MILITARY AVIATION PERSONNEL SELECTION

Damir Karpljuk, PhD[1]
Maja Meško, PhD[2]
Mateja Videmšek, PhD[1]
LTC Suzana Tkavc, MSc[3]

[1]University of Ljubljana, Faculty of Sport, Ljubljana, Slovenia
[2]Slovenia Control, Slovenian Air Navigation services, Limited, Ljubljana, Slovenia
[3]Ministry of Defence, Headquarters of Slovenian Armed Forces, Ljubljana, Slovenia

ABSTRACT

The nature of work in military organizations involves a high degree of responsibility as it is to do with human lives.Therefore, the importance of an appropriate candidate selection is of utmost importance.In our study, we aimed to determine which tests differentiate Slovene military pilots from the control groups, and produced a profile of a military pilot. The sample consisted of 120 participants, 30 of whom were in the experimental group while the other 90 were in the control group. The experimental group included military pilots and the control groups included the general population, sport pilots and soldiers with no relationship with connection to aviation.The participants in this research completed the personality inventory (BFQ) and Coping Responses Inventory (CRI) in a classroom, all motor tests and Complex Reactionmeter Drenovac (CRD) tests were performed in the gym. The statistical analysis, which was based on the discriminant analysis, identified statistically significant differences between the Slovene military pilots and the control groups. The results showed that military pilots use strategies focused on a problem and that they cope with problem situations effectively. Slovene military pilots are also very emotionally stable and outstandingly extraverted with a greater desire for achieving goals and a greater tendency towards activity.

Key words: Slovene military pilots, sport pilots, soldiers

MILITARY PILOT SELECTION

The nature of work in military organizations involves a high degree of responsibility as it is to do with human lives. Therefore, the importance of an appropriate candidate selection is of utmost importance. The need for a professional approach to candidate selection was expressed or percieved as early as in World War I. Implementing the selection process, military institutions motivated psychology experts to cooperate with them in this process. »Army Alfa« and »Army Beta« tests were applied to almost two million soldiers, however, these activities had no direct impact on the selection process (Zeidner & Drucker, 1989).

Air Force is, among others, also aimed at achieving and maintaining a high level of the required qualification of staff. To achieve this goal, qualified pilots have to meet the requirements of the position (Caretta & Ree, 2003). Since World War II human resource experts have been devoting their time, efforts and financial resources to identifying the characteristics of a well-qualified pilot and the instruments to be used in measuring (assessing) these characteristics (Caretta, 1989). Pilot selection as an element of a recruitment process has begun by implementing »self-selection«, which is still an important factor in civil pilot as well as in military pilot selection. Only those who have a strong desire for flying by plane are able to try and may consequently obtain a flying licence (Pohlman & Fletcher, 1999). In aviation, motivation is one of the prerequisite for military pilot service; it is a fundamental factor of success in this profession. Motivation enables people to function effectively while possessing certain abilities and knowledge. In prospective pilots, perseverance is a characteristic that represents a basic kind of a natural selection. It is demonstrated in the completion of the course and pursuing the career of a pilot. Later on, the procedure of pilot selection began to develop in more depth since pilot training represented a high expense. Therefore, in addition to »self-selection« more systematic and formalized procedures were introduced – initially by implementing a general selection method for selecting military staff, namely by physical qualification (Pohlman & Fletcher, 1999). At first physical requirements for military pilots differed only marginally from the requirements for other military staff (Brown, 1989; Hilton & Dolgin, 1991). Subsequently, they tried to upgrade the military pilot selection process by conducting various research, at first in Italy and France (Dockeray & Isaacs, 1921). Pilot selection procedures have been rendered more effective due to their stringency. Researchers established that pilots should be emotionally stable, possess good psychomotoric reactions and mental concentration, and should be able to take swift decisions. Italian researchers developed instruments for measuring reaction times, emotional states, balance, attentiveness and muscle strength, which were included in standard selection procedures. Shortly afterwards research began also in other countries. In addition to selection tests, they began to apply mental ability tests (pen and paper tests), which contributed to a stricter military pilot selection (Pohlman & Fletcher, 1999).

Military pilot selection is a multi-stage process. It is a process by which the decisions are taken in stages, from reviewing references, the number of flight hours, the test, the interview, the evaluation of the flight on a simulator to the evaluation of flying an aircraft and final interview (Caretta & Ree, 2003).

According to the planned development of the military aviation, the Slovenian Armed Forces plans long-term needs for aviation staff. Therefore, the Government of the Republic of Slovenia, on the initiative of the Ministry of Defence, opens applications for study grants (for aviation staff) every year. By way of the selection method, the most appropriate applicants are recruited. The selection involves a practical testing of candidates and is performed at the military airport. To serve this purpose, the methodology of candidate selection is designed.

Flight rules of military aircraft (Official Journal 46/2000, 31. 5. 2000) determine that a military person can manage or fly a military aircraft as a pilot, or they can fly as crew members if they meet the following requirements (provided for by the regulations):

- they have an appropriate aviation licence – a licence that is an upgraded civil licence with the prescribed military power;
- they are passed as medically fit to perform aviation tasks on the same category of an aircraft on which they are trained;
- they are theoretically and practically competent in performing tasks on a certain aircraft;
- they are issued with a flight order which are to be approved by a competent authority.

A candidate applying for a position of a military pilot in the aviation of the Slovenian Armed Forces selected to be trained according to the existent needs and plans has to fulfil the following requirements:

a) higher professional or university education in the aviation field
b) "A" health certificate awarded by the organization authorized for the medical checks of aviation staff
c) 200 flight hours in a motor airplane
d) examination for a sport pilot
e) examination for a professional pilot

Aviation staff can be subdivided by the levels of professional aviation qualifications in terms of skills or qualification and training for performing aviation tasks. The number of levels and the assessment procedure, defining the level of professional aviation qualification, are determined by regulations on

military aviation professional staff. Checking the level of qualification is performed every two years in accordance with the regulations on military aviation staff.

In our study, we aimed to determine which tests differentiate Slovene military pilots from the control groups, and produced a profile of a military pilot.

RESEARCH

Participants

The sample consisted of 120 participants, 30 of whom presented an experimental group while the other 90 presented a control group. The experimental group included military pilots and the control groups included general population, sport pilots and soldiers with no relation to aviation. The members of the control group were selected with regard to the qualities of the experimental group members so that both groups were equivalent in terms of relevant factors (gender, age, health condition, level of education, etc), thus participating in the study of equivalent pairs.

Tools

- BFQ questionnaire

BFQ (Big Five Questionnaire) is a tool for measuring personality structure according to the model of the 'Big Five' – i.e. the five major factors, which include ENERGY, AGREEABILITY, CONSCIENTIOUSNESS, EMOTIONAL STABILITY and OPENNESS.

- Coping Responses Inventory – CRI

To identify the strategies for coping with stressful life situations we used the CRI-Adult inventory designed by Rudolf H. Moos (Moos, 1990). The inventory consists of two parts. The introductory part (10 items) where someone presents a major problem from the last year of their life is followed by a longer second part (48 items) where the coping style is assessed using eight CRI sub-scales: logical analysis (LA), positive appraisal (PA), seeking guidance or support (SS), problem-solving action (PS) on one hand (thus assessing problem-focused coping styles) and cognitive avoidance (CA) on the other hand, acceptance or resignation (A), seeking alternative rewards (AR) and emotional discharge or emptying (ED) (thus assessing coping styles focused away from the problem). The logical analysis (LA) measures the cognitive effort to understand the stressor and the attempt to mentally prepare for the stressor and its consequences. The positive appraisal (PA) involves the effort to explain and positively reinterpret the problem while accepting the reality of the situation. The seeking guidance or support (SS) consists of behavioural efforts to seek information, guidance and support. Problem-solving action (PS) includes behavioural efforts to do something and to deal with the problem directly. Cognitive avoidance (CA) measures cognitive efforts to avoid a realistic consideration of the problem.

Acceptance or resignation (A) encompasses cognitive efforts to respond to a problem by accepting it. The seeking of alternative rewards (AR) includes behavioural efforts to engage in new activities and create new sources of satisfaction. Emotional discharge or emptying (ED) covers behavioural efforts to alleviate tension by venting negative emotions. The first four strategies constitute the strategies of approaching (problem-focused) and the last four the strategies of avoidance (emotion-focused). The strategies are further subdivided into cognitive and behavioural.

- Complex Reactionmeter Drenovac - CRD series

CRD is an origionally developed and rationally structured psychodiagnostic laboratory composed of 4 electronic instruments (of the type of reactionmeter), an IBM personal computer, professional printer, functional software for automatic measurement, generator of new tests and data base (Drenovac, 1994). In the CRD series, there are different instruments (CRD1, CRD2, CRD3 and CRD4), consisting of various tests. For the purpose of our research, we implemented CRD2 (spacial coordination), CRD 4A (visual proprioreceptive regulation and control of performing a motoric activity) and CRD 4C (test incite the function of signal noticing).

Procedure

The data were collected during the spring and summer of 2007 at different locations in Slovenia. The participants in this research completed the BFQ and CRI in a classroom, following the instructions specified on the inventory. There was no time limit determined to complete the inventory. All motor tests and CRD tests were performed in a gym.

The data were processed using the following methods:

- calculation of basic statistical parameters (descriptives); and
- discriminant analysis

All hypotheses were verified at a 5% risk level ($p = 0.05$). The SPSS software package was used for the data analysis.

RESULTS

The discriminant analysis was applied to all the groups, namely the group of military pilots and the control group. The analysis was applied to all the obtained variables in the following tests: push-ups, trunk-lifting, coordination and speed, in some of the tests in the CRD series, in the questionnaire measuring personality structure using the model of »the big five« - BFQ (big five questionnaire), and in the questionnaire identifying the strategies for coping with stressful life circumstances (CRI questionnaire – coping responses questionnaire).

Table 1

Summary of discriminant analysis for two groups (military pilots and control groups (altogether) after classification into separate variable clusters

ALL TESTS Function	Proper value	% variances	Cummulative %	Canonical correlation	Test of functions	Wilks' Lambda	Hi - square	df	Sig.
All tests	0.372	100.00	100.00	0.52	1	0.729	36.65	4	0.000
Motor tests	0.052	100.00	100.00	0.22	1	0.950	6.00	1	0.014
CRD	0.070	100.00	100.00	0.26	1	0.935	7.96	1	0.005
BFQ	0.301	100.00	100.00	0.48	1	0.768	30.69	3	0.000
CRI	0.231	100.00	100.00	0.43	1	0.812	24.13	4	0.000

We were interested in calculating the discriminant functions for the two groups (the military pilot group and the group including all the three control groups) by way of separate variable clusters. A summary of the discriminant analysis is presented in Table 16. A canonical correlation between all the variables and the first discriminant function is 0.52. A canonical correlation between four motor variables, which are (considered separately) all statistically significant, and the discriminant function is 0.22. A higher canonical correlation is shown only with the variables in the personality questionnaire BFQ, and amounts to 0.48.

DISCUSSION

Since 2004 major changes have been introduced in the Slovenian Armed Forces. Slovenia has become a NATO member as well as the European Union member, which requires new solutions in the organization and functioning of the Slovenian Armed Forces. A new law on military duties was adopted, introducing a combination of a professional army and voluntary contract reserve formation into the Slovenian military system. In Slovenia, the changes in security conditions have emerged. All the changes that have appeared require a higher level of professionalism as well as higher standards and better combat readiness. Military Air Force has a significant role in a state's defence system, be it in peace or in a period of crises as manoeuvring aircrafts can control the airspace and thus assure the sovereignity of a state, in particular the one that has a sensitive geostrategical position. The successfulness of the army and its desired goals cannot be achieved without highly qualified staff. Selection models and instruments should be found to make an optimal selection of candidates possible. This is especially true for smaller states, which, among other, lack qualified personell. The

nature of work in military organizations involves a high level of responsibility as people's lives are involved/in question. Therefore, the significance of appropriate candidate selection is even more important. In Air Forces, one of the most important goals is to achieve and maintain a high level of the required qualification. In order to achieve this goal, candidates for military pilots have to be highly qualified and should meet all the requirements. A good psychological readiness and motoric ability in military pilots are among the requirements necessary for a good qualification.

Motoric abilities are not equally developed in all people, which results in differences in motoric efficiency among individuals. In the Slovenian Armed Forces, there is a tendency towards well-developed motoric abilities among the majority of its members as motoric abilities of each individual soldier, as well as the whole unit, represents one of the key elements of combat readiness, which emphasises the significance of army training (Karpljuk, Rožman, Suhadolnik & Karpljuk, 2000). The pertaining evaluation of motor abilities, as an element of the contents and tasks, is based on general and specialised guiding principles (Tkavc, 2004). Psychological characteristics of each individual soldier are, beside motorical abilities, the starting point of combat readiness (Novak, 2003). Therefore, we can conclude that the motoric abilities and psychological characteristics of soldiers are of utmost importance for appropriate combat readiness of armed forces. This is also related to the basic purpose of our research, which is to study some special characteristics of military pilots or to establish if it is possible to design a model or a profile for Slovenian military pilots. In our research we tried to define the special features of some motoric abilities and psychologic characteristics of Slovenian military pilots and define those parameters that have lead to such a position.

In our studies we applied motoric tests (push-ups, trunk-lifting, coordination tests, speed tests), some of the tests in the CRD series, a verified questionnaire for measuring personality structures by the »Big Five« model and the questionnaire for finding out the strategies for coping with stressful living circumstances – stress coping questionnaire CRI.

In all motoric tests the groups distinguished statistically significantly between each other. In two motoric tests the military pilots on average reached the highest results, namely in the test of movement coordination and the test of movement speed.

In the research we focused on finding out the main motoric abilities and psychologic characteristics of the Slovenian military pilots group, namely on finding out the special characteristics of this group. We believed that the special characteristics of the Slovenian military pilots can be defined in terms of the subspace of motor ability variables and in terms of the subspace of psychological characteristic

variables. In our research, the special characteristics of military pilots were analysed by way of discriminant analysis.

Accordingly, by way of discriminant analysis we aimed at finding out the characteristics of the military pilots group, namely the characteristics including all the applied variables in this research. We made a discriminant analysis for the two groups (the military pilots and the control groups) in the area of separate test clusters. By way of discriminant analysis we aimed at establishing which tests most accurately discriminated the military pilots from the other groups and best defined the characteristics of the military pilots group. We established that the military pilots were best distinguished from the other groups in the research by the cluster of all the tests used in our research, and they could also be quite equally distinguished by the BFQ test and CRI test. The CRD test series and the motor ability tests were those that distinguished them to a little bit lower extent. By way of discriminant analysis we established or determined the special characteristics of the military pilots that distinguished them from the other groups. These characteristics involved better emotion control - aspects that relate to tension control and involve emotional experiences, a higher level of emotional stability – the ability of emotional self-control, the ability of keeping steady nerves (not losing one's temper) and (mental) balance, absence of negative emotional states, energetic and dinamic functioning, communicativeness and enthusiasm, the ability of self-assertion, pushing oneself forward and influencing others and in turn a high level of extrovertness, a high impulse control - aspects relating to the ability of one's own behaviour, also in unpleasant, conflict and dangerous situations. Nevertheless, in comparison with other groups, the military pilots were less distinguished by the strategy of coping with stress, cognitive avoidance representing cognitive efforts to avoid realistic thinking about the problem, amiableness (as a personal trait) as well as longer maximum time in seconds in completing the test of spacial coordination measuring a mental function involving complex analytical processes.

Therefore, we can conclude that there is a correlation between the military pilots' motor abilities, psychomotoric abilities, personality, stress coping strategies and successfulness in the profession of military pilot. This correlation explains a part of successfulness variability in the profession of military pilot and cannot be neglected. In military pilot selection, more and more importance is given to motor abilities and psychological characteristics of military pilots as they represent performance parameters in this profession.

In the research presented we gathered a large number of data pointing out some important phenomena which will need to acquire additional attention in the future.

REFERENCES

1. Brown, D.C. (1989). Officer aptitude selection measures. In M.F. Wiskoff & G.M. Rampton (Eds.), *Military personnel measurment: Testing, assignment, evaluation* (pp. 97-127). New York: Praeger.

2. Caretta, T.R. (1989). USAF pilot selection and classification system. *Aviation, Space, and Environmental Medicine, 60,* 46-49.

3. Caretta T.R., & Ree M.J. (2003). Pilot Selection Methods. In P.S. Tsang & M.A. Vidulich (Eds.), *Principles and practice of aviation psychology* (pp. 357-396). London: Lawrence Erlbaum Associates, Publishers.

4. Dockeray F.C., & Isaacs S. (1921). Psychological research in aviation in Italy, France, England, and the American Expeditionary Forces. *Comparative Psychology, 1 (2),* 115-148.

5. Hilton, T.F., & Dolgin, D.L. (1991). Pilot selection in the military of the free world. In R. Gal & A.D. Mangelsdorff (Eds.), *Handbook of military psychology* (pp. 81-101). New York: Wiley.

6. Karpljuk D., Žitko M., Rožman F., Suhadolnik M., & Karpljuk K. (2000). *Teoretične osnove in praktična izhodišča športne vadbe, namenjene višjim častnikom Slovenske vojske [The theoretical basics and practical principles of physical training aimed at senior officers]*. Ljubljana: Ministrstvo za obrambo RS.

7. Moss, R.H. (1992). »Coping responses inventory manual«. In D.L. Milne (Ed.), *Assessment: A Mental Health Portfolio.* Windsor: NFER Nelson.

8. Novak, M. (2003). *Razvoj motoričnih sposobnosti pripadnikov SV po standardih ameriške vojske [Development of motor skills in SAF members according to the standards of the US Army]*. Bachelor's thesis, Ljubljana: Univerza v Ljubljani, Fakulteta za šport.

9. Pohlman, D.L., & Fletcher J.D. (1999). Aviation Personnel Selection and Training. In D.J. Garland, J.A. Wise & V.D. Hopkin (Eds.), *Handbook of Aviation Human Factors* (pp. 277-308). Mahwah, New Jersey: Lawrence Erlbaum Associates.

10. Tkavc, S. (2004). Gibalne sposobnosti v povezavi s športno dejavnostjo in nekaterimi morfološkimi značilnostmi ter struktura motivov pripadnikov stalne sestave Slovenske vojske [Motor abilities in relation to sport activity and some morphological characteristics, and the structure of motives of active military personnel of the Slovenian Armed Forces]. Master's thesis. Faculty of Sport. Ljubljana.

11. Zeidner, J., & Drucker, A.J. (1989). *Behavioral science in the Army: A corporate history of the Army Research Institute*. Alexandria: Army Research Institute.