

Well-being & Pilots' flying: An Empirical Study on the Impact of Medical Status on Mental Health

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Abstract

Military aviators undergo routine medical examinations periodically to determine their fitness to fly. Aviators who are deemed unfit may experience lower levels of Subjective Well-Being (SWB) which is a relatively stable construct that deals with healthy human functioning and adjustment. SWB may have a bearing on their recovery and return to flying in addition to their mental health status. The present study aims to determine the impact of medical status on SWB of aviators. 110 military pilots participated in the study; 46 of whom were in the full category, 20 in the temporarily low medical category and 46 in the permanent grounded category. Diener's Satisfaction With Life Scale (SWLS), WHO – 5 Well-Being Index, Watson's Positive Affect and Negative Affect Scales (PANAS), Marlowe-Crowne Social Desirability (SD) Scale as well as a demographic inventory were administered to participants. Medical status was found to have an effect on SWB, SWLS and Negative Affect scores. On SWB, active flyers reported high scores while temporarily and permanent unfit pilots reported average scores. In general, aviators were in the average range on SWLS irrespective of medical category with active fliers reporting significantly higher quality of life compared to unfit pilots. On PANAS, all three medical categories differed significantly on levels of Negative Affect (NA) with permanently unfit pilots reporting highest scores and active fliers reporting the lowest. Conversely, the group displayed high Positive Affect (PA) irrespective of medical status. These findings validate the hypothesis that medical status has an impact on aviators' mental health and well-being. The limitation of high SD among aviators especially for SWLS and PA is noted. The paper highlights the importance of uplifting SWB among aviators who are an integral part of the Indian Air Force.

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Introduction

Flying fitness of all military aviators is routinely assessed by annual / periodic medical examination. Accordingly, relevant employability restrictions are placed, resulting in possible temporary or permanent disqualification from flying. Such disqualification, commonly referred to as 'grounding' deprive the aviator of something he is passionate about, as well as places his/her career at stake.

Geeze (1) elaborated how grounding poses a major threat to the aviator in terms of severe occupational and personal losses. Occupational losses included dissatisfaction with the career, loss of gratification, lower monetary returns and often, a lower social status. Personal losses, he believed could be in the form of loss of libidinal gratification (especially among young aviators). Loss of ability

to fly may be seen to unconsciously represent a loss in sexual potency or machismo which can be highly demotivating and debilitating. Grounding may also have an adverse effect on the aviator's recovery and return to flying (2). Hence, medical disqualification affects aviators in complex ways. Geeze (1) posits that grounded aviators experience the five stages of grief similar to 5 emotional stages (denial, anger, bargaining, depression, and acceptance) in response to impending death or illness as described by Kübler-Ross (3). Thus, it

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reasonably follows from such a theory that one important bearing of being permitted to fly is on the aviator's Subjective and Psychological Well-Being and mental health.

Subjective Well-Being (SWB) reflects the extent to which people think and feel that their life is going well (4). SWB has three main components: a cognitive component (satisfaction with life) & an emotional component (positive and negative affect). SWB is mostly hedonic; that is, it refers to fulfilling the criteria of maximizing pleasure and minimizing pain (5). Thus, aviators who are grounded may experience lower levels of SWB because being fit to fly is likely to be associated with one's sense of happiness and life satisfaction.

In the recent times, there has been an increased interest in the study of SWB; especially due to its many positive outcomes. Diener & Chan (6) found that high subjective wellbeing (such as life satisfaction, absence of negative emotions, optimism, and positive emotions) predict better physical health and longevity. There are also claims that suggest that subjective well-being lengthens the lives of those with certain diseases such as cancer but such claims remain controversial.

SWB is often used interchangeably with another measure of well-being, namely, Psychological Well-Being (PWB). Although they do not represent the same construct which is now clear, much of the early work on well-being does not differentiate between PWB and SWB. Two such studies that have attempted to examine well-being among aviators were identified.

The first study was carried out to characterize the PWB of United States Air Force fliers using Berkman's version of Bradburn's PWB scale (8). It was found that flying as well as non-flying officers had identical PWB, which was uniformly better than comparably aged civilians. The study also revealed that high PWB was positively correlated with better self-assessed health and

PWB seems inextricably related to flier's overall health, an important correlate of performance.

Conversely, Wetzler et al (9) characterized the PWB of USAF pilots and navigators and found that flying officers were found to have significantly better PWB than non-flying officers; with both groups having better PWB than that reported for the general population in line with the previous study.

As is clear from the above studies, there is no consensus in extant literature regarding the effect of medical status on well-being. Moreover, there is paucity of such research; especially with regard to SWB among Indian Air Force aviators. The present study aims to determine the impact of medical status upon the SWB of aircrew. It is hypothesized that aviators who have been deemed unfit-fly will consequently experience lower levels of well-being. Moreover, it is expected that aviators who are temporarily grounded will experience higher levels of well-being than those permanently unfit but lower levels of well-being than active fliers. It is believed that this preliminary investigation would enable us to understand how medical status affects the pilot's optimal life outcomes.

Methods

A total of 110 male military pilots participated voluntarily in this study. The dataset comprised of aircrew who visited the Institute of Aerospace Medicine (IAM) for their medical boards or to undergo aeromedical training. Out of the sample of 110, 46 pilots were assessed fit for flying, 20 were in temporary low medical category while 44 pilots were permanently unfit owing to medical disabilities. The reasons for grounding were fractures, low back ache, diabetes mellitus, hypertension, etc. The demographic characteristics of the group are as shown in Table 1.

Test administration and scoring

A good rapport was first established with the pilot after which informed consent was taken. Each

Table 1: Average Mean values of the demographic characteristics of the group of aviators (N=110)

Characteristic	Average Mean (S.D)		
	Medically Fit-To-Fly (N=46)	Temporarily Unfit-To-Fly(n=20)	Permanently Unfit-To-Fly(n=44)
Age (Yrs)	30(5.2)	31(7.4)	32(6.4)
Service (Yrs)	8.73(5.27)	9.46(7.68)	11.37(6.72)
Total Flying Hours	1451.37(1003.14)	1570(1430)	1838(1233.1)

participant was administered four questionnaires, namely:-

- (a) WHO (5) Well-Being Index (9) - This scale was initially developed for the evaluation of subjective quality of life or subjective psychological well-being including depression, anxiety, energy and positive well-being. Five statements were presented and participants had to indicate how they have felt over the last two weeks on a six point scale.
- (b) Satisfaction With Life Scale (SWLS) (10) – This scale measures the global cognitive judgments of satisfaction with one’s life which consists of the evaluative component of SWB. It has five statements and the participants were required to indicate their agreement with each item on a seven point scale.
- (c) Watson’s Positive Affect and Negative Affect Scale (PANAS) (11) - This is a measure of affect which assesses participants’ current feeling or basic predisposition. It has twenty words that describe different feelings and emotions. The participants were requested to indicate to what extent they felt in a particular way during the past week on a five point Likert scale.
- (d) Marlowe-Crowne Social Desirability Scale (12) measures Social Desirability (SD) independent of psychopathology. It is a 33-item questionnaire and the participants were asked to indicate whether they chose “true” or “false” for each item.

The data of 110 pilots on these questionnaires was scored and subjected to statistical analysis using the SPSS® Statistics 19 Package. The descriptive

statistics were drawn for the group on all the well-being dimensions and demographic characteristics. In order to examine whether there is any significant difference in the means between the pilots of the three flying categories viz. actively flying, temporarily unfit and permanently unfit on the dimensions of PWB, one way analysis of variance (ANOVA) was carried out.

Results

The descriptive data showed that on the well-being index, the fit-to fly aviators reported to experience high levels of positive functioning while temporary and permanently unfit aviators have reported to experience average quality of life. In general, the aviators were in the average range profile on SWLS irrespective of their medical category. The groups displayed a high Positive Affect (PA) scores irrespective of the flying status. On the Negative Affect (NA) scale, the active flyers have obtained a mean score of 13.52 while temporarily unfit flyers have a mean value of 18.50 and permanently unfit pilots have a mean value of 20.32. On SD, fit-to-fly aviators reported the highest scores, and permanently unfit aviators reported the least mean score.

ANOVA was carried out to examine whether there is any significant difference in the mean values between the three groups of pilots. Highly significant differences were obtained among the three groups on SWB, SWLS, and NA ($p < 0.01$). There was no significant difference found in the mean value of PA among the three groups.

To find out where these differences lie, data obtained from SWB, SWLS and NA were subjected to Tukey’s Post-Hoc analysis.

Table 2: Descriptive Statistics of the sample on PWB, SWLS, PA, NA and SD variables (N=110)

Variable	Category/Status	N	Mean	Std. Deviation	Minimum	Maximum
SWB	Fit-To-Fly	46	18.96	3.386	13	24
	Temporarily Unfit	20	15.90	2.972	10	21
	Permanently Unfit	44	15.70	3.606	4	23
	Total	110	17.10	3.729	4	24
SWLS	Fit-To-Fly	46	25.85	5.590	12	35
	Temporarily Unfit	20	22.75	4.854	14	30
	Permanently Unfit	44	20.32	6.038	6	34
	Total	110	23.07	6.142	6	35
PA	Fit-To-Fly	46	33.78	8.674	20	49
	Temporarily Unfit	20	33.30	8.621	15	46
	Permanently Unfit	44	33.73	5.896	21	49
	Total	110	33.67	7.6	15	49
NA	Fit-To-Fly	46	14.13	3.797	8	21
	Temporarily Unfit	20	18.50	4.946	10	23
	Permanently Unfit	44	20.32	5.762	11	33
	Total	110	17.4	5.9	8	33
SD	Fit-To-Fly	46	21.13	4.731	11	32
	Temporarily Unfit	20	20.45	4.872	14	31
	Permanently Unfit	44	20.07	4.326	12	28
	Total	110	20.58	4.582	11	32

On SWB, a significant difference was seen between active pilots and temporarily unfit pilots ($p = 0.03$). Active pilots also reported significantly better SWB when compared to permanently unfit pilots ($p < 0.001$). However, both temporarily and permanently unfit pilots did not differ significantly on the measure of SWB with permanently unfit pilots showing the least levels of well-being.

On SWLS, a significant difference was seen only between active flyers and permanently unfit pilots ($p < 0.001$). Active fliers did not report significantly better life satisfaction when compared to temporarily unfit pilots. Moreover, SWLS scores were similar whether the aviators were temporarily or permanently unfit.

On NA, active fliers differed significantly both from temporarily unfit pilots ($p < 0.001$), as well as

from permanently grounded pilots ($p < 0.001$). Permanently unfit aviators experienced the highest levels of NA but these values were not significantly different from temporarily unfit pilots.

On SD, results indicate that the mean score obtained by medically fit-to-fly flyers is 21.13, temporarily unfit flyers is 20.15 and permanently unfit-to fly pilots is 20.07. It reflects that irrespective of the flying status/category, the participants had been cautious in their responses and perhaps had under reported undesirable traits, indicating a high need for approval.

Discussion

An aviator's job is one that is extremely demanding and yet, extremely gratifying. Optimal levels of performance on this job are undoubtedly

very high. When the aviator is expected to perform challenging tasks on an everyday basis, it is crucial that he is of sound body and mind in order to ensure safe flying. While the personality correlates of mental health and well-being are of primary concern; there are other factors that govern SWB which may be part of the aviator's work environment. Thus, it is in the best interest of the organization (like the IAF) to gain better insight into the various factors that influence SWB among personnel.

Medical status provides an aviator with unconditional clearance to fly; something that he is extremely passionate about. When assessed unfit to fly, the adverse effects of such a predicament on the aviator is discussed in terms of his well-being and mental health. Better insight into the effect of medical status on SWB will facilitate aviation medicine specialists and aviation psychologists to take appropriate precautions and actions to ensure high SWB and optimal life outcomes among aviators.

Pilots were administered the WHO Well-Being Index to measure SWB which is considered to be a general psychological well-being scale measuring a global hedonic dimension. It is also a good screening instrument that is used to detect the presence of depression in nonclinical populations; while also being used to test the efficacy of various depression therapies in clinical populations (19, 20). To this effect, the WHO-5 was employed in this study to assess whether medical status had a significant influence on pilots' subjective well-being.

It was found that medical status had a significant main effect on subjective psychological well-being. Active fliers showed the highest level of positive functioning which was significantly higher than well-being of temporarily grounded pilots as well as permanently unfit pilots. However these latter groups did not differ significantly from one another on the global measure of SWB.

This finding, along with the results of analysis on SWLS, together unquestionably replicate Wetzler's study which found a significant difference in well-being between active fliers and non-fliers. In fact, the study goes one step further by using three instead of two medical categories among aviators which has provided further insight into the differences between temporarily and permanently grounded fliers.

Furthermore, another implication of the finding, that medical status has a significant effect on WHO-5 scores, is that an aviator, if any, with a low score on well-being index may be inclined towards psychopathology. Henkel et al (21) have demonstrated the superior sensitivity and negative predictive quality of WHO-5 in identifying depression over other instruments which deem it one of the most dependable and robust measures of mental health. As WHO-5 assesses well-being of participants over the last two weeks, these findings are all the more important as they suggest that permanently grounded pilots as a group are at an increased risk for depression. Similarly, temporarily grounded pilots, albeit with a slightly higher score, may also demonstrate some depressive symptoms. Hence, timely intervention by aviation medicine specialists and aviation psychologists is necessitated in order to provide a more stable support system that emphasizes the utmost care and understanding for the pilot's situation.

Life satisfaction has been defined as "a global assessment of a person's quality of life according to his chosen criteria". As Diener & colleagues (10) point out, life satisfaction is a purely subjective phenomenon as it is comprised of self-perceived judgments of one's satisfaction with their own lives. The SWLS is an overall measure of life satisfaction as a cognitive-judgmental process. Although pilots in all three medical categories fell in the average range in their SWLS scores, we found a significant main effect of medical status on life satisfaction.

Post-hoc analyses revealed that active fliers were significantly more satisfied with their lives when compared to permanently grounded pilots. Global life-satisfaction is generally said to be a judgment of one's life circumstances compared to one's standard (15). These results suggest that active fliers perceive their lives to be significantly closer to their ideal standards when compared to permanently grounded pilots. This follows logically from the premise that a pilot's ideal standard of life circumstances is when he is able to fly or when he is hopeful of returning to flying duties in the near future. Thus, the decrement in scores among grounded pilots (signifying an overall dissatisfaction with their lives) can be attributed to the fact that there is a relatively wider gap between their current circumstances and their ideal circumstances.

NA is one of two dimensions of affective structure where high NA reflects subjective distress accompanied by aversive mood states such as anger, discontent, fear, anxiety, contempt and the like (11). The study has found a significant main effect of medical status on NA. Active fliers have significantly lower NA compared to both temporarily and permanently grounded pilots. This may be due to the fact that grounded pilots are perpetually in a state of ambiguity about their role as aviators in the organization which contributes to their NA. Moreover, Bakhshi, Kumar & Rani (16) suggest that state NA is generally evoked by invalidating situations. These results support the view by showing that pilots who have been either temporarily or permanently grounded may perceive their grounding as a form of invalidation of their ability to fly which leads to NA.

It is interesting to note that permanently grounded pilots do not report significantly higher NA compared to those temporarily grounded. When deemed permanently unfit, pilots may associate feelings of anger, insecurity, anxiety, disgust and other unpleasant feelings with their current state which they are certain is not bound to

change. On the other hand, temporarily grounded pilots, albeit feeling slighted and inutile at the moment (and hence feeling some anger and contempt), may or may not fly again. It is important that this ambiguity be channelized positively. Feelings of hope need to be reinforced by the Flight Commanders, Aviation Medicine Specialists and Aviation Psychologists in order to combat high levels of NA in these aviators and to ensure their early upgrade to full flying status.

PA is a measure of one's enthusiasm, alertness, levels of concentration and energy. For a person to score high on this measure, they should possess high levels of the aforementioned states of being (11). The results of this study show that pilots of all medical categories have high PA which suggests that regardless of their flying status, pilots tend to be alert, energetic and enthusiastic; while enjoying their current role as aviators. They are also well attuned to the tasks they pursue and generally participate in pleasurable engagement. This finding supports Tellegen's (17) view that these dimensions of affective structure do not merely represent affective state dimensions; but are related to corresponding affective trait dimensions of positive emotionality. Positive emotionality has been shown to predict better physical health, lower rates of suicide, and favorable increments in learning, creativity, problem-solving and relationship formation (18); all of which are important variables in determining success among aviators. These results stress upon the increased need for care and counseling services for pilots who are deemed as unfit to fly, either temporarily or permanently. It is relatively more important to ensure that temporary grounding doesn't manifest in high levels of NA, negative evaluations of life and low levels of well-being. Aviators in such categories must eventually return to flying and in doing so, must be in the best of physical as well as mental health.

It is true that all three measures utilized in this study are measuring either the same construct

(SWB) or components of the same construct. Despite this, there are minor differences in the results obtained from each measure. While WHO-5 finds a significant difference between active fliers and temporarily grounded pilots, SWLS detects a difference only between active fliers and permanently grounded fliers. One explanation for this could be that WHO -5 is considered to be the most robust psychometric instrument to measure well-being or positive quality of life which is perhaps the reason for its high sensitivity in detecting differences in well-being between active fliers and temporarily grounded pilots; which was not seen with SWLS. Another explanation could be that the difference between active fliers and temporarily grounded pilots could be attributed to the presence of significantly higher negative affect levels in the latter group which is another component of SWB. Temporarily grounded pilots have reported significantly higher levels of negative affect when compared to active fliers. This could perhaps be the reason for lower levels of well-being among them compared to at similar levels of life satisfaction.

A caveat in this study involves the issue of SD. It is a well-known fact that samples are inclined towards giving socially desirable responses i.e. to underreport undesirable traits and possess a high need for approval which is in accordance with the previous studies made (22,23). Similarly the group's mean value on SWLS and PA may not be an accurate representation since the correlation between SD and SWLS and SD with PA is positive and significant. This could be one possible explanation behind the lack of differences between the three groups in levels of PA while there was a clear difference in NA levels among all three groups.

Therefore, interpretations of SWLS and PA results should be performed with caution, without undermining the possible exaggerations made by the group in the self-disclosure. This is in line with

earlier studies [24, 25] which reported significant positive correlations between Marlowe-Crowne Scale and life satisfaction.

Conclusion

Greater well-being has been known to bring about better physical health, educational and occupational success, better interpersonal relations and even longevity of life. Given the benefits of a positive functioning and well-being, it is important for psychologists to help personnel lead more rewarding lives and experience greater SWB using timely interventions to help the organization prosper. This study was an attempt to determine SWB among IAF pilots of various medical categories against the backdrop of positive psychology. On the whole, results indicated that medical status did play a crucial role in the well-being and mental health of the aviator. In line with previous research, temporarily and permanently unfit aviators experience lower satisfaction with life and have lower levels of well-being when compared to active fliers; who perceive themselves to lead positive, fulfilling lives with high SWB.

Moreover, grounding, although unavoidable, is a practice that affects the aviator – doctor relationship by instilling feelings of fear and distrust of the medical profession. The flight commander at the station must ensure that the morale of the grounded aviator is kept high and he is encouraged to overcome his disability as quickly as possible. In dealing with the crew member who is separated from flying, therapy should be directed at exploring and understanding feelings, with less emphasis on support that might be given to patients without the intelligence and motivation common to fliers. The aviation medicine specialists must always maintain a good rapport with aviators and should offer the grounded aviator timely and sound medical advice to help him cope with his disability.

Such practices will go a long way in ensuring positive functioning and high levels of SWB among

aviators, regardless of their medical category. The importance of this, along with maintaining positive relationships with aviators are crucial factors upon which the effective practice of aviation medicine depends.

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