



Original Article

Personality profiling of flying instructor and trainee instructor

K Anand¹, V Sharma²

¹Scientist 'E', Aviation Psychologist and Unit Counsellor, IAM, Bangalore, ²Specialist in Aerospace Medicine (IAF), Chief Coordinating Officer, IAM, Bangalore, India.



***Corresponding author:**

Mrs. K Anand,
IAM, Bangalore, India.
Scientist 'E' Aviation
Psychology, IAM IAF,
Bengaluru - 17, India.

kalpnadev@gmail.com

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ABSTRACT

Introduction: Military flying entails sound psychological health along with a high level of skill and aptitude. Pilots are selected on the basis of their psychological profile, psychomotor ability, and cognitive ability. Hence, the performance of pilots can be construed as a product of skill, attitude, and personality factors. Personality factors and cognitive ability have a vast impact on the flying performance and flight safety. This acquires a whole new dimension for flying instructors, as teaching the nuances of flying to a young flight cadet is a very challenging task.

Materials and Methods: To study the personality and cognitive profile of the special group of flight instructors, 45 instructors and trainee instructors from flying instructors' school, Tambaram, were administered NEO five-factor inventory and four cognitive tests comprising Stroop test, symbol-digit coding and digit span-backward and forward. The data were analyzed using descriptive statistics, *t*-test, and analysis of variance.

Results and Discussion: Trainees and instructors constituted the sample wherein they were considered as a common group; hence, comparison between them was not carried out. The aircrew manifested emotional stability, high extraversion, willingness to experience novel experiences, low to average agreeableness, and average to very high conscientiousness. Their cognitive performance was compared with available norms for general population and was found to be above average. No significant difference was found in the personality dimensions or cognitive performance on the basis of mode of entry, stream, marital status, etc.

Conclusion: Instructors came out to be more emotionally balanced, extraverted, and keen to have new experiences and had high conscientiousness compared to non-instructor pilots. The instructors showed above-average performance when compared to normative data provided by the test authors. It has implications for future studies with large samples and similar protocols.

Keywords: Affect, Training, Military aircrew, Cadets

INTRODUCTION

Flying is a complex activity that takes place in a rapidly changing and uncertain environment in which the performance of pilots can be construed as a product of skill, attitude, and personality factors. Personality is defined as stable, deep-seated predispositions to respond in particular ways.^[1] Personality factors, in general, have been found to contribute to crew effectiveness and are important predictors of team performance in aerospace environments.^[2]

Numerous studies have been conducted to link cognitive functioning with flight performance, and different measurements of cognitive efficiency have been identified as crucial to the piloting

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ability, including time-sharing,^[3] speed of processing,^[4] attention,^[5] and problem-solving.^[6] Executive functions (EFs) underlie goal-directed behavior and adaptation to novel and complex situations.

While flying is challenging, teaching someone to fly and fly safely is more challenging. The organization selects potential instructors with great care and caution because becoming an instructor is a huge responsibility. What makes a good pilot or what are the common features of good pilot has been the interest of many researchers. In one of the studies it was found that sociability, balance, self-assertiveness, and orientation toward actions and activity are successful characteristics of pilots.^[7] In the UK Army Air Corps, pilots who pass training, are more stable, extroverted, tough-minded, and independent than those who fail training.^[8]

Previous research seems to suggest that there is evidence in pilot literature supporting the relevance of personality characteristics for pilot success. Initial studies in experienced military pilots found three distinct personality types. The first and most common type were composed of those pilots that were the most affiliative and outgoing. The second group consisted of individuals who are emotionally controlled, inhibited, apprehensive, and socially retiring. The third group was made up of pilots described as highly independent, competitive, and decisive.^[9]

Many researchers have indicated that conscientiousness is a crucial trait for pilot performance regardless of differences in aircraft and performance dimensions.^[10,11] Agreeableness and its relation to performance in aircrew have also advocated that there is a universal pilot personality, irrespective of experience, or position.^[2,11]

Another set of studies investigating associations between cognition and flight performance aimed to measure the predictive validity of pilot candidate selection tests, as determined by the relationship between students' performance on the selection tests for entry into the training program and the training outcome (indexed by flight performance).^[12-15] Another study was able to explain 45% of the variance of the flight simulator performance with four Cogscreen-Aeromedical Edition predictors (speed/working memory, visual associative memory, motor coordination, and tracking) in a cohort of 100 aviators aged 50–69 years.^[16]

Carrying out goal-directed behaviors and adapting to novel and complex situations,^[17] inhibiting automatic responses in favor of controlled and regulated behavior,^[18] making decisions,^[19] and reasoning^[20] are all EFs without which a pilot would be unable to operate an aircraft successfully.

With the above background, this study was taken up with an aim to study the personality profile and cognitive performance of flying instructors from three streams.

MATERIALS AND METHODS

A total of 48 male pilots undergoing qualified flying instructors' course at flying instructors' school (FIS), Tambaram, along with instructors participated in this study. Responses from three pilots were incomplete and hence were not included in the study. Only medically fit 45 male pilots from three streams were included in the study. Their ages ranged from 29 to 38 years with a mean of 31.43. A total of four standardized tests were administered to get the personality and cognitive profile of the pilots. These tests were as follows:

NEO five-factor inventory (Costa, McCrae and Dye, 1991)

NEO five-factor inventory measures the five-factor model of personality. The five broad factors (60 items) allow a general assessment of adult personality. The internal consistencies for the domain scales are high, with the coefficient ranging from 0.86 to 0.92.^[21]

Stroop test

It is a widely used and easy to administered test. Five colors were chosen, i.e., blue, green, yellow, orange, and red. It was the main focus of the study to analyze the interference of meaning information with the task at hand, so the scoring procedure given by Valgimigli *et al.*^[22] as it meets the two requirements of accuracy and speed and measures a global index in the form of interference score.^[23]

Digit-symbol coding Wechsler adult intelligence scale (WAIS-III)

It is a subset of the widely used battery, WAIS-III, and it is easy to be administered. There is a practice set and a test set. This tests implicit learning, incidental learning, and perceptual-motor speed.

Digit span test Wechsler memory scale (WMS-III)

It is a subset of the widely used battery, WMS-III, and it is easy to be administered. It consists of strings of numerals that are to be repeated in either forward or backward order verbally. Its reliability and validity have been reported to be 0.89 and 0.598, respectively.

The pilots were briefed regarding the purpose of the study. They were also informed that the participation was voluntary. Pilots from three steam were taken as separate groups to study differences in their personality and cognitive profile if any. Each test was scored individually with the help of scoring key and standard scoring procedures. Results were fed in the Excel sheet for statistical analysis.

RESULTS

Figures 1-5 show that most of the aircrew had their scores in the average range and only two aircrews had a very high score on neuroticism. Forty-one aircrews had their scores on average to very high range, and only four aircrews had a low score, and none had a very low score on extraversion. Forty aircrews had their scores between the range of average and very high whereas only eight aircrews had a very low score, and none had very low scores on openness to experience. Twenty-nine aircrews had their scores between the range of average and high, whereas only 16 aircrews had a low to very low score and none had very high score on agreeableness. Thirty-eight aircrews had their scores between the range of

average and very high, whereas only seven aircrews had a low score and none had very low score on conscientiousness.

Table 1 shows that the mean of the National Defence Academy (NDA) entry aircrew on five dimensions of personality was almost equal to the mean of direct entry aircrew and the *t*-value of 1.221 (neuroticism), 0.003 (extraversion), 0.231 (openness to experience), 0.547 (agreeableness), and 0.086 (conscientiousness) were found to be non-significant. Table 1 also shows that the mean performance of NDA entry aircrew on four cognitive measures was almost equal to the mean performance of direct entry aircrew and the *t*-value of 1.143 (digit-symbol coding), 1.785 (Stroop test), 0.249 (digit span-F), and 0.523 (digit span-B) was found to be non-significant. NDA and direct entry aircrew displayed almost similar performance on these dimensions.

Table 2 shows the mean and standard deviation (SD) for the three streams of aircrew for personality dimensions and cognitive measures. From the above table, it can be seen that the mean of three streams of aircrew on five dimensions of personality and four cognitive measures was within the same range. Their SD too was almost similar. To find out if these small differences were significant or not analysis of variance was carried out.

Table 3 shows the ANOVA on the basis of streams wherein no significant differences were found between three groups on either personality dimensions or cognitive measures.

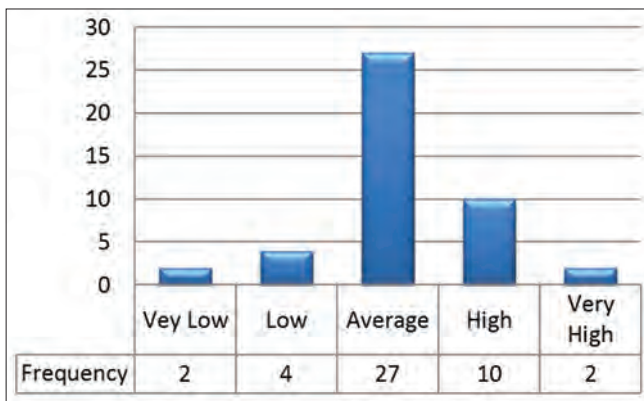


Figure 1: Neuroticism.

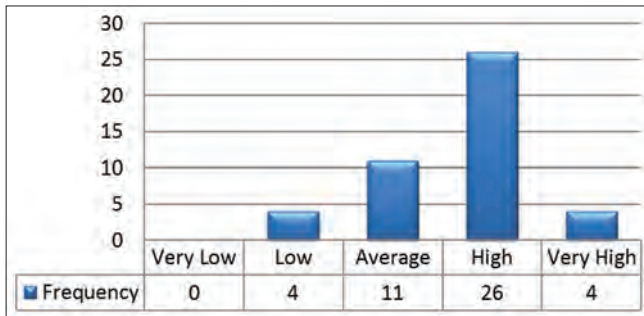


Figure 2: Extraversion.

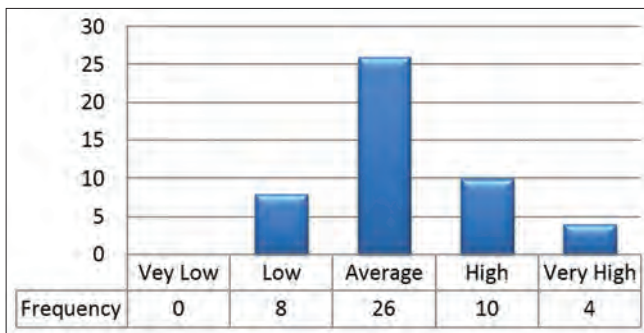


Figure 3: Openness to experience.

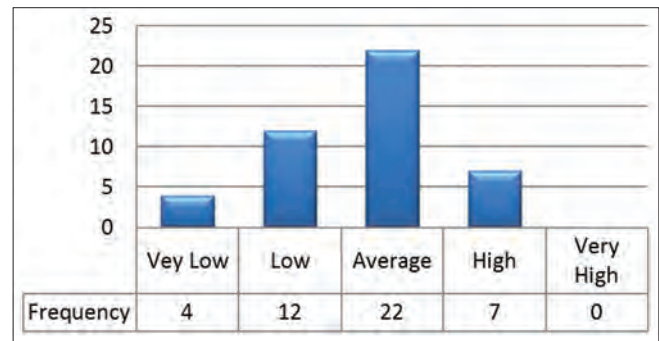


Figure 4: Agreeableness.

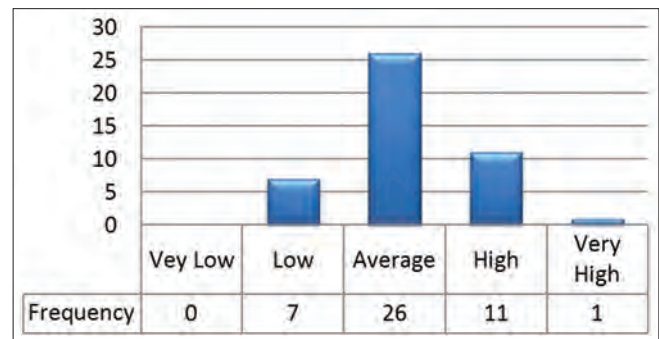


Figure 5: Conscientiousness.

Table 1: Mean scores, *t*-values of NDA and direct entry participants on personality and cognitive variables.

Variables		Entry		<i>t</i> -value	<i>P</i>
		NDA	Direct		
		Mean±SD	Mean±SD		
Personality	N	52.52±9.18	49.38±6.21	1.211	0.229
	E	58.07±8.17	58.06±6.52	0.003	0.998
	O	51.34±7.26	50.81±7.66	0.231	0.818
	A	47.48±8.13	46.13±7.67	0.547	0.587
	C	51.79±7.39	52.00±8.26	0.086	0.932
Cognitive variables	Dig-Sy	42.53±5.32	44.44±5.54	1.143	0.259
	Stroop	17.04±5.29	19.97±5.21	1.785	0.081
	DS-F	11.76 ± 1.64	11.88±1.24	0.249	0.805
	DS-B	8.10±2.04	7.81±1.17	0.523	0.604

SD: Standard deviation, NDA: National Defence Academy

Table 2: Mean and SD of three streams of aircrew.

Stream		Report								
		N	E	O	A	C	Digit symbol	Stroop	DSF	DSBW
F	Mean	50.64	59.86	50.07	49.43	53.29	45.57	18.28	11.86	8.50
	N	14	14	14	14	14	14	14	14	14
	SD	6.868	7.347	7.343	6.198	7.630	5.302	6.41	1.460	1.990
H	Mean	50.53	59.71	51.00	45.82	50.65	42.76	16.05	11.88	7.82
	N	17	17	17	17	17	17	17	17	17
	SD	5.854	8.029	6.423	8.531	7.673	5.321	3.49	1.453	1.286
T	Mean	53.21	54.29	52.43	46.00	51.93	41.36	20.34	11.64	7.71
	N	14	14	14	14	14	14	14	14	14
	SD	11.81	7.539	8.582	8.638	7.849	5.123	5.59	1.646	2.054
Total	Mean	51.40	58.07	51.16	47.00	51.87	43.20	18.08	11.80	8.00
	N	45	45	45	45	45	45	45	45	45
	SD	8.310	7.924	7.320	7.911	7.618	5.413	5.38	1.486	1.771

SD: Standard deviation

The three streams cannot be differentiated on the basis of personality or cognitive performance.

Table 4 shows the mean of married aircrew on five dimensions of personality was almost equal to the mean of unmarried aircrew, and the *t*-value of 0.970 (neuroticism), 0.794 (extraversion), 0.719 (openness to experience), 0.384 (agreeableness), and 1.049 (conscientiousness) was found to be non-significant. Table 4 also shows that the mean performance of married aircrew on four cognitive measures was almost equal to the mean performance of unmarried aircrew and the *t*-value of 0.579 (digit-symbol coding), 0.492 (Stroop test), 0.527 (digit span-F), and 1.246 (digit span-B) was found to be non-significant. Married and unmarried aircrew displayed almost similar performance on these dimensions.

DISCUSSION

The results revealed that 74% of the aircrew scored average or less on neuroticism, which indicates that they are emotionally

stable and keep their cool under trying and demanding stressful situations. Results further revealed that 82% of the aircrew in the study had average to high extraversion which is indicative of healthy inclination toward interpersonal interactions. Openness to experience is the inclination toward proactive seeking and appreciation of new experiences, and 85% of the aircrew in the study had average to very high levels of this dimension, and only 15% were in the range of low, and none in the very low range. About 76% of the aircrew studied scored within low and average range on agreeableness. About 85% of the aircrew scored average to very high on conscientiousness.

The findings are supported by the previous research wherein it was found out that the average male pilot was altruistic yet highly competitive, sceptical, and tough-minded. Components of worthy achievement, great competency, high responsibility, and the ability to cope with high levels of stress were observed. Compared with the general male adult norms, it was noted that the male student pilot sample had greater levels of extraversion and lower levels of agreeableness.^[24]

Table 3: ANOVA on the basis of stream.

ANOVA table							
Stream			Sum of squares	df	Mean square	F	Sig.
N * Str	Between Groups	(Combined)	66.993	2	33.497	0.473	0.626
	Within Groups		2971.807	42	70.757		
	Total		3038.800	44			
E * Str	Between Groups	(Combined)	290.699	2	145.350	2.469	0.097
	Within Groups		2472.101	42	58.860		
	Total		2762.800	44			
O * Str	Between Groups	(Combined)	39.554	2	19.777	0.358	0.701
	Within Groups		2318.357	42	55.199		
	Total		2357.911	44			
A * Str	Between Groups	(Combined)	120.101	2	60.050	0.958	0.392
	Within Groups		2633.899	42	62.712		
	Total		2754.000	44			
C * Str	Between Groups	(Combined)	53.532	2	26.766	0.450	0.641
	Within Groups		2499.668	42	59.516		
	Total		2553.200	44			
Digitsymbol * Str	Between Groups	(Combined)	129.498	2	64.749	2.345	0.108
	Within Groups		1159.702	42	27.612		
	Total		1289.200	44			
Stroop * Str	Between Groups	(Combined)	141.718	2	70.859	2.619	0.085
	Within Groups		1136.548	42	27.061		
	Total		1278.267	44			
DSF * Str	Between Groups	(Combined)	129.498	2	64.749	2.345	0.108
	Within Groups		96.693	42	2.302		
	Total		97.200	44			
DSBW * Str	Between Groups	(Combined)	5.172	2	2.586	0.818	0.448
	Within Groups		132.828	42	3.163		
	Total		138.000	44			

No significant differences were found between three groups on either personality dimensions or cognitive measures. The three streams cannot be differentiated on the basis of personality or cognitive performance. ANOVA: Analysis of variance

Table 4: Mean scores, *t*-values of married and unmarried participants on personality and cognitive variables.

Variables		Marital status		<i>t</i> -value	<i>P</i>
		Married	Unmarried		
		Mean±SD	Mean±SD		
Personality	N	51.87±8.24	48.33±7.45	0.970	0.337
	E	58.44±7.99	55.67±7.66	0.794	0.432
	O	50.85±7.24	53.17±8.23	0.719	0.476
	A	47.18±8.32	45.83±3.87	0.384	0.703
	C	52.33±7.44	48.83±8.79	1.049	0.300
Cognitive variables	Dig-Sy	43.38±5.58	42.00±4.38	0.579	0.566
	Stroop	17.93±5.16	19.10±7.19	0.492	0.625
	DS-F	11.85±1.58	11.50±0.55	0.527	0.601
	DS-B	8.13±1.82	7.17±1.69	1.246	0.220

SD: Standard deviation

In a study to understand the personality profile of pilots of aircrew, conducted at the Institute of Aerospace Medicine, it was found that pilots (*n* = 50) manifested high levels of neuroticism and very high levels of extraversion.^[25] The findings are not in line with this study wherein the levels

of neuroticism are concentrated in the average range, and levels of extraversion are in high score range and not in very high range. This discrepancy could be due to the sample characteristics wherein most of them were either doing instructors course or were fully operational instructors thus

making this group very special and distinct from general population of aircrew in Indian Air Force.

Results on agreeableness among aircrew are in line with previous studies. A study conducted on 1301 the United States Air Force (USAF) student pilots did personality profiling of pilot students using NEO personality inventory-revised; the results revealed that student pilots scored low on agreeableness.^[24] Another study conducted on 12702 USAF training pilots found that pilots scored low on agreeableness.^[26] Aircrew in the study had manifested average to high level of conscientiousness, and the findings are similar to another research wherein a study on USAF pilots of different streams concluded that fighter pilots were high on dimension conscientiousness^[27] and trainee USAF pilots scored high on conscientiousness.^[26]

The performance of the aircrew was tested on four cognitive tasks comprising digit-symbol coding, Stroop test, and digit span-backward and forward. The performance of the aircrew on these tests was found to be above average when compared with the general norms, but pilots' norms for Indian military aircrew are not available. In an attempt to go beyond the stipulated objective of the study which was the psychological profiling of healthy military aircrew, data were subject to further statistical analysis. Personality dimensions and cognitive performance of the pilots were compared on the basis of marital status and mode of entry. It was evident that the marital status and mode of entry does not have an effect on the study variables. There was no significant difference among three streams of pilots with respect to their personality dimensions and cognitive performance. This clearly shows that pilots share same characteristics irrespective of the type of aircraft flown. This could be due to the fact all of them go through same screening and selection procedure followed by same training.

CONCLUSION

This study was an attempt to understand the psychological profile of flying instructors. Aircrew in the study came out to be more emotionally balanced, extraverted, and keen to have new experiences and had high conscientiousness compared to other pilots. This clearly indicates the effectiveness of screening and selection criteria set by the organization for instructors. Instructors and trainees showed above-average performance on cognitive measures used in this study when compared to normative data provided by the test authors. Three streams showed similar performance, which suggests a specific personality and cognitive profile desirable for instructional duties.

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Conflicts of interest

There are no conflicts of interest.

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