Personality characteristics of South African Navy divers

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Van Wijk C, Waters AH. Personality characteristics of South African Navy divers. Undersea Hyper Med 2001; 28(1):25–30.—The first study aimed to determine the extent to which the 16 Personality Factor Questionnaire (16PF) can be used to describe successful divers in the South African Navy. The 16PF profiles of 100 divers were analyzed to describe the personality characteristics of naval divers. Results indicate that four personality factors were most descriptive of the sample. They were Group-orientation, Enthusiasm, Adventurousness, and Confidence. These factors seemed appropriate when discussed from an environmental demand perspective. The second study aimed to determine the extent to which the 16 PF can be used to differentiate between divers and submariners in the South African Navy. The two groups differed significantly on two factors—divers scored higher on Enthusiasm and submariners scored higher on Conservatism

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Military divers are confronted with potentially severe environmental stressors in the execution of their duties, and it is little wonder that the diving branch is considered one of the elite units of the South African Navy. Naval diving presents one of the most challenging and psychologically demanding environments for divers. This hostile environment necessitates the use of specialized equipment, which requires advanced training. Potential life-threatening stressors include equipment failure, gas contamination, very low ambient temperatures (causing hypothermia), impairment of senses under water due to the environment (e.g., low visibility) or equipment (e.g., wet suit), poor communication (visual and auditory), isolation when performing duties underwater, dangers of inadequate decompression, and working in enclosed spaces. These potential stressors would require a person to be able to adjust to those stressors, to make a success of a naval diving career. To define that kind of person, previous research tried to describe personality characteristics common to divers.

Focusing on psychopathology, Biersner and Ryman (1) reported that more divers were admitted to the Psychiatric Service than the overall U.S. Navy average for similar age and pay grade (1.7 vs. 0.75%). Further, there were more diagnoses of "situational maladjustment" than among the other navy psychiatric admissions (1). However, more divers ($P < 0.001$) with diagnoses of "character and behavioural disorders" were returned to active duty. Dembert et al. (2), using the Minnesota Multiphasic Personality Inventory (MMPI), found that navy divers fell "well within the extreme score limits" (p49), indicating the lack of psychopathology. Within the normal range, the hypomania (Ma) scale was the most elevated, but not enough to suggest psychopathology.

Biersner and LaRocco (3) report findings that divers suffer from more social adjustment problems, and are more autonomous and less dependant on others. The divers also had low levels of self-reported negative mood and high levels of self-reported positive moods. Biersner and LaRocco's (3) research used Rotter's Internality-Externality scale, which gives an indication of a person's perceived locus of control, and the Socialization scale of California Personality Inventory (CPI). They also used the State-Trait-Anxiety Inventory (STAI) Trait-subscale, which measures individual proneness to anxiety, and the Sensation Seeking Scale (SSS). In Biersner and LaRocco's study (3), the divers showed more internality, indicating a perceived internal locus of control, and had significantly fewer and less friendly interactions with others according to the Socialization scale of the CPI. They also reported lower levels of chronic anxiety than the STAI norm group on the Trait-Anxiety scale. On the SSS, the divers scored significantly higher on the Thrill and Adventure-seeking subscale, and significantly lower on the Experience-

seeking and Disinhibition subscales. The SSS results would imply that US divers, compared to first-year college males, acknowledge a higher interest in and preference for risks that involve physical danger, but more often avoid mental and social activities that are novel or unconventional.

Beckman et al. (4) used the Millon Index of Personality Styles (MIPS) to describe group personality characteristics among U.S. Navy divers. They identified five subscales as most descriptive of naval divers, namely, Enhancing, Modifying, Individuating, Thinking, and Controlling. In summary, Beckman et al. (4) describe the divers as optimistic, independent, self-serving, analytical, and tending toward social aggressiveness. The authors conclude that the five traits appear contextually appropriate when viewed from an occupational perspective.

Given the potential environmental stressors of military diving, it can be hypothesized that navy divers as a group will display certain characteristics to cope with this environment. The first study aims to determine the extent to which the 16 Personality Factor Questionnaire (16PF) can be used to identify characteristics to describe successful divers in the South African Navy (SAN). The study tries to identify factors common to divers, and explain it from an environmental demand perspective. The second study aims to determine the extent to which the 16 Personality Factor Questionnaire can be used to differentiate between risk-professions in the SAN by comparing divers and submariners.

STUDY 1

Method

Participants: One hundred navy divers on active duty in the diving branch participated in this study. Their ages ranged from 20 to 45 (mean of 25.86). Divers were included in the study if they had 12 yr of formal school education (all participants had 12 yr), if they were qualified as clearance divers, and if they had at least 1 yr of operational experience. Divers were further included if they were on their second or more 2-yr contract with the navy, giving an indication that they were willing to stay in the branch for at least another 2 yr. The last two criteria were selected because it was hypothesized to give an indication of ability to adjust to the demands of naval diving. None of the divers had any previous psychiatric history. All the divers were enlisted men. The divers in the group were involved in the tasks of mine-clearance, ships' maintenance, and search and rescue operations. Due to cultural sensitivity, race was not indicated. All of the divers took part in their annual medical evaluation (which includes a psychological screening) at the time the instrument was administered.

Instrument: 16 Personality Factor Questionnaire. The 16PF was developed by Cattell et al. (5) and is a measurement of personality described by 15 personality factors and 1 mental ability factor. Each factor on this self-report instrument is scored on a bipolar scale, indicating a personality trait. Factor A is reserved vs. warmhearted. Factor B is low intelligence vs. high intelligence. Factor C is high ego strength vs. low ego strength. Factor E is submissiveness vs. dominance. Factor F is somber vs. enthusiastic. Factor G is low superego vs. high superego. Factor H is timid vs. adventurous. Factor I is tough-minded vs. tender-minded. Factor L is trusting vs. suspicious. Factor M is practical vs. imaginative. Factor N is artlessness vs. shrewdness. Factor O is untroubled adequacy vs. guilt proneness. Factor Q_1 is conservatism vs. radicalism. Factor Q_2 is group orientation vs. self-sufficiency. Factor Q_3 is low self-sentiment vs. high self-sentiment, and factor Q_4 is low ergic tension vs. high ergic tension (referring to irrational worry and anxiety). The South African edition of the 16PF that was used is standardized for non-clinical populations and previously used in the South African context for a wide range of personnel selection applications and vocational guidance. At present it is mostly used for research purposes.

Design: All divers who came for their annual psychological evaluation were invited to participate. The first 100 completed 16PF answer sheets of divers who met the criteria of education, experience, qualification, and contractual commitment. Consent to use the psychometric profiles for research purposes was given before participating. Test administration took place individually or in small groups. The same person was responsible for administering the test to all 100 divers. The 16PF was completed in one session, and the profiles were computer scored.

Results

Table 1 presents the means and standard deviation for the 15 personality factors. The 16PF pattern for divers appear to be one of enthusiasm (F^+) and adventurousness (H^+), confidence (O^-), and group orientation (Q_2^-). They also show elevated scores for ego-strength (C^+), assertiveness (E^+), and self-sentiment (Q_3^+). The first four factors differed most from the general population and are the best descriptors of the divers in this group.

Discussion

The four personality factors most descriptive of this

Table 1: Means and Standard Deviations for 15PF Factor

	Diver Group		
Factor	Mean	Standard deviation	Mean of norm group
A	5.28	1.95	5.5
C	6.64	1.44	5.5
E	6.72	1.88	5.5
F[a]	7.21	1.83	5.5
G	5.98	1.48	5.5
H[a]	7.12	1.63	5.5
I	4.74	1.89	5.5
L	4.61	1.92	5.5
M	5.06	1.14	5.5
N	5.42	1.99	5.5
O[a]	4.10	1.59	5.5
Q_1	5/87	1.79	5.5
Q^2a	4.00	1.86	5.5
Q_3	6.59	1.69	5.5
Q_4	4.51	1.64	5.5

[a]The four factors most descriptive of the norm group.

sample appear contextually appropriate when viewed from an environmental demand perspective. This perspective maintains that the demands of an occupational environment would cause people with the skills or abilities or characteristics to meet or cope with those demands, to stay and progress in that occupational environment. Beckman et al. (4) found that personality traits can be adaptive with respect to the specific requirements of military diving duty.

Factor Q_2 refers to group dependency, and low scores indicate social group orientation, a "joiner" and a sound follower. Low scores are typical of people who fall in with groups, depend more on social approval, and are more conventional (5). A positive group orientation may be an important requirement for adjusting to the teamwork approach of diving operations, as well as dependance on a "diving buddy" and support team while under water.

Another factor that may contribute to this is the way in which the divers see themselves as an elite unit, separate from other branches, with a very strong loyalty code. The high group-orientation stands in contrast with previous research (3,4), which indicated less friendly social interaction and more independence among military divers. This contrasting finding may be due to the use of different instruments, and may also be influenced by the specific organizational environment (SAN), and the close focus on group work and interdependency for safety in the SAN diving branch.

A high score on Factor F is indicative of an enthusiastic, happy-go-lucky person. It further points to a quick and alert person, without too many cares. A person with a high score also appears to be more effective in groups (5). Because of their more care-free nature, they probably adjust well in the group. Further, their enthusiasm may compensate for the often adverse environments in which they have to work (e.g., dirty water), allowing them to adjust well to the demands of the job. South African research suggests that high scores on factor F are correlated to risk-taking behavior in bus drivers (6). Risk taking may also be applicable in divers, given the dangerous nature of the military diving occupation.

High scores on factor H is indicative of adventurousness, being thick-skinned, and socially bold. According to Cattell et al. (5) "H presents some largely constitutional factor of low physiological reactivity to threat" (p92). This may be a valuable trait for divers, who would ideally not be too easily thrown by the potential dangers of general diving duties. This trait becomes even more necessary when engaged in more gruesome tasks like body recovery, where sensitive individuals may experience more distress. The variety of tasks a military diver may be exposed to, as well as the uncertainty of not always knowing what will come next, makes their sense of adventurousness a particularly valuable trait. This finding corresponds well with previous research (3).

A person with low scores on factor O can be described as self-assured, placid, and secure. Persons with high O scores report over-fatigue from exciting situations, and find themselves unable to sleep through worrying. They feel inadequate to meet the rough demands of life, and prefer books and quiet interests to people and noise (5).

The lower scores found may indicate a resilience to the exacting and demanding situations divers need to confront in their duties. High scores are positively correlated with accident proneness in automobile driving (5). With no margin of error under water, a proneness to accident can be fatal, and a low score on factor O very important. The self-confidence may also allow them to make and rely on their own quick decisions when there is no opportunity to consult on a job.

The selection process for divers in the SAN may influence the findings. Stringent selection criteria are applied to diving candidates, including health and fitness orientation, academic competency, and practical dexterity. The selection process is an intense and arduous one, and those candidates who are selected may then constitute a homogeneous group even before they enter the diving branch. The results of the 16PF may therefore be descriptive not so much of active duty divers, but of the kind of person that pass the selection process.

Considering the environmental demand perspective, certain self-selections have also taken place. All divers had at least 2 yr of sea-gong experience, and were on their second or further contract. This may imply that divers with profiles that impaired their performance may have left the branch after their first contract expired.

To further refine the description of personality characteristics of naval divers, and to determine if it is any different from other risk-professions at all, the divers were compared with a group of South African naval submariners.

STUDY 2

Method

Participants: The same profiles of the 100 navy divers on active duty in the diving branch were used for this study. Their ages ranged from 20 to 45 (mean of 25.86). The divers were compared to a group of 85 submariners from the SAN. The ages of the submariner group ranged from 21 to 48 (mean of 31.52). Submariners were included if they had 12 yr of formal education (all participants had 12 yr), were qualified submarine operators, had 2 yr of active duty experience, and were on their second or further 2-yr contract with the navy. The profiles of submariners with any psychiatric history were excluded. The submariners were all enlisted men. The 16PF profiles of the submariner group were reported previously in Van Wijk and Waters (7). They found that submariners shared elevated scores for adventurousness (H^+), confidence (O^-), group orientation (Q_2^-), and high self-sentiment (Q_3^+).

Instrument: The 16 Personality Factor Questionnaire (5) was used again. It is an instrument that describes personality on 15 personality factors, and 1 mental ability factor. It is a self-report instrument, on which each factor is scored on a bipolar scale, indicating a personality trait.

Design: The 100 diver-profiles of the first study were compared to 85 profiles from submariners, which were drawn from their files. The submariners gave consent for use of their psychometric data for research purposes at the time of their test administration (1995–1998).

Table 2: Means and *P* Values for the 16PF Factors

Factor	Mean: Diver	Mean: Submariner	*t* Value	*P* Value
A	5.28	5.36	-0.284	0.777
C	6.64	6.34	1.405	0.162
E	6.72	6.25	1.603	0.111
F[a]	7.21	5.88	4.705	0.000[a]
G	5.98	5.93	0.264	0.792
H	7.12	6.85	1.005	0.316
I	4.74	4.91	-0.597	0.551
L	4.61	4.61	-0.006	0.995
M	5.06	5.11	-0.255	0.799
N	5.42	5.64	-0.722	0.471
O	4.10	4.05	0.229	0.819
Q_1[a]	5.87	6.44	-2.137	0.034[a]
Q_2	4.00	4.33	-1.058	0.291
Q_3	6.59	6.91	-1.216	0.226
Q_4	4.51	4.68	-0.749	0.455

[a]$P < 0.05$.

Results

The two sets of data were subjected to *t* tests for independent groups, using STATISTICA 95. Table 2 presents the means and *P* values for the 15 personality factors of the two groups. Two factors differed significantly, namely, factors F (enthusiasm) ($P < 0.01$) were the diver group scored higher, and Q_1 (conservatism) ($P < 0.05$) with the submariner group obtaining the higher scores. The age between the diver and submariner groups were also significantly different. The mean age for divers was 25.86 and for submariners 31.52 yr $t = -6.34$, $P < 0.01$).

Discussion

A high score on Factor F is indicative of an enthusiastic, happy-go-lucky person. It further points to a quick and alert person, without too many cares. A person with a high score also appears to be more effective in groups (5). Divers scored higher on factor F, which may suggest an ability not to be too easily upset by more gruesome tasks like body recovery. It is suggested that submariners, taxed with detailed procedures for operating equipment, careful maneuvering of their boat, and complicated systems to run, may be more inclined to be sober and serious to be successful in their environment.

Low scores on Factor Q_1 represents conservatism of temperament, while high scores describe a person who is inclined to experimenting, more liberal, and free-thinking (5). Submariners scored higher on factor Q_1, which is surprising, as submariners are required to be very conservative in carrying out their duties. It can be suggested that the liberal thinking may refer to submariners allowing everyone to be who they are—thereby increasing cooperation within the closed environment and near physical proximity inside submarines. In closing it should be said that the reason for this difference is not clear, and further research is needed to explore the issue.

The significant age difference between the two groups may have influenced the findings. Greater age may entail more educational attainment, and more responsibilities in the occupational fields or home lives of the men in these two samples. As data relating to further education or occupational responsibility is not known, it is possible that the differences between the two groups may be a factor of different ages, and not of differences between risk professions. This possibility is supported by the significant correlation between age and factor F ($r = -0.30$; $P < 0.05$). The older men in both groups scored less on the enthusiasm, happy-go-lucky factor trait. The correlation between age and factor Q_1 was zero $r = 0.0$; $P < 0.05$), showing again how difficult it is to determine the effect of age, as the stability of personality, as defined by traits, appears to be fairly stable over time (8).

General discussion

Certain findings of the 16PF seem to support previous work. The most notable contrast is the finding of higher social group orientation. Studies using the MIPS (4) found military divers to be more independent, self-serving, and leaning toward social aggressiveness. Other studies reported social adjustment problems (3), and the CPI showed that navy divers reported fewer friendly interactions (3). It is unclear why the South African divers are different. Previous research on South African submariners (7) also found them to be more socially oriented than what researchers from other countries reported. The SAN is relatively small, and may constitute a close-knit community where good social interaction is an important requirement for effective professional relations. The diving community is further an elite and close-knit group within the navy, and it can be hypothesized that its members may be even more dependent on each other in personal as well as professional contexts.

The finding of high scores on enthusiasm may relate to the term *optimistic* used by Beckman et al. to describe their diver group (4). This may suggest support for research from overseas. The high scores on adventurousness support previous work done with the SSS, where high scores on the Adventure Seeking subscale was found among divers (3).

The first study reported here supports the use of the 16PF to describe attributes of naval divers, and aids the understanding of which personality characteristics may be appropriate to cope with and excel at the demands of military diving. If the four traits discussed are indeed adaptive within the diving environment, then it may be useful to include them in the selection process of candidate divers.

It is not so certain, however, that the 16PF can be used to differentiate divers from other risk professions. The profiles of the divers and submariners differed in only 2 of 15 scales. This commonality may point to an inability of the instrument to differentiate between occupational groups, or may suggest that people involving themselves in risk-professions share a common personality profile. It is even possible that all naval personnel have the same personality characteristics. It is more likely that risk-

professionals all share a basic profile with minor changes between specific applications (i.e., divers vs. submariners). This needs to be further researched, by for example comparing divers (and submariners) to other risk professions like parachutists or ordnance disposal operators.

The support that some of the findings (e.g., high scores on adventurousness) give to studies from other countries (3) make it possible to consider the generalization of the findings to other military divers. Any generalization must however be done with caution as one personality attribute in particular (group-orientation) seem to differ from what was found in other diver groups (3,4). Further research, especially with similar instruments used on divers from different countries, may show the extent to which findings can be generalized across countries. Whether these findings can be generalized to other commercial divers is unclear, and more research, comparing commercial divers with military divers, is needed to answer this question.

The findings of the first study can probably not be generalized to recreational diving. The motivation of recreational divers, and the conditions under which they dive, are worlds apart (often literally). Recreational divers do their diving for sport, and often under pleasant diving conditions. The rigors and demands of military diving may therefore not be present in sport diving.

Future studies will need to check a number of shortcomings in this study. The sample size was fairly small, although the diving branch is fairly small too. Although the 16PF gives a meaningful description of divers from an environmental demand perspective, there were not enough comparison groups, especially from the general navy, to determine whether divers are a distinct group within the larger naval service. Future research needs to compare divers with general navy personnel, and with other risk-professions to determine the extent to which the naval divers constitute a unique group in terms of personality characteristics.

Future research could also compare selection outcomes with later performance within the diving branch to determine whether personality traits predict performance in the military diving environment. Comparing the 16PF profiles of diving candidates who are not selected with those who are would be interesting, and to compare those who fail their training with those who complete their training and successfully perform their duties. If it can be determined during the selection process that candidates have the psychological attributes to meet the demands of the diving occupational field, the 16PF or other instruments may benefit both individuals and the navy in placing people where they will do best given their personal psychological profile.

In summary, the 16PF was used to describe a sample of naval divers. The four most descriptive personality factors appeared appropriate when viewed from an environmental demand perspective. They were Group-orientation, Enthusiasm, Adventurousness, and Confidence. The 16PF was then used to distinguish between navy divers and submariners. Two factors differed significantly. The divers scored higher on Enthusiasm and submariners higher on Conservatism.

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