



Original Article

## Predicting of pilot's job success based on thirty subscales of NEO-PI-R questionnaire

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### Abstract

**Introduction:** Resent researches have shown that contextual domain of job performance criteria could be affected by personnel's personality. This study aimed to determine, how personality traits can effect on performance of military pilots.

**Materials and Methods:** In this descriptive cross-sectional research, 40 military pilots were selected in a cluster sampling method and also they fulfilled NEO-PI-R (240 questions form). Each pilot evaluated by two assessor pilots for flight performance scores. Stepwise regression was used to predict flight standardization scores based on predictive variables. All statistical analyzes is done through SPSS software version 19.

**Results:** The results of this study indicated that four subscales of personality traits thus imagination (O1), actions (O4), trust (A1) and competence (C1) were significant valid predictors ( $P < 0.05$ ) of flight standardization check (considered as job performance of pilots). The modesty (A5) can predict the standardization check scores ( $P \leq 0.01$ ). Otherwise the relationship between vulnerability (N5) and grades of flight standardization check was inverse ( $P < 0.05$ ). The result of stepwise regression showed that the four personality subscales of N5, O4, A5 and C1 could be the best predictors of pilot's job success with the following accuracy of mines 10, 12, 24 and 21 percents.

**Conclusion:** The results show that personality traits can predict the job performance in military pilots. The findings have numerous implications for research and practice in aviation psychology field, especially in the subfields of personnel employment and performance appraisal.

**Keywords:** Job success, Personality traits, Pilot

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### Introduction

Performance or humans' function affects directly and continuously by various factors such as individual, familial and social life and mental health. In recent years more attention paid to personnels physical and psychological health and their effects on job performance. So, this issue be listed in worklist of organs and almost of them effort to knowledge about stress sources in job environments through conduction of scientific research that they can supply more suitable job environment for personel by appropriate scientific strategies and

enhance personels' job success and satisfaction. Robbins defines job success as positive job performance and he knows it as consequences of results measurement and conduction of work in bad or good form (1). In another meaning, performance refers to a complex of individuals' behaviors related to job (2).

The similarity between job and individual's characteristics has many advantages such as sense of commitment in personel. Esmaeili suggests (referred to Lotonz and Shaveh) that concept of organizational commitment as an attitude among personel may lead to strong tendency for survivance in organization and extraordinary effort to progression of it. On the other hand, personel accept the goals and values of organization strongly (3).

Absolutely, one of the effective factors in

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personel's job satisfaction are their personality characteristics. Every person act in special style so he/she has unique expects, needs, abilities and behavioral skills that they accord to his/her personality pattern. On the other hand, organizations supply special needs and expects based on their goals, duties and routine activities. Therefore, the various and special job environments are suitable for every personality type and it be noticed that individuals' personality characteristics should be in according to job conditions. Khkpour et al. (refer to White) suggest that personality characteristics may be applied in prediction of individuals' behaviors and job performance (4).

The psychologists who have interests in professional behaviors believe that the personality relates with individual's type of job and job performance. So, the various jobs are appropriate for every personality types (5). Therefore, considering to the mentioned issues, assessment of personality traits and their relation with job performance is important and researchers in recent years have agreement that personality characteristics especially big five personality model, have generalization in cultures, criteria and evaluation sources and they can be applied to description of most important personality aspects. Also, the big five personality model has been assessed expansively in most industrial and organizational psychology especially in relation of jod success (6).

Amy Fitzgibbons and Donald Davis approved one specific personality named "pilot personality" through comparative study in 93 pilots and other job groups based on NEO personality questionnaire. They found that about 60% of pilots received low and very low scores in total scale and neuroticism subscale while only 13% of them received high scores. Also, in extroversionism subscale, 42% of pilots received high scores while 23% of them had low scores which indicates the tendency to extroversion among pilots but its severity is not same to neuroticism subscale. Distribution of scores related to openness and Agreeableness were approximate to normal range. Finally, the scores of conscientiousness with 58% of explanation were high and very high. Only 7.5% of pilots received low scores in this subscale.

Hans Hormann and Peter Maschke assessed the personality traits among pilots who work in European airlines. They scored pilots performance in standard and substandard levels in 3 first years of employment through flight simulator (8). The regression results indicate that personality traits can

predict pilots job success and successful pilots received higher scores in interpersonal scales and lower scores in TSS scale.

Carretta and Ree evaluated 687 USA pilot students through job performance test. They concluded that among subscales of this test, written part of flight knowledge or computerized testing can be the best predictor of pilots job success with 23% of explanation (9).

This study aimed to assess the significant relationship between 30 pilots personality subscales based on the revised NEO personality scale (which theorisians identificated these subscales as indicator parts of personality differences and functions in same conditions) and the scores of flight performance.

### Materials and Methods

This descriptive-cross sectional study has been used cluster sampling method. Regarding to selected cluster (n=45) and Kerjesi-Morgan formula with 95% coefficient, our sample should be consisted of 40 cases (10). So according to the lack of need to equal number of cluster members, 40 army pilots of I.R.Iran selected from one of the seven main clusters (army centers which consist research community) in 2012, then they fulfilled NEO questionnaire. The scores of flight performance measured through practical and theoretical skills by two evaluator pilots and finally each case received two performance scores from 100 scores. Then the mean score was concerned as flight performance score. To considering ethical issues, after approve of research center of army, all cases ensured that all data remained secretly and they used only for research goals. One secret code was recorded as identification of each case at the head of paper of questionnaire.

### Research instruments

The research instrument consisted of Costa and McCrae revised version of NEO personality questionnaire (240-item) and Flight standardization check.

- *The Revised NEO Personality Inventory (NEO PI-R)*: This is a self-measurement of personality traits based on famous personality model titled five factor model. This version has 240 items (8 questions for each of 30 subscales or 48 questions for each main 5 scale according to table 1. Responders score each of these question in 5 degree Lickert system as (completely agree, agree, no idea, disagree and completely disagree).

**Table 1.** Main scales and subscales of NEO questionnaire

Main factors	Subscales					
Neuroticism (N)	Anxiety N1	Angry Hostility N2	Depression D3	Self-Consciousness N4	Impulsiveness N5	Vulnerability N6
Extroversion (E)	Warmth E1	Gregariousness E2	Assertiveness E3	Activity E4	Excitement Seeking E5	Positive emotions E6
Openness (O)	Fantasy O1	Aesthetics O2	Feelings O3	Actions O4	Ideas O5	Values O6
Agreeableness (A)	Trust A1	Straightforwardness A2	Altruism A3	Compliance A4	Modesty A5	Tender-Mindedness A6
Conscientiousness (C)	Competence C1	Order C2	Dutifulness C3	Achievement Striving C4	Self-Discipline C5	Deliberation C6

The longtime validity of NEO test and coefficients related to O, E and N were reported as 68-83% in a 6-year longitudinal study. The coefficients related to C and A were reported as 79% and 63% in a 3-year interval. The retest validity of NEO test were reported as 0.63 to 0.83 in 3-year and 6-year intervals (11).

In Iran, Haghshenas assessed 502 cases of Shiraz city and concluded same results. Consistency related to retest of NEO-Persian version was assessed through evaluation of 36 cases. To assess the correlative coefficients of NEO-Persian version, this test evaluated 36 cases. These coefficient were reported as 0.53 to 0.76 (P<0.01) for main scales. These coefficients were acceptable in the other subscales (12).

- *Flight Standardization Check:* Based on Federal Aviation Administration of USA and introduction of number 16-8081 of this organization (13), to assess practical and theoretical preparedness, all pilots evaluated undersupervision of standard office of flight units in every year. This score includes 3 parts of written exam of flight theory, verbal exam and practical flight exam. Part of practical flight skill is related to roles and guiding, control and navigation devices in flight cabin. The written part is consisted of information about flight theory otherwise verbal exam is related to verbal IQ and ability of effective communication with watchtower. The final score for each pilot is the mean of above 3 parts from 100 scores and passing score is in range of 70 to 100.

Martinussen assessed the reliability of pilots occupational efficacy test on 66 pilots in 1996 (14). Best coefficients for job performance reported in subgroups of practical experience of flight, ability of data analysis and flight knowledge and mixed complex of motor-sensory test and knowledge and awareness during flight as 30%, 24% and 37% respectively.

Reliability of flight standardization check was assessed in USA Air Force for 12 years by Erickson and Ben Avi (15,16). The results indicated that correlation between the scores of flight standardization check at first and end of pilot educational course is higher than 0.30. Also, Greer et al. in research unit of USA Air Force assessed the reliability of flight standardization check on pilot students in Fort Rucker of Alabama and Wolters Camp of Texas (17). These research conducted in three phases before pere solo flight (without staff), mediate and final level of education and each pilot conducted flight efficacy exam in three phases. The scores of each phase were compared to staffs scores in every day at the end of every flight (daily educational scores). The correlation at level of alpha=0.05 in three phases were 0.35, 0.08 and 0.09 respectively.

For data analysis in part of descriptive statistics, we used descriptive indexes include mean and standard deviation, columnne diagrams and comparative profiles. Also, Pearson correlative coefficient used to assess the relationship between variables in illiative statistics accordibng to the two interval variables. In addition, stepwise regression applied to predicte flight standard check based on predictive variables of personality traits. The statistical analysis performed through SPSS software version 19.

**Results**

In this research, the sample size was 40 cases (26 non-fighter pilots and 14 fighter pilots). As seen in Table 2, non-fighter pilots mean age is higher more than 1 year compared to fighter pilots mean age. Also, the distribution of age in two groups is similar.

**Table 2.** The descriptive indexes in pilots age

Variable	Pilot	Number	Mean	Standard deviation
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Age	Fighter	14	33.6	1.3
	Non-fighter	26	34.8	1.2
	Total	40	33.6	1.2

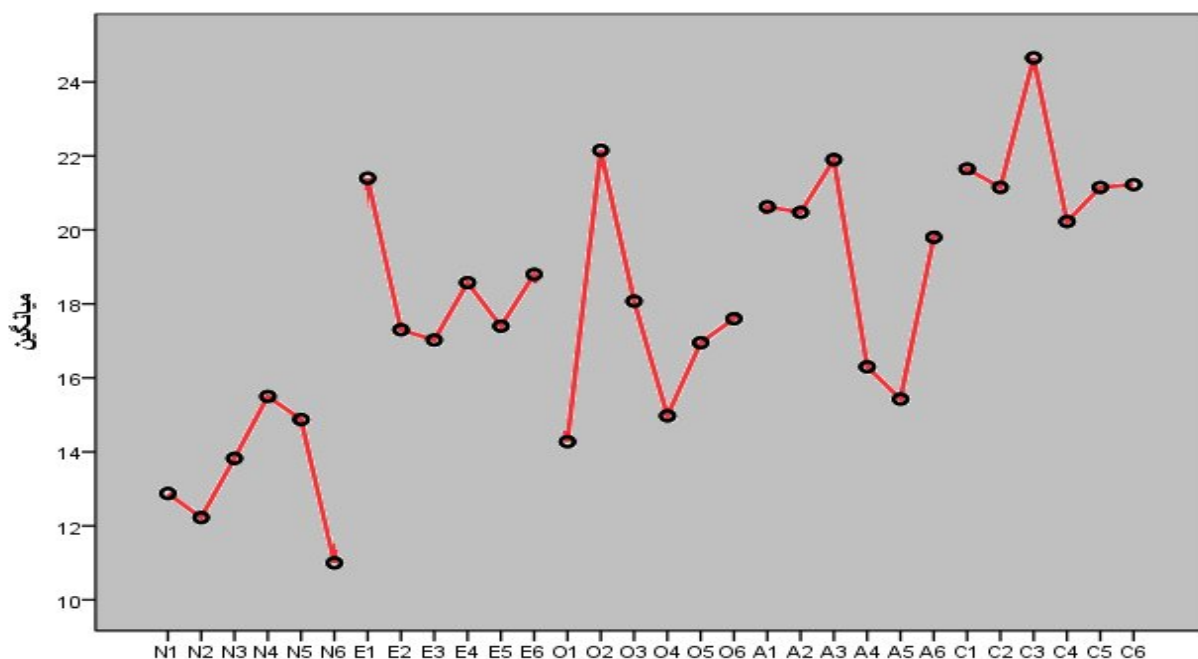
Variable	Pilot	Mean	Standard deviation
Scores of flight standard check	Fighter	83.08	6.76
	Non-fighter	84.01	5.62
	Total	83.68	5.97

According to the results of Table 3, the mean score of flight standard check of non-fighters pilots is approximately one score higher than fighters. But the distribution of scores related to non-fighters pilots is lesser than others.

Profile of diagram 1, indicates the mean of subscales of personality traits among pilots. The highest means are related to Dutifulness (C3), Aesthetics (O2), Altruism (A3), Competence (C1) and Warmth (E1) respectively. The lowest means are related to Vulnerability (N6), Angry Hostility (N2) and Anxiety (N1) respectively.

**Table 3.** The descriptive indexes in scores of flight standard check

**Diagram 1.** Personality profile of pilots



According to the results of Table 4, there is reverse and significant relationship between Impulsiveness (N5) and flight standard check score in level of alpha=0.05. The subscales of Trust (A1), Actions (O4), Fantasy (O1) and Competence (C1) have direct and significant relationships with flight standard check score in level of alpha=0.05. Also, there is direct and significant relationship between Modesty (A5) and flight standard check score in level of alpha=0.01.

Variable	Impulsiveness (N5)	Trust (A1)	Actions (O4)	Fantasy (O1)	Competence (C1)	Modesty (A5)
Flight standard check	-0.32*	0.32*	0.34*	0.31*	0.31*	0.49**
	0.043	0.048	0.031	0.043	0.049	0.001

$P < 0.05^*$   
 $P < 0.01^{**}$

**Table 4.** Pearson correlative coefficient between personality traits and flight standard check scores

The results of stepwise regression to predict flight standard check based on personality traits indicated

that traits of N5, O4, A5 and C1 can explain variance of standard check as 10%, 12%, 24% and 21% respectively that F variance analysis related to them is significant so R2 is significant too. The result of stepwise regression indicates that only

weight of 4 mentioned subscales in regression equation is significant so traits of Impulsiveness, actions, modesty and Competence are the predictors for flight standard check scores (Table 5).

**Table 5.** Stepwise regression for prediction of flight standard check based on personality traits

Variable	R	R2	Standard error	F	P	B	$\beta$	t	P
Regression fix of Impulsiveness (N5)	0.321	0.103	5.73	4.37	0.043	77.5 -0.416	- -0.321	25.05 -2.09	0.000 0.043
Regression fix of Actions (O4)	0.34	0.12	5.69	5.01	0.031	72.88 0.72	- 0.34	14.84 2.24	0.000 0.031
Regression fix of Modesty (A5)	0.49	0.24	5.28	11.88	0.001	95.45 0.76	- 0.49	27.17 3.45	0.000 0.001
Regression fix of Competence (C1)	0.48	0.213	5.14	10.63	0.008	90.25 0.63	- 0.31	22.36 2.24	0.000 0.049

## Discussion

Most of theoreticians believe that different general traits such as intelligence or high education in all jobs can help to job success so in most cases, a unit complex use for job selection without needed concern to mental and personality traits. Sometimes individuals professions are appropriate to their academic education, environment or instruments but the output is not acceptable. One of the effective reasons is lack of attention to individuals mental and personality traits. These humanistic factors can be summarized in job satisfaction and tendency to work in a organization. The correct selection of manpower in flight department regarding to massive investment, is concerned as a effective basic and functional issues. This issue has most importance because of importance of flight services and great tendency to pilotage. So, most attention to scientific levels of selection of pilotage, especially personality traits as base of individualized and social behaviors is concerned as a most important task of managers of flight and aviation organizations.

Data analysis showed that among neuroticism components (N), there is a reverse relation between Impulsiveness (N5) and flight standard check as pilots with lesser Impulsiveness, reported higher job success that it seems this relation is a necessity for risky job of pilotage. Also, regarding to result of regression stepwise, Impulsiveness component can predict more than 10% of pilots job success lonely.

In assessment of correlation between none of extroversion (E) and pilots job success so the regression is not possible because of the lack of significancy of correlative coefficients.

Only action component (O4) has direct relation with job success so that individuals with high O4 have more job success. Pilots with this trait, prefer novelty compared to common and usual issues and they accept various tasks during time otherwise individuals with low O4, resistance against changes. This component indicates creative and venture mood of successful pilots. Stepwise regression indicated that 12% of pilots job success is predicted by actions component and openness trait.

Also, there is direct relationship between trust (A1) and modesty (A5) with pilots flight standard check. In another statement, pilots with high trust and modesty, have more job success. Individuals with high score of trust component, believe that others are honest and optimist and they have good wills. Individuals with low score of this component are pessimistic and cynical to others and concern them as dangerous and dishonest. People with high score of modesty can ignore their gains. Although they have not lack of self-esteem. People with low score of this component are arrogant and they believe them as exceptional people. So these two components are necessary to success in pilotage. The stepwise regression indicated that 24% of pilots job success is explained by modesty component.

There is direct relationship between Competence with pilots flight standard check. In another statement, pilots with high Competence, have more job success. The stepwise regression indicated that 21% of pilots job success is explained by Competence component. Competence is referred to individuals feeling about ability, wisdom, tact and effects on environment. The high score indicated

belief about abilities. Among conscientiousness components, Competence is more related to self-esteem (11).

Roberts et al. researched the relationship between personality traits and job performance of police forces and they concluded that among five factors, conscientiousness has most effect on job performance (18). In another statement, polices with higher score of this component have better job performance. The studies of jobs indicated that personnel with this trait, work harder, more ended tasks and they received more job promotions so their job and life satisfaction are increased.

Pilots personality profile in this research, indicates individuals with healthy personality who have conscientiousness and adjustment which explain their accountability and altruism. Traits of conscientiousness and neuroticism are in highest and lowest levels respectively. So pilots are in the opposite of neuroticism pole. It means that they have emotional, self-believe and relaxation consistency. Also, the results of research conducted on pilots through McCrae et al. job styles questionnaire (1. attitude style: they are classified in the progressive class, 2. Mood style: they are classified in the altruism class, 3. defense style: they are classified in the adaptive class, 4. Impulse control style: they are classified in the honest and unpretentious class, 5. interests style: they are classified in the creative class, 6. anger control style:

they are classified in the tolerant class, 7. activity style: they are classified in the sustained class, welfare style: they are classified in the optimism and peppy class) are concordant with the results of the present study (19).

According to better standards and same environmental conditions in the aviation centers, it is recommended that the present study will conduct in a re-test format on pilotage students and their practical and theoretical scores at the end of course concerned as performance criteria.

Little number of cases and lack of access to the cases because of geographical distribution are concerned as limitations which led that data collection last for about 6 months.

### Conclusion

According to the past researches which approved the effect of personality traits on job performance and need to fitness of personality with job, in our country, personality test is not used for selection individuals for a riskful and important job such as pilotage so these tests can be applied for candidates at the first employment for more concordance between pilots personality traits and environmental characteristics and type of flight instrument and the results can be compared to the standard profiles related to the job and applicants will be ranked based on the similarity to the standard profile in a relative scale.

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