

ASSESSMENT OF PERSONALITY TRAITS OF NAVY DIVERS

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Abstract - Little researches have been done to demonstrate the relationship between psychological condition, personality traits of divers and scuba diving. Successful divers have a profile that is positively correlated to intelligence, is characterized by a level of neuroticism that is average or below average, and score well on studies of self-sufficiency, independence and emotional stability. The profession of military diver is especially risky and requires practitioners to possess a high degree of physical and mental stability. Much of the published research has been done on US Navy Divers, two study reported on divers in the South African Navy, one research has been made in the Spanish Navy Diving Center.

Our study compared the personality traits of military sailors (non-divers), navy divers and civilian sport divers. Tested are 258 persons (86 in each group) using the 16 Personality Factor Questionnaire. Compared with sailors navy divers manifest themselves as higher scores for emotional stability, were more adventurous, more enthusiastic, group-oriented and tough minded. In comparison to the sport divers, they had higher superego scores, were less assertive, were more practical, shrewd, group-oriented and they had a higher self-sentiment.

Keywords - personality traits, occupational diving, navy divers

I. INTRODUCTION

Divers are people employed to work in underwater environments, operate in an extreme occupational health context. The unique dynamics of their hyperbaric environment, with its physiological, psychological, and social concerns, poses serious potential risk to their health and safety. Professional requirements imposed on divers require them to be individuals with high levels of physical sustainability. In order to cope well, divers need to have a particular psychological resilience. Research on the personality of military divers have described them in terms of biographical variables [3], psychiatric "disturbances" [4], personality traits [2, 28], anxiety [2, 24], psychopathology [5, 13], aggression [21], locus of control [2], personality styles [1], and neuropsychological profiles [15, 16]. Selection and subsequent successful implementation of divers much depends on their personality traits. Naval diving presents one of the most challenging and psychologically demanding environments for divers. This hostile environment creates special challenges, which include technological, biological, and psychological stressors. Personal qualities of divers are essential for the good realization and safe performance of tasks under water. Navy divers show a more internal locus of control, and have lower scores on measures of social contact [2]. Certain personality traits known to be important for navy divers, as measured by the 16 Personality Factor Questionnaire (16PFQ), the IPAT Anxiety Scale [11], and Rotter's Internality-Externality Scale (RIES) [19, 29].

Navy divers undergo a stringent selection before entering the diving branch, which tends to lead to the homogeneity of scores on any subsequent psychological measures. It is not

surprising, therefore, that military divers have been reported to score in the direction of internality on the RIES [2], and lower on anxiety measures than control groups [2, 24]. These findings support the hypothesis that individual differences are related to the probability of successful adaptation and effective performance in professional diving. These results also verify that personality traits play a decisive role in diving training and are significant factors in divers' psychological fitness.

The aim of our study was to find out what are the personality traits of professional navy divers and whether they differ from those of other military (non-divers) and whether personality traits of navy divers be typical of those of civilian recreational divers. Results from our study could potentially inform appropriate selection of individuals in these groups, as well as facilitate their subsequent job satisfaction and psychological well-being.

II. MATERIALS AND METHODS

PARTICIPANTS

Voluntarily in the study involved three groups, each up to 86 men a total of 258 people. Very few women work in this branch, so we are not collecting data about them yet. Participants were recruited from different units of the naval base and several civilian diving clubs. Participants' data were included in the analyses if a number of criteria were met:

- are approximately the same age (average age 27±6);
- no previous psychiatric history;
- participants were included after obtaining their voluntary consent;

- all have secondary education, each had 12 years of formal schooling (exclude university graduates because they are a small number among of studies contingent);
- all participants were operationally employed in their field for at least 2 years.

The last criteria was selected because it is assumed that the would give an indication of the ability to adjust to the demands of the environment.

Navy diver group

Eighty six navy divers on active duty, participated in the study. The mean age of the all 27.03 years (see table 1). On average they had been involved with military diving for 4.5 years. 14 study participants were recruited from the group of Navy Seals who besides divers are paratroopers (16.28% of all). All have undergone regular medical examination for fitness for military diving activities.

Navy non-diver group

86 sailors (average age 27.65) from the command deck of ships and technical personnel participated in the control group. All seamen who are recruited for conducting the survey were from the same naval base with divers. None of them has been engaged in diving activities so far. There was no significant difference in the time spent in the Navy when compared with the divers.

Civilian recreational (sport) diver group

Eighty six civilian sport divers from 6 local diving clubs formed the non-navy recreational diver comparison group. They have different diving experience as a diver qualification varies between Open Water Diver to Divemaster according to PADI (from CMAS* to CMAS***). None of them had any military background. They had a mean age of 28.12 years, and had been, on average, involved with sport diving for 4.2 years.

Table 1. Descriptive statistics for age

Group	Mean	SD	Min	Max	No
Navy divers	27.0349	2.95634	22	32	86
General navy	27.6512	3.29266	22	33	86
Sport divers	28.1163	4.05091	21	34	86

PROCEDURE

Data collection

Completing the questionnaire was done in the classroom, in a relaxed atmosphere in groups between 10 and 15 people. The researchers explained in detail how to answer and fill out the answer sheet of the instruments, making it clear that the participants should choose the answer that best represented their behavior.

Data analysis

The analyses were carried out using the Statistical Package for the Social Sciences (SPSS) version 19. The descriptive statistics for age are shown in table 1. The navy diver group is compared with the navy non-diver group in table 5 using t-tests for independent groups. T-tests were also used to compare the navy divers with the recreational divers (Tab.6).

Ethical Considerations

Throughout the research process have observed the ethical principles to protect human rights in accordance with the Declaration of Helsinki.

TEST USED

16 Personality Factor Questionnaire (16PFQ) was administered to all participants [9]. The 16PFQ was designed to assess a constellation of traits. Raymond Cattell develops 16PFQ by that measure the personality, described by 15 personality factors and one mental ability factor. Cattell was one of the most important theorists in the area of personality. In Cattell's view, personality is the manner in which human beings behave in a certain situation. In empirical studies, he considered three kinds of basic data to capture personality dimensions: "a" - responses to questionnaires, that is, the introspection of the individuals about their own behavior (Q-data); "b" - third party reports based on observations about the individual everyday life behaviors (L-data); and "c" - relatively straightforward measures of behavior controlled in a lab [6, 7, 8, 27].

Table 2. Description of the 16 global factors and their respective traits for low and high scores

Nº	Global Factors (Sub-scale)	Personality Traits Low score vs High score
1	A – Warmth	reserved, cool vs warm hearted, outgoing, participating
2	B – Reasoning	lower grade, low intelligence vs higher grade, high intelligence
3	C – Emotional Stability	high ego strength, emotionally instable, affected by feelings, easily upset vs low ego strength, emotionally stable, adaptable, calm
4	E – Dominance	deferential, docile, cooperative vs assertive, dominant, independent
5	F – Liveliness	sombre, taciturn, serious, introspective vs carefree, enthusiastic, cheerful
6	G – Rule-Consciousness	low superego, expedient, inconvenient vs high superego, conscientious, conforming with cultural and conventional values
7	H – Social Boldness	shy, timid vs adventurous, socially bold, venturesome
8	I – Sensitivity	tough-minded, utilitarian, objective vs sensitive, tender-minded
9	L – Vigilance	trusting, unsuspecting vs suspicious, skeptical, vigilant
10	M – Abstractedness	practical, grounded vs abstract, imaginative, absorbed in ideas
11	N – Privatness	artlessness, forthright, genuine vs shrewdness, polished, private
12	O – Apprehension	untroubled adequacy, complacent, self-assured vs guilt proneness, indecisive, apprehensive
13	Q ₁ – Openness to Change	conservatism, traditional vs radicalism, experimental, open to change
14	Q ₂ – Self-Reliance	group-oriented, affiliative vs self-reliant, self-sufficiency, solitary
15	Q ₃ – Perfectionism	low self-sentiment, undisciplined, tolerates disorder vs high self-sentiment, controlling, perfectionist
16	Q ₄ – Tension	low ergic tension, calm, relaxed vs high ergic tension, tense, impulsive

The factor structure used by the 16PFQ is described under sub-scales (Table 2). It consists of 185 questions (185 items - 5th and current edition) and 16 sub-scales (16 primary traits) [10]. After an analysis of 16 factors of the first version they are grouped in five global factors known as the Big Five Factor Model of Personality Traits (FFM) which is proposed by some authors as universal (McAdams, 2009; Nunes, Hutz, & Nunes, 2010). FFM is: extraversion, anxiety,

toughmindedness, independenceand self-control (Table 3), whichwould later be updated as extraversion, neuroticism, openness to experience (inverse correlation), agreeableness (inversecorrelation) and consciousness, through reanalysis of Cattell’s data by other researchers (Costa Jr. & McCrae, 2007, McCrae R. R., John O. P). The 16PFQ is considered to be a predecessor of the modern Big Five(Table 4).

The instrumentwe used is called Cattell’s Personality FactorQuestionnaire (Primi & Carvalho, 2008).For each item, a scale offour point answers was added (1 = *nothing to do with me*, 2 = *a little to do with me*, 3 = *a lot to do with me* and 4 = *verysimilar to me*), based on studies about scaleoptimization (Nunes, 2010).In our study we used only 15 factors(thefactor B, reasoning, was removed, due to the fact that it is factorwith contents less related to the personality).

Table 3: Description of the Five Global Personality Factors of Raymond Cattell

Primary Global Factors	Secondary Global Factors
A+ F+ H+N- Q2-	I – Extraversion vs Introversion Extrovert (Socially Bold)vsIntrovert (Socially Inhibited)
C-L+ O+ Q4+	II – Anxiety vs Stability High Anxiety (Emotionally reactive) vsLow Anxiety (Emotionally stable)
A- I- M- Q1-	III – Though Mindedness vs Openness Inflexible (Firm, Low Empathy) vsReceptive (Open Minded, Intuitive)
E+ H+ L+ Q1+	IV – Independence vs Accommodation Independent (Persuasive, Focused on the future) vs Accommodated (Submissive, Self-sacrificing)
F- G+ M- Q3+	V – Self-control vs Lack of inhibition Controlled (Inhibited) vsVigilant (Impulsive)

Table 4: Description of the modern Big Five Factors

Big Five Factors	Description
Extraversion is characterized by talkativeness, assertivenessand energy	This factor is sometimes referred to as Surgency.
Neuroticism is characterized by upsetability and is the polar opposite of emotional stability	This factor is sometimes scored in the opposite direction and referred to as Emotional Stability.
Opennessto experience is characterized by originality, curiosity and ingenuity	This factor is sometimesreferred to as Culture because of its emphasis on intellectualism, polish and independence of mind. This factor is also sometimes referred to as Intellect because of its emphasis on intelligence,sophistication and reflection.
Agreeableness is characterized by good-naturedness, cooperativeness and trust	While this factor is most commonly called Agreeableness, it can also be seen as a combination of friendliness and compliance.
Conscientiousness is characterized by orderliness, responsibilityand dependability	This factor is sometimesreferred to as Dependability.

This description of the Big Five is drawn from Digman [14], Goldberg [18], and John & Srivastava [20].

III. RESULTS AND DISCUSSION

In tabular form we present only those factors that we have found a significant difference between the three groups studied by comparing navy divers with civilian divers and non-divers.Table 5 presents the comparison among thenavy diver and navy non-diver groups.The navy diver group had higher emotionalstability(C+), were more enthusiastic (F+),socially bold (H+),tough minded (I-), andgroup-oriented (Q₂-) than their non-diving colleagues.

Table 5: Comparative scores for navy diversand navy non-divers

Factor	Mean navy divers	Mean navy non-divers	t-value	p-value
* C+	6.82	5.28	3.15	0.0026 *
* F+	7.44	5.12	4.48	0.0004 *
* H+	7.12	5.68	3.09	0.0096 *
* I-	4.63	6.21	- 2.53	0.0203 *
* Q ₂ -	3.48	5.73	- 3.86	0.0018 *

Correlation is significant at the 0.05 level (*p<0.05)

The comparative scores for the navy diver andcivilian recreational diver groups are presented in table 6. The results showed thatthe navydivers weremoredeferential and cooperative (E-), had ahigher superego (G+), were more practical (M-), moreshrewd (N+), were less apprehensive (O-), more group-orientated (Q₂-), and had a higher self-sentiment (Q₃+).

Table 6: Comparative scores for navy diversand civilian sport divers

Factor	Mean navy divers	Mean civilian divers	t-value	p-value
* E-	6.12	7.93	-3.95	0.0006 *
* G+	6.14	4.96	3.22	0.0024 *
* M-	4.71	5.62	-2.32	0.0198 *
* N+	5.64	4.38	2.37	0.0207 *
* O-	3.98	5.12	-2.14	0.0233 *
* Q ₂ -	3.48	6.04	-3.97	0.0004 *
* Q ₃ +	6.79	5.48	2.72	0.0089 *

Correlation is significant at the 0.05 level (*p<0.05)

Every diver has his own personality makeup, which may respond differently to abnormal physiological and psychological states. There are, significant differences in personality traits between military and civilian divers. Although they are less, differences were also detected between the two groups of military: divers and non-divers.

When compared navy divers to other Navy personnel not involved in diving,differences emerged on 5 factors. Factor C(emotionalstability) refers to emotional stability, lower egostrength, with a higher score indicating maturity and calmness or self-controlamidst difficulties [8]. Navy divers aremore confident, carefree, complacent, and emotionally stable, compared with their counterparts from the Navy, not

divers. The divers' higher scores reflect the demands of military diving which requires maturity and self-control, maybe more than for the general navy.

A high score on Factor F is indicative of an enthusiastic, happy-go-lucky, and carefree person. Risk taking behaviour has also been correlated with high scores. The highest score of the navy divers can then be expected, as such persons seem to adjust well in groups and to adverse environments.

Factor H+ relates to how subjects present themselves socially, which can be either in an uninhibited and outgoing manner. The navy divers are adventurous and socially bold.

Factor I refers to emotional sensitivity, where a lower score describes a person who is tough and independent. This factor relates to the way people deal with their actions, that is, more objective, realistic, practical and discreet manner. A low score on this factor is desired and sought the selection of divers, because only a tough-minded and hardened individual scope with the heavy training program. So this result could be expected, given the selection process for military divers and their conditions of work.

Factor Q₂ (self-reliance) corresponds to the way people relate to others, in a more individualistic way or more dependent on group contact, which may affect the relations between the divers and other crew members. Low scores refer to group orientation, and are typical of navy divers. They adhere to groups or they are group-oriented [31]. A positive group orientation is possibly also a trait of naval personnel in general, reflecting the team-approach of Naval operations.

When comparing the two diving groups, this the military divers versus the group of civilian sport divers, we find significant differences in the seven factors of personality traits.

Factor E (dominance), shows the way in which people tend to relate to others. The persons with a lower score are more obedient and easily influenced. They are deferential, as a more cooperative. The sport divers' higher scores on assertiveness may be an indication of their superior academic education. On the other hand, the navy divers were also subject to military indoctrination, trained to follow orders, a form of conditioning not necessarily experienced by civilians. The lower (more docile) scores of the non-diving navy group seems to support this explanation.

The higher score of factor G (rule-consciousness or super ego) poses a person who is conscientious, rule-bound and persevering [9]. A person with high score tends to follow rules and conventional values. The higher scores of the naval divers may reflect their environment, the tightly regimented and regulated world of the military. Civilian divers do not necessarily live in such an environment, and are more free to choose expedient solutions.

A low score on factor M relates to the way people deal with their actions, that is, more objective, realistic, practical and discreet manner. A person with a low score of this factor is practically orientated, who has his feet on the ground and focuses on practical needs. Navy divers work in a more practical system which performed various regulated activities, often monotonous practically directed and controlled. Sport diver is an imaginative person, who is more caught up in ideas. The sport divers all had a wider background, which would prime them to be more comfortable with ideas and possibilities.

A high score on factor N is indicative of a shrewd, polished, and private person. Why navy divers tend to be more world-wise is unclear. It can be that through their exposure in the navy they have seen more of life, but this remains mere assumptions and needs to be further investigated.

Factor O (apprehension) defines military divers as untroubled, complacent, and self-assured. The persons with a low score are more confident, carefree, and emotionally stable. As the comparison with the sailors, the navy divers are much more group-oriented (low Q₂ factor).

The factor Q₃ (perfectionism) determines navy divers as high self-sentimental, controlling, and perfectionist. They are individuals who are more careless and less controlled, but they are not able to tolerate disorder and make unplanned decisions. The demands of navy diving (adverse conditions, dangerous situations, technical challenges) may require a precision that is not necessary for the sport diver who mostly dives under unpleasant conditions.

Our results substantially confirm the facts of the investigation on the personality traits on the US Navy divers [1] which describes them as optimistic, independent, self-serving, analytical, and tending towards social aggressiveness. They tend to conform to a profile of enthusiasm (F+), adventurousness (H+), confidence (O-), and group orientation (Q₂-) [31]. In our study, we find small differences that define the Bulgarian navy divers as more tough-minded, utilitarian, and objective (factor I-).

Owing to the physiological and psychological demands of their work environment, all naval specialists are annually subjected to a specialised and comprehensive health assessment. Navy divers are known for their physical fitness. This is a requirement for selection, and is further indoctrinated through strong emphasis on physical fitness during training. Physical exercises are associated with psychological well-being. They also display high levels of psychological resilience, again partly due to their demanding psychological selection processes. Their status as part of an elite work group, which could enhance their experiencing life as meaningful may further contribute to the understanding of their high scores.

Factor Q₃ (perfectionism) juxtaposes individuals who are more careless against individuals who are self-controlled, precise and even compulsive. The demands of navy diving may require a degree of precision and self-control that is not necessary for other occupational fields or for sport diving. Military indoctrination further encourages meticulous checking of equipment and imposes regimented diving procedures, and high precision or perfectionism may then be required as a requirement for safe diving in situations where mistakes can be fatal.

A high score on factor F is indicative of an enthusiastic, quick and alert person, who also appears to be more effective in groups, and group adjustment is very important for navy divers. Further, enthusiasm may compensate for the often adverse environments in which they have to work, allowing them to adjust well to the demands of the job.

IV. CONCLUSION

Personality plays an important role in environmental adaptation, particularly in the military diving. Do navy divers constitute a unique group?

Navy diver and navy non-diver 16PF profiles were relatively closely here. Our findings suggest that they differ from non-diving naval personnel on 5 traits using the same instrument. Some of the differences may be explained by selection, whether formal or self-selection, and some may reflect the diving environment. Occupational selection may be important for individuals within the military who express an interest in military diving, but some may not meet the person-task fit.

We found 7 personality traits which differ navy with civilian divers. These differences may be a function of other factors, not associated with their military/civilian backgrounds. They may reflect a difference between young people of different educational level. The sports divers come from a group with tertiary academic attainments, and a higher socioeconomic status.

In summary, navy divers are enthusiastic and emotionally stable. They show higher ego-strength, tough-mindedness, adventurousness, and group-oriented than their non-diving counterparts in the navy. They are less assertive, displayed higher superego scores, practical orientation, shrewdness, group orientation, more docile and self-sentiment (precision) than civilian sport divers.

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