Motivational work needs and personality factors in aircrew

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ABSTRACT

Motivational work needs and personality both have a direct bearing on the high stress occupational role of aircrew. The aim of this study was to investigate motivational work needs and delineate whether motivational work needs are associated with any personality factors. Fifty five aircrew were administered the 16 PF test and the Work Needs Assessment Inventory. Test results were scored and the number of aircrew who had n ach, n aff and n power in order of priority were calculated and subjected to χ^2 test. Work needs and personality scores were analysed using Pearson's product moment correlation. Results indicated that a significant majority of aircrew assigned N ach, and n aff work needs almost equally in the first and second positions and placed n power in the third position ($p<0.01$). N ach, and n aff were negatively correlated with each other ($p<0.01$) and with n power ($p<0.001$). N ach, and n power showed no significant relationship with personality factors. Only n aff was positively correlated with Factor N (Shrewdness) ($p<0.008$), the second order factors III (Alert Poise) ($p<0.008$) and IV (Independence) ($p<0.02$), and negatively correlated with Factor A (Warmth) ($p<0.01$). These characteristics appear to be distinct and therefore need to be measured independently when addressing issues related to selection, training and evaluation of aircrew.

Motivational work needs and personality have a direct bearing on the high stress occupational role of aircrew and are attributes which are of prime importance in selection, training and evaluation. Human motivation is said to consist of goal-directed behaviour initiated by a drive state, leading to the attainment of the appropriate goal and producing subjective satisfaction and relief. Aeronautical motivation "is a mental force capable of directing drives and inducing specific behaviours. Motivated behaviours are selective, active and persistent- they increase in intensity according to deprivation and they tend to keep internal balance and harmony in the environment" [1]. Personality is defined as the enduring predispositions to behave in particular ways in response to the environment and could be expected to play a significant role in the motivational process.

Social motives consist of three basic needs, achievement (n ach), affiliation (n aff), and power (n power). People with high need for achievement

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are motivated to master tasks and excel, and feel satisfied in doing so. They tend to establish challenging and difficult but realistic goals, prefer personal responsibility, and innovate to improve. They like tasks in which their performance can be compared with others or in terms of some other standard. Even though they utilize feedback on performance quality, competitive motivation impairs their performance [2]. They tend to be persistent in working on tasks they perceive to be career related, and like to work in situations in which they have some control over the outcome [3]. They like to struggle with a problem rather than ask for help, are able to delay gratification and make careful plans about the future [4].

In high n aff people there is a concern for establishing, maintaining and repairing friendly relations. The tendency for people to affiliate with others may come from a need to feel part of a group or to feel loved. It may also reflect the fact that people can help other people meet their needs. People also routinely consult others before making major decisions, in an effort to avoid errors because other people provide a source of social comparisons. Other people can also provide support and comfort in times of trouble. The existence of mutual support groups suggests that people in trouble are especially motivated to affiliate with others [6]. However, there is some evidence that the motive to affiliate when anxious is reduced if the other person is not anxious [7]. High n aff people make more local phone calls, visits, seek approval, dislike disagreeing with strangers and get higher grades from a warm teacher.

Social power is "the ability or capacity of a person to produce (consciously or unconsciously) intended effects on the behaviour or emotions of another person" [8]. The goals of power motivation are to influence, control, cajole, persuade, lead, charm others, and to enhance one's own reputation in the eyes of other people. Some of the ways in which people with high power motivation express themselves are by impulsive and aggressive action, participation in competitive sports, joining organisations and holding office, obtaining and collecting possessions, associating with people who are not popular with others, and choosing occupations that have a high impact on others.

The need theory of personality emphasises on the various needs and motivation is governed by needs, therefore the two could be interrelated [9]. There is no literature specifically pertaining to the measurement of work needs in pilots using the Work Need Assessment Inventory (WNAI). Manifest needs in aircrew have been studied using the Edwards Personal Preference Schedule (EPPS). One study found that compared to the general adult male the jet aviator expresses greater manifest needs in the areas of dominance and achievement [10]. "Typical" pilots tended to be dominant, outgoing, active and achievement oriented with strong needs for novelty and change and mastery of their environment [11]. Another study found that US Navy jet pilots were higher than general aviation pilots on achievement, affiliation, dominance and aggression and lower on succorance and nurturance [12]. Male adult norms were lower than jet pilots' on achievement, dominance and aggression but were higher on affiliation. USAF fighter pilots were higher than other subjects in achievement, one personality dimension "sociability" discriminated them from the general community [13]. All three studies found that pilots were lower on affiliation, succorance and nurturance [10,11,13].

The need for achievement has been measured in two studies on pilots who were outstanding in their jobs. "Successful or high achiever" jet pilots differed significantly from the normative group in that they expressed a greater need for achievement [10]. One study on 105 fighter pilots who were selected from the upper 10% of their peer group found that the outstanding jet aviator desired success and scored high on achievement. They also avoided deep interpersonal relationships, kept an emotional distance and isolated affect. They preferred to be very independent, autonomous and focused on external events [14].

There has been evidence to show that there are at least several different "types" of individuals who successfully adapt to military aviation. Three distinct personality subtypes were empirically identified among USAF aviation trainees [15]. The first type, which characterized the largest percentage (58%) of the sample, was described as achievement-oriented, dominant and affiliative, with a structured approach to problem solving. A second type, which characterized 21% of the sample, was similar in many ways to the one previously described, but were also more aggressive, exhibitionistic and self-aggrandizing. The third type, which also comprised 21% of the sample, was described as cautious, compulsive and socially retiring.

A few studies have utilized 16 PF test on aircrew. Three studies have attempted to see the association of personality with flight safety in terms of involvement in pilot error accidents. In the first study, 86% of the aviators were correctly classified as to whether or not they had been previously listed as a cause factor in a military aviation accident, by the three personality factors M, N, and Q2 [16]. The second study, however,

could not replicate these findings [17]. Personality constructs using 16 PF test were compared in one group of fighter pilots who had experienced accidents and in another group who had not. Five significant personality factor (conscientious, suspicious, shrewd, self-sufficient, tense) differences discriminated the safe from the crashed pilot subjects. 27% of the variance in crashing was explained by personality differences, and over 70% of the pilots were correctly classified [8]. Two other studies have used 16 PF test on trainee pilots. In one, thirty-one male aviation majors aged between 18 and 38 years who were studied varied significantly from the male college student norm on Factors E, F, G, H, and Q3 of the 16 PF test [19]. In the other study, 50 first year flying trainees were found to be significantly lower on self control (Factor Q3) and higher on tough mindedness (Factor I) than the norm [20].

One Indian study described the personality profile of highly rated Air Force pilots using the 16 PF, as "above average in abstract thinking, high stress tolerance, resilient, decisive, practical, sober and dependable". In absolute scores, fighter pilots were higher on intelligence, self sufficiency and emotional stability but no statistical differences between fighter and transport pilots were found [21]. General needs have been measured as part of personality in pilots but there have been no studies, which have looked specifically into the relationship between motivational work needs and personality factors. The aim of this study was to (a) investigate the general order of priority that aircrew assign to the motivational work needs of n ach, n aff and n power and (b) delineate whether motivational work needs were associated with any personality factors.

Material and Methods

Subjects

A group of 55 aircrew (54 males, 01 female) who were referred for psychological assessm ent as a part of their medical evaluation for various diagnoses from July 1995 to July 2004, at the Institute of Aerospace Medicine, IAF, Bangalore constituted the sample population. All were given the 16PF test and the WNAI. Demographic characteristics of the sample are shown in Tables 1A and 1B, and categories of the sample are shown in Table 2.

Table 1A: Demographic characteristics of the aircrew population

Characteristic		No.	%
Sex	Male	54	98.2
	Female	01	1.8
Marital status	Single	37	67.3
	Married	18	32.7
Present aircraft stream	Fighter	34	62.0
	Transport	05	9.0
	Helicopter	16	29.0

Table 1B: Demographic characteristics of the aircrew population

Characteristic	Group Mean (SD)	
Age in years	29.27	(4.25)
Years of Education	15.00	(0.00)
Years of Service	07.20	(3.90)
Flying hours	924.50	(733.70)

Table 2: Categories of aircrew sample based on clinical condition

Category	No.	%
Non- clinical	10	18
Psychiatric illness	07	13
Medical illness	38	69

Psychological Questionnaires

A good rapport was first established with the pilot, informed consent was obtained and a detailed clinical interview was carried out. The interview pertained to the present and past medical and/or psychological history, flying and occupational history, family, personal and treatment history. The questionnaires were administered individually to aircrew under structured conditions as outlined in the test manuals. These were :-

(a) The 16 PF test, Form D. This is a 105-item questionnaire, which measures sixteen first order and four second order factors of personality by factor assay [22]. It has been standardized on Indian general population. Institute of Personality and Ability Testing have provided the consistencies of the test in a number of ways and the test is considered reliable and valid.

(b) The WNAI. This instrument was designed to identify respondent's own needs and the needs in the workplace that motivate people [23]. Statements are rank ordered. The ordering reveals the respondent's desire for achievement, affiliation or power as first, second or third priorities.

Procedure

Test Administration and Instructions

The subjects were asked to complete the questionnaire as part of the psychodiagnostic testing. Instructions to the subjects followed the test manuals' instructions to subjects. They were instructed to give their first and natural response to the questions and to answer them carefully and truthfully. The examiner read out the instructions to the subject who then worked through the examples. The subject was then told that if he did not understand any question, he could note down

the number and the examiner would clarify the unanswered questions at the end of the test, since as far as possible no questions should be left unanswered. The test was then begun; questions were read from the test booklets and answered on separate answer sheets. The responses of the 16PF were then computer scored, raw and sten scores were then plotted on test profiles. The responses from the WNAI were hand scored and the different needs priorities were made.

Data Reduction and Statistical Analyses

Data of thirty-three variables, for 55 subjects, were entered into the Statistical Package for Social Sciences (SPSS) worksheet. The test results were analyzed and the number of aircrew who prioritized achievement, affiliation, and power in first, second or third positions was tabulated and subjected to χ^2 testing. Twenty personality factor variables, and three needs variables were analyzed using Pearson's product moment correlation. Demographic characteristics such as age, education, service and flying hours were also correlated with work needs. Student's "t" test was done to compare groups based on type of aircraft flown, marital status and diagnostic group.

Results

(a) Need priorities of aircrew. Results indicated that a significant majority of aircrew assigned n ach, and n aff work needs almost equally in the first and second positions and a significantly smaller number of aircrew placed n power in the first two positions. A significant majority of aircrew assigned n power in third position and a significantly smaller number placed n ach and n aff in the third position as shown in Table 3, chi square value was 29.91 (df = 4, p<0.01).

(b) Correlations between 16 PF scales and work needs. Results showed that n ach and

Table 3: Number of aircrew assigning different need priorities in first, second and third positions.

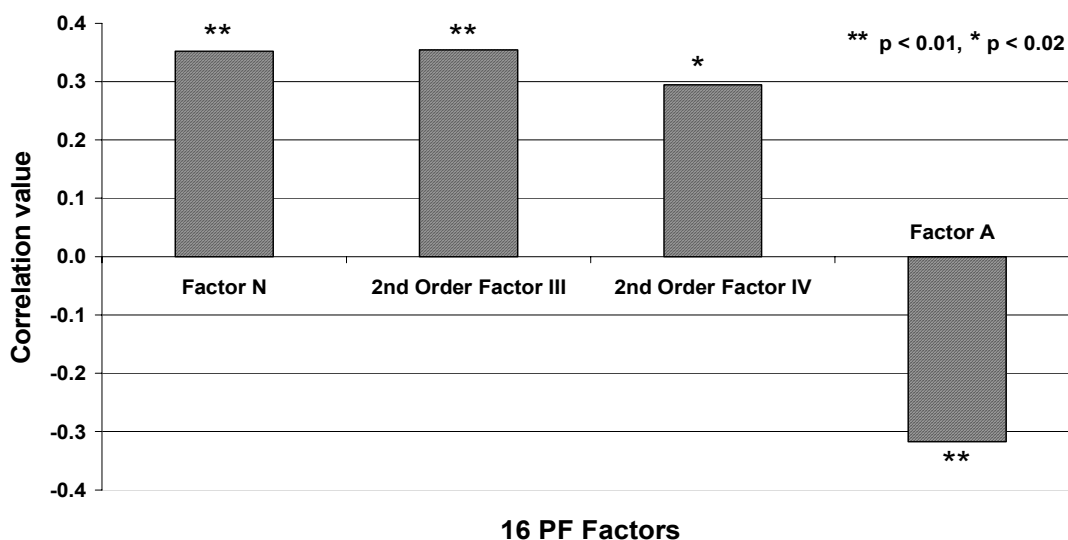| Position	N Ach	N Aff	N Power
1st	25	21	14
2nd	27	25	11
3rd	08	13	33

Fig 1 : Significant correlations between 16PF scales and N aff

n power did not have any significant correlation with either the sten or raw scores of the 16 PF scales and the four second order scales. Only n aff had significant correlations in this respect (Fig 1). N aff was positively correlated with Factor N (Shrewdness) (r = 0.3521, n = 55, p< 0.008), the second order Factor III (Alert Poise) (r = 0.354, n = 55, p<0.001) and Factor IV (Independence) (r = 0.294, n = 55, p<0.02), and negatively correlated with Factor A (Warmth) (r = -0.317, n = 55, p<0.01).

(c) Correlations between different work needs. Correlation analysis showed that the different work needs had a negative correlation between each other. N ach scores had a significant negative correlation with n aff (r = -0.341, n = 55, p<0.01) and n power (r = -0.433, n = 55, p<0.001). Similarly n aff had a significant negative correlation with n power (r =-0.686, n = 55, p<0.0001).

(d) Correlations between 16 PF scales. Correlation analysis showed that numerous scales of the 16 PF and second order factors had significant positive and negative correlations between each other. There were seventy eight of such correlations and since the discussion of all these are beyond the scope of this paper, these are not mentioned here.

(e) Correlations between demographic characteristics and work needs. There were no statistically significant correlations between demographic characteristics such as age, education, service and flying hours and all three work needs.

(f) Student's "t" test values of significance between groups based on demographic characteristics. When groups based on demographic characteristics such as type of aircraft flown, marital status and diagnostic groups were compared using Student's "t" test, a few significant differences were observed. Lower mean values indicate higher need priority. The fighter aircraft group were significantly higher (Mean = 34.37, SD = 2.32) on the achievement need priority than the helicopter group (Mean = 36.25, SD = 2.53), (t = 2.37, p<0 .02). The transport aircraft group was also significantly higher (Mean = 33.20, SD = 3.42) on the achievement need priority than the helicopter group (Mean = 36.25, SD = 2.53), (t= 2.05, p <0 .05). No significant differences in work needs were seen between married and unmarried groups. When the non-clinical category of aircrew was compared with the medical category, the non clinical group was significantly higher on the achievement need priority (Mean = 33.54, SD = 2.85) than the medical group (Mean = 35.21, SD = 2.28), (t = 2.14, p <0.03). The medical group was significantly higher (Mean = 37.43, SD = 2.89) on the power need priority than the psychiatry group (Mean = 40.20, SD = 2.17), (t = 2.05, p <0.04). All group comparisons of other work needs were non significant.

Discussion

Results of this study indicate that a significant majority of aircrew assigned n ach and n aff work needs almost equally in the first and second positions whereas only a smaller number of aircrew placed n power in the first two positions. Most aircrew were in one of two groups; the first group's order was n ach, n aff and n power, whereas the second group's was n aff, n ach and n power. A smaller number of aircrew placed n power first with either n ach or n aff in second and third positions.

N ach was the dominant work need in the first group. This is in line with a number of studies, which have found using the EPPS, that jet pilots are high in achievement. One study found that compared to the general adult male the jet aviator expresses greater manifest need of achievement [10]. "Typical" pilots tended to be dominant, outgoing, active and achievement oriented [11]. Another study [12] found that US Navy jet pilots are higher than general aviation pilots on achievement. Male adult norms were lower than jet pilots' on achievement [13]. One study found that the outstanding jet aviator desired success and scored high on achievement [14]. Two out of the three personality subtypes of pilots were achievement oriented [15].

It is seen that the type of aircraft flown influences the pilot's achievement need, with fighter and transport pilots having a higher need than the helicopter pilots. Also, there is no significant difference between the fighter and transport pilots possibly because the transport pilots were more similar and were initially in the fighter stream before they were medically down. The non clinical group had higher need achievement than the group with medical illness. Being downgraded in their medical category is likely to affect motivation, specifically n ach.

In the second group, n aff was the dominant work need. This finding is quite different to the findings of previous studies, which have all found that affiliation is lower in pilots. Compared to the general adult male the jet aviator expresses a lower manifest need of affiliation [10]. "Typical pilots" tended to be low on affiliation, succorance and nurturance [11]. One personality dimension "sociability" discriminated them from the general community [13]. Therefore all three studies found that pilots were lower on affiliation, succorance

and nurturance. A study on the outstanding jet pilot observed that they avoided deep interpersonal relationships, kept an emotional distance, and isolated affect [14]. 21% of a pilot sample, was described as cautious, compulsive and socially retiring [15].

The findings of the present study differ from t he earlier ones and this may be due to a number of factors. Firstly, 29% of the present sample consisted of helicopter pilots, who were found to differ in their dominant work need as compared to the fighter and transport pilots. Second, this sample consisted of pilots who were undergoing medical evaluation and had been off flying for some time. They could differ from those who are current in their flying in terms of their predominant work needs. Since there is no data for comparison in a non aircrew sample, this finding could also be because of a cultural difference, since the Indian culture places more emphasis on affiliation.

A significant majority of aircrew assigned n power in third position compared to the smaller number of aircrew who placed n ach or n aff in the third position. There has been no research on aircrew, which has specifically studied n power. A number of studies have reported that aircrew tend to be dominant [11]. US Navy jet pilots were higher on dominance compared to both general aviation pilots and the adult male norm [12]. Seventy nine percent of pilots were seen to be dominant [15]. However, it appears it is a secondary characteristic to the other two work needs of n ach and n aff. In this study, the group with medical illness was significantly higher than the psychiatry group on n power. This is possibly because with a medical illness it is more likely that the pilot may return to flying, hence he tends to want to be in control of things. With a psychiatric illness there is less likelihood of getting

back to flying, so being in control is not that important.

Results showed that n ach and n power were not significantly correlated with primary or secondary personality factors. These two motivational needs thus appear to be independent from personality factors. Only n aff which has to do with interpersonal relations, had significant correlations with personality factors. N aff was positively correlated with Shrewdness, and the second order factors of Alert Poise and Independence. These factors are unexpected and are possibly related more with motivational needs in the *work* environment, which seem to be different from n aff in other environments and situations. N aff was negatively correlated with warmth. It has been observed that typical aviators avoid deep interpersonal relationships, keep an emotional distance and isolated affect [14]. On psychometric evaluation they usually get high scores in gregariousness but are low on warmth.

Different work needs had a negative correlation between each other. N ach scores had a significant negative correlation with n aff and n power. Similarly n aff had a significant negative correlation with n power. This indicates that there was no overlap in these three needs, the predominant one was always associated with less of the other two. Also, work needs do not appear to be related to temporal characteristics such as age, years of education or service and experience in terms of flying hours.

Conclusion

The aim of this study was to investigate the general order of priority that aircrew assign to the motivational work needs of n ach, n aff and n power and to delineate whether motivational work needs were associated with any personality

factors. Fifty-five aircrew were administered both the 16 PF test and the WNAI, as a part of their clinical evaluation. Results indicated that a significant majority of aircrew assigned n ach and n aff work needs almost equally in the first and second positions and placed n power in the third position. Also, n ach and n aff were negatively correlated with each other and with n power. N aff in interpersonal working relationships was positively correlated with Shrewdness, Alert Poise and Independence, and negatively correlated with Warmth. N ach, and n power showed no significant relationship with personality factors. Motivational needs such as n ach and n power and personality appear to be distinct and separate characteristics. These therefore need to be measured independently when addressing issues related to aircrew selection, training and evaluation.

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