Personality Traits and Psychological Well-Being in Indian RPAS Crew

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ABSTRACT

Introduction: Remotely Piloted Aircraft System (RPAS) operations have proven their popularity on a global scale and their use is rising at a rapid rate in the Indian Armed Forces. Technological advancements and complexities in operations of RPA have increased and therefore, there is an increase in role and responsibility of RPAS crew. Allowing an RPA to fly would typically involve interactions among the external pilot, the observer, the mission commander and the internal pilot at the Ground Control Station. It is therefore evident that though they may be unmanned, these operations are not lacking in the human element. Not only do these crew require superior psychomotor and cognitive skills but also specific personality traits. They also need to sustain heavy workload and face a host of different emotional challenges for the kind of tasks they accomplish. Physical fitness and emotional stability may play a crucial role in helping the crew to adapt to the occupational demands.

Method: The aim of this study was to identify personality traits and general level of well-being in RPAS crew (n=75) from all three services. The age range of the sample was 28-50 years. Well-being was measured using Flourish Scale, personality was measured using NEO-FFI and resilience was measured using Connor–Davidson scale.

Results: Descriptive statistics were computed and Pearson product moment correlations were drawn for the variables under study. The crew had low scores on neuroticism, high scores on extraversion and were found to be average on openness, agreeableness and conscientiousness. They obtained moderate scores on resilience and well-being.

Discussion: RPAS crew were found to be emotionally stable, disciplined and relaxed under stress. They also reported high levels of psychological well-being. The study recommends job task analysis to determine Knowledge, Skills, Attitudes and Other attributes (KSAOs) for this specific occupation. The study emphasizes on considering psychological assessment for determining the operator's suitability before re-streaming into RPAS as these are vital for one's optimal Psychological Well-Being and Performance. This is a first of its kind of study in India attempting to focus on well-being and human factors of RPA crew.

Key words: *Remotely Piloted Aircraft, Personality, Well-Being, Human Factors.*

INTRODUCTION

Remotely Piloted Aircraft System (RPAS) operations may dominate the sky in the future for the military purpose. RPAS operations are highly insightful and the aircrafts used are autonomous. Such operations are on high demand and there is an exponential growth of RPAS as an independent stream of military aviation. RPAS can be used in a wide spectrum of military assignments like electronic counter measures, electronic intelligence gathering, surveillance, reconnaissance, target illumination, air defense etc. and such operations could be a valuable complementary force to all manned air operations. To perform these tasks, the Unmanned Aerial Vehicles (UAVs) are endowed with unique challenges. Some of the unique human factor challenges include reduced sensory cues, unconventional characteristics of unmanned aircraft and heavy reliance on automated systems.

Though they may be called unmanned, RPAS operations are not devoid of human element. It is evident that a seamless interaction and sound understanding between the Mission Commander (MC), Internal Pilot (IP), Observer and External Pilot (EP) is vital. All the activities at the Ground Control Station (GCS) have to be smooth and synergistic. A healthy mind and the ability to cooperate play a crucial role in helping the

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crew to adapt to this new (emerging) occupational demand. Certain personality traits may play a vital role in the successful mission completion without any collateral damage. It is thus obvious that success of RPA operations is dependent on the man behind the machine and their Psychological Well-Being (PWB).The RPA crew require superior psychomotor and cognitive functioning as well as personality traits that are unique and may be different from aviators of manned aircraft. Biggerstaff et al. conducted a UAV operator task analysis and proposed both medical and operator selection tests. Several performance-based selection test measures were identified and evaluated in the study to predict UAV operator training outcome [1].

Personality traits related to risk taking, stress tolerance, comfort during working in a confined space with others, and positive social exchanges are alluded as important to performance among RPA pilots [2]. The reviews of selection recommendations for USAF and Navy RPA pilots have emphasized the importance of hardiness (i.e. resilience to stress and adaptability) and positive social interpersonal style (i.e. group warmth) [1-7].

Some of these personal traits can be found in the RPA crew. For example, the RPA's capability to remain aloft on station extending for several hours and hence the RPA operator needs to focus on the mission for a long time span. Thus, a unique capability to compartmentalize the tasks and prioritize the tasks based on their importance,may ease off the mental strain of the operator. They also need to sustain heavy workload and face a host of different emotional challenges for the kind of tasks they accomplish [8]. A study that included the input of over 80 USAF RPA subject matter experts (training cadre, pilots, and commanders) also identified several personality traits (e.g.stress tolerance, assertiveness, self-confidence, impulse control, etc.) perceived to influence training outcomes and adaption to the USAF RPA pilot career field [9].

Indian Context

A study by Sharma and Chakravarti [10] has analysed the human factors and crew resource management issues of incidents and accidents in UAV operations. The study highlighted that the RPAS operations are technologically advanced operations with little scope of mechanical error. Occurrence of any error or failures could be attributable to human inadequacy and fallibility, which may be linked to personality and cognitive capabilities of the operators. The authors have also brought out an interesting issue that the superior and highly sophisticated design of the system may possibly contribute to poor self-image of the operator who may feel redundant while making efforts to control a fail-safe machine. The study has also brought out that there could be a possibility of proactive interference (conflict) when conventional methods of flying training is imparted to learn UAV operations.

A report [11] on the human factors in UAV operations in India stated that UAV operators involve multi-crew missions and these operations would require concerted interpersonal coordination between the crew members. Further, while analyzing the role of the operators, the author concluded that sustained attention or vigilance are the primary cognitive faculties required for performing the UAV operations. In such operations, workload is high while carrying out surveillance or dealing system emergencies and low workload while performing scheduled tasks.

In the RPA era, the crew must be analytical and collaborative. They must be comfortable at multitasking, effective at communication and capable of continually learning on the job. Their verbal reasoning is higher and they tend to perform higher on measures of information processing and visual memory [12].

Studies indicate that cognitive abilities (Spatial, perceptual), in combination with aviation knowledge, flying experience, psychomotor abilities and personality of the RPA crew play a vital role for their success and overall growth in military services.

Current Study

As of now, in IAF, aviators who had cross-training and experience of manned airframe are restreamed to RPAS. They are trained for different crew functions as IP, EP,

MC and Observer. It is worth noting that these roles are interchangeable. Discussions with various service personnel within the aviation community (e.g. flight surgeons, manned aircraft pilots and RPA operators) and corroboration with the previous studies carried out elsewhere have brought out a notion that RPA crew are perceived to have a socially detached and isolative disposition [6]. Few other studies reported that they were more likely to be less excitement seeking and action oriented; less assertive; more socially introverted and withdrawn; less self-disciplined and achievement oriented [3,4]. It may be difficult to identify the genesis of these negative perceptions;however, many do not share the same perceptions or report observable differences between RPA and manned airframe pilots.

An in-depth understanding and further objective studies are needed to substantiate or refute such widely held beliefs and stereotypes, particularly RPA operations are envisaged to play a vital role in armed forces. Therefore, it was felt pertinent to delineate the personality traits that distinguish this new generation of RPA crew.Building from this literature base, the purpose of this study was to identify the personality traits, resilience and general level of Psychological Well-Being (PWB) of RPA crew. This research paper considers RPA, RPAS and UAV as synonymous terms.

METHODOLOGY

Study Design

A cross-sectional design was used in this study to examine the relationship between the personality domains, resilience and PWB in RPAS operators.

Participants

The RPA operators at five different squadrons of Indian Air Force, Army and Navy were approached through their respective medical officers. A total of 75 operators with mean age of 35.3 ± 6.5 years and mean flying hours 546.9 h voluntarily participated in the study.

Equipment (Psychological instruments)

The Neo- Five Factor Inventory [13] is a standardized and abridged version of NEO PIR containing 60 statements which give the indication of the extent of the presence of each of the big five dimensions of personality in the individual. These five dimensions include Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness. The respondents rated their choices on a Likert scale.

Resilience was measured using Connor – Davidson Resilience Scale [14] which has 25 items and is defined as the ability to overcome or adapt to extreme stress or adversity and maintain or recover high well-being.

PERMA-P Questionnaire- A Brief Measure of Flourishing was administered which indicates the experience of 'life going well'. It is a combination of 'feeling good' and 'functioning effectively'. Flourishing in synonymous with a high level of psychological well-being, and it epitomizes good mental health and Physiological Well-Being (PWB) [15].

Data Collection

An informed consent was obtained from the RPA operators and they were asked to complete self-reported questionnaires. Completion of questionnaires along with a demographic inventory took approximately 20 minutes.

Data Analysis

Data was analysed using Microsoft Excel and IBM SPSS version 20.0. The descriptive statistics were computed and Pearson Product Moment Correlations were drawn to study the relationship between the variables under study.

RESULTS

The means, SD and range of scores for the variables of interest are described in Table 1.

Table 1: Means, SD and Range of variables under study (n = 75).

Variables	Mean	SD	Min	Max	Range
Age	35.35	6.50	24.00	51.00	27.00
RPA flying hours	546.94	476.0	13.00	1950.00	1937.00
Neuroticism	13.64	8.10	0	36.00	36.00
Extraversion	31.00	8.16	21.00	45.00	24.00
Openness	28.06	6.43	17.00	39.00	22.00
Agreeableness	31.76	5.76	21.00	43.00	22.00
Conscientiousness	36.06	9.17	12.00	48.00	36.00
Resilience	76.41	11.19	53.00	93.00	40.00
Phychological Well-Being	7.98	1.19	4.81	9.75	4.94
Positive Emotions	8.17	1.51	4.60	10.00	5.40
Engagement	8.04	1.57	5.30	12.00	6.70
Relationship	8.03	1.16	5.00	9.30	4.30
Meaningfulness	7.89	1.35	4.30	10.00	5.70
Accomplishment	7.84	1.40	4.30	10.00	5.70

The descriptive statistics on the five broad domains of personality revealed that RPA operators have obtained very low scores on neuroticism. The sample has obtained high score on extraversion, average on openness, agreeableness and conscientiousness domains.They have moderate to high levels of resilience when compared to population norms. They have moderate to high level of well- being. They experience high positive emotions and have high engagement in the tasks they execute. The sample strives to maintain positive relationships. The sample obtained high scores on meaningfulness and accomplishment dimensions as well.

Pearson's product moment correlation was calculated between Personality domains and PWB dimensions.This was carried out to study the relationship between the variables in the present research. The significant values are as given in Table 2.

Table 2: Significant Correlations between personality domains and PWB dimensions.

Personality/ PWB	PWB	Positive Emotion	Engagement	Relationships	Meaningfulness	Accomplishment
Neuroticism	-0.83**	-0.77**	-0.51*	-0.60*	-0.79**	-0.86**
Openness	0.57*	0.53*	NS	NS	0.49*	0.61*
Agreeableness	0.68**	0.68**	NS	NS	0.69**	0.65**
Resilience	0.68**	0.70**	0.57*	NS	0.53*	0.66**

*p<0.05, **p<0.01, NS- Non Significant

It is evident from table 2 above, that there is a strong negative correlation of neuroticism with PWB and its dimensions viz. positive emotion, meaningfulness and accomplishment. A moderate negative correlation is observed between neuroticism with engagement and relationships. Openness has positive and moderate correlation with well–being, positive emotion, meaningfulness and accomplishment. Agreeableness is also found to have a moderate and positive correlation with PWB, positive emotion, meaningfulness and accomplishment. There was no significant correlation obtained between extraversion and conscientiousness domains of personality with any dimensions of PWB.

DISCUSSION

The descriptive statistics with regard to personality traits indicate that the RPA operators are emotionally stable and generally relaxed under stressful conditions. They are out-going and active. They are practical and are willing to consider new ways of doing things. They are trusting and agreeable, avoiding conflicts and competitive too. They are moderately well-organised and dependable with average levels of self-discipline as is evident from their score on conscientiousness. This personality profile of RPA operators is similar to the personality profile emerged in the studies and job analysis carried out by Pavlas et al. [2] in USAF RPA crew.

The findings of this study further did not support commonly held stereotype perceptions and beliefs that RPA operators are more inclined to have a socially detached and isolative disposition, to be less tolerant to stress but supported the observation that they are moderately conscientious [16]. Moreover, the personality profile that has emerged out of the current research study matches with the job requisites like being more socially compliant, relaxed and calm. These findings corroborate with previous research outcomes of separate studies made by House[8] and Chappelle et al.[16].

An interesting findingof this study was that the RPAS crew have reported to cope up with moderate to high levels of stress as compared to the standard sample as measured by neuroticism and resilience scales.This indicates that in the current sample RPA crew are able to function optimally under duress and maintain their cheerfulness. A heavy emphasis was given to hardiness or resilience to stress and adaptability as it emerged as an important trait of RPA operators. The elements like level of trust in automation, disengagement, frustration tolerance could be predictive of crew performance[17- 19].

Another important study variable measured was resilience which is an important personality trait for sustaining PWB, performance and for overall operational efficiency under stress. It is noteworthy that the current sample reported moderate to high levels of resilience. These findings are further supported by an Indian study [10] that looked into stress as one of the contributory factors for accidents and incidents in UAV operations in India. The study highlights that the human errors which are acts of commissions and omissions are dependent on the stress coping strategies of the operator, rather than the failure or serviceability issues of the system.With evidence of linkage between resilience and performance under stress, it may be pertinent to assess resilience of the crew before re-streaming to RPAS.

Resilience yielded a moderate and positive correlation with engagement and meaningfulness, but a strong correlation with PWB, positive emotion and accomplishment.

On the dimensions of PWB, the sample is found to have moderate to high level of well-being. The crew experience high positive emotions reflecting the hedonic nature of well-being. The participants are aware of the fact that they need to enjoy themselves in ‘the here and now’ along with other dimensions of PWB. The RPA crew, on the eudemonic dimensions have reported high engagement levels which indicates that they experience a state of flow- concentrate intensely on the present which contributes towards their high levels of well-being. The crew take pride on high proficiency in operational level of warfare, soft skills and communication which contribute to experiencing positive emotions.

The present sample strives to maintain positive relationships which are pivotal to one’s well-being.

Scores obtained on Relationship (R) domain of PERMA questionnaire indicate that the crew put in efforts to build and maintain positive relationships and seek social support. This brings in high levels of synergy in the operations and contribute to effective functioning. This brings out the importance of CRM training for the RPA crew.

The sample obtained high scores on meaningfulness which indicates that they have a sense of belonging to and serving something that they believe is bigger than the self. Meaningfulness contributes to spatial orientation, the ability to plan ahead, the mission and to know the effects of one's actions and reactions. High score on accomplishment specifies that they strive to better themselves in some way, whether seeking to master a skill, achieve a valuable goal, or win in some competitive event. As such, accomplishment is another important thing that contributes to one's ability to flourish.It is pertinent to note that it takes a completely different set of skills to fly something remotely when one is not on it and perhaps having high levels of meaningfulness and accomplishment is a definite advantage for safe and efficient operations.

The negative correlations between neuroticism with PWB and its dimensions highlight the importance of maintaining emotional stability for high PWB. Perhaps being emotionally stable contributes to one's feeling good and functioning well component. Low levels of neuroticism help the crew in decision-making in the absence of tactile, real-time reference points and situational awareness of manned system pilots. The moderate and positive correlations between resilience with PWB and its dimensions bring into light that the crew in the current sample need to acquire high levels of resilience for optimum levels of flourishing and make favorable judgments of their overall life satisfaction and well-being.

CONCLUSION

RPAS operations in Indian Armed Forces are rapidly growing and are envisaged to be a dominant force in the sky in the near future. The unique nature of RPA operations mandates a highly agile crew with superior cognitive functioning and specific personality traits. The distinct operations along with personality traits influence the PWB of the crew. The combination of 'feeling good and functioning well' is important for one's well-being and overall performance. Therefore,the current research is carried out with an aim to gain an in-depth understanding of personality traits and PWB of RPA crew in India. It revealed that the personality profile of RPA crew in the studied population does not fit in the stereotypical framework as was argued. The personality traits required to operate RPA and the personality profile of Indian RPA crew as brought out in the current study do not fit into the stereotyped framework of RPA crew, possibly due to the fact that Indian RPA crew are originally from fixed wing airframes.

The findings that RPA operators reported to have moderate to high level of PWB. The personality profile revealed that they are emotionally stable, socially active, practical, inclined to avoid conflicts and possess average levels of conscientiousness. They perceive themselves to have higher levels of PWB, indicating that they feel good and function well. They also nurture positive relationships and attribute significance to the tasks they are involved in. The crew reported moderately highlevels of resilience which could influence one's ability to perform under stress and adversity.

Research Directions

In order to facilitate the integration of 'right man at right place' and maximize efficiency in the operations, it is recommended that a detailed aeromedical examination and aviation psychologist's opinion to be considered while restreaming an aircrew to RPAS. Further studies to compare the aircrew with RPA crew will bring out greater insights regarding suitability of aircrew from all streams (fixed wing and rotary wing) as RPAs operators.

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