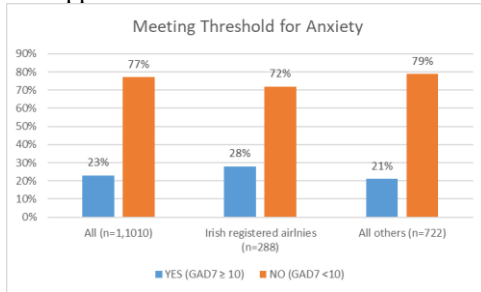


Fig. 3. Suicidal Ideation & Groups.

48% of all respondents reported a life satisfaction rating equal to or higher than the OECD average (6.5). 35% of respondents who identified as working for an Irish registered airline reported a life satisfaction and happiness rating equal to or above the OECD average, as compared with 53% of all others. The probability of having life satisfaction and happiness score which is the same or above the OECD average of 6.5 is 52% lower for employees of Irish registered airlines, as compared with all others. Statistical analysis indicates that the difference in probability of this event occurring for both groups is highly statistically significant (p value < 0.001). Further explanation is provided in Appendix 2.

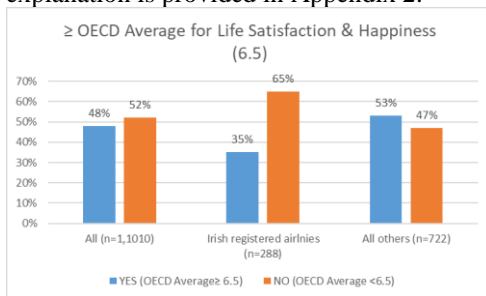


Fig. 4. Life Satisfaction & Groups.

4. Discussion

Survey results indicate that there are a significant number of aviation workers suffering from the symptoms of anxiety and depression. The numbers of aviation workers screening positive for both depression and anxiety, is higher than what is reported in the general population (Hyland et al, 2021; Shelvin et al, 2021). In relation to depression, it is higher than what was reported in earlier studies (Wu et al, 2016; Cahill et al, 2021).

Logistic regression provides evidence as to the impact of being in Group 1 (i.e., working for an Irish registered airline), on aviation worker health and wellbeing. The models and associated p values provide evidence of statistical relationships between the predictor variables and the probability of certain outcomes. As indicated in this analysis, employees of Irish Registered airlines are more likely to have clinically significant levels of depression and anxiety, as compared with other aviation workers. In addition, employees of Irish Registered airlines are less likely to have life satisfaction and happiness levels which are the same or above the OECD average, as compared with all others. However, statistical analysis indicates that working for an Irish registered airline does not either increase or decrease the probability of suicidal ideation.

Overall, survey findings and associated regression analysis support the case for addressing the wellbeing culture within aviation organisations both globally and within Ireland. Aviation organisations need to advance an ethical and evidence-based strategy for managing employee wellbeing. An improved wellness management approach necessitates addressing the promotion of positive wellbeing, in addition to preventing and managing levels of psychological anguish.

Given that wellbeing is a factor in safe performance, it is argued that aviation organisations need to develop new approaches to integrating wellbeing and safety culture, and associated safety management processes. As part of this, aviation organisations need to gather data about wellbeing levels for workers and to encourage disclosure/reporting about wellbeing issues and associated fitness for duty issues. This will require a degree of culture and organisational change for aviation organisations and involves eliciting a multi-stakeholder perspective (including operational staff, safety managers, occupational health and safety personnel and human resources).

The study involved convenience sampling. There may have been bias as regards the participation of aviation workers (i.e., those interested in wellbeing, those suffering, those who have issues with their organisation's management of wellbeing). The COVID situation is dynamic. The health situation of workers may have changed (disimproved or not).

The logistic regression was based on a classification of respondents into two groups. Participants were only assigned to Group 1 (Irish registered airlines), if the profile information they reported included an employer name that corresponded to an Irish registered airline. It is possible that some participants may have worked for an Irish registered airline but not given their airline's name. In such cases, the respondent was classified as group 2 (all others). This would impact the reporting picture.

The odds ratio was calculated using individual logistic regression model addressing one independent/predictor variables (i.e., employment group) and one outcome variable (i.e., health measure). In relation to understanding the determinants of health outcomes, these emerging finding requires further analysis with reference to a combination of predictor variables (for example, age, gender, job status etc). More complex models (multiple regression models) are required to explain all factors that influence the dependent variables (i.e., depression severity, anxiety severity and happiness/life satisfaction level). Further, deeper analysis is required to examine relationships across health outcomes.

5. Conclusions

Aviation workers are experiencing considerable challenges in relation to their wellbeing. This research highlights the need for a system level/human factors response to the management of wellbeing and MH for aviation workers – both globally and in Ireland. This involves advancing interventions predicated on a clear understanding of the relationship between the design of the work system and its interacting elements (i.e., people, task, tools, culture, environment), work processes, and outcomes. This will necessitate coordination between different stakeholders including operational personnel, management, and the regulator. Given that wellbeing is a factor in safe performance, aviation organisations need to develop new approaches to integrating wellbeing and safety culture, and associated safety management processes.

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Appendix 1: Survey Instruments

The PHQ-9 is the 9-item depression module from the full PHQ (Kroenke et al., 2001). It is a multi-purpose, self-reporting instrument for screening and assessing depression. Respondents self-rated the frequency of a variety of depressive symptoms within the past 2 weeks along a 4-point scale, as follows: 0 = "not at all," 1 = "several days," 2 = "more than half the days," and 3 = "nearly every day." Total scores ranged from 0 to 27. Overall, a score of 10 is recommended as the cut-off score for diagnosing the presence of depression (Kroenke et al., 2001).

This GAD 7 is a self-administered patient questionnaire used as a screening tool and severity measure for generalised anxiety disorder (GAD) (Spitzer RL, Kroenke K, Williams, 2006). The GAD-7 score is calculated by assigning scores of 0, 1, 2, and 3, to the response categories of "not at all," "several days," "more than half the days," and "nearly every day," respectively, and then adding together the scores for the seven questions. A score of 10 or greater on the GAD-7 indicates GAD.

Appendix 2: Statistical Analysis

Table 1. Statistical Analysis

Outcome (success)	Log Odds	Odds Ratio	Change in Odds %	P value
Clinical Levels of Depression	0.29 177	1.338	34% (1.34-1 *100)	0.05 69
Presence of Suicidal Ideation	0.16 20	1.175	17.58% (1.17586024 132-1 *100)	0.45 6
Clinical Levels of Anxiety	0.40 867	1.504	50% (1.50-1 *100)	0.01 07
Life Satisfaction and Happiness score (≥ OECD average)	- 0.73 39	0.480	52% (.48-1 *100)	3.48e -07

