

University of Groningen

Personality Traits of Special Forces Operators

Huijzer, Rik; Jeronimus, Bertus F.; Reehoorn, Anniek; Blaauw, Frank; Baatenburg de Jong, Maurits; de Jonge, Peter; den Hartigh, Ruud

Published in:
 Sport, Exercise and Performance Psychology

DOI:
[10.1037/spy0000296](https://doi.org/10.1037/spy0000296)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
 Final author's version (accepted by publisher, after peer review)

Publication date:
 2022

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Huijzer, R., Jeronimus, B. F., Reehoorn, A., Blaauw, F., Baatenburg de Jong, M., de Jonge, P., & den Hartigh, R. (2022). Personality Traits of Special Forces Operators: Comparing Commandos, Candidates, and Controls. *Sport, Exercise and Performance Psychology*, 11(3), 369–381.
<https://doi.org/10.1037/spy0000296>

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

**Personality Traits of Special Forces Operators:
Comparing Commandos, Candidates and Controls**

Rik Huijzer¹, Bertus F. Jeronimus¹, Anniek Reehoorn³, Frank J. Blaauw², Maurits Baatenburg de Jong³, Peter de Jonge¹ and Ruud J.R. den Hartigh¹

¹Department of Developmental Psychology, Faculty of Behavioural and Social Sciences,
University of Groningen, 9712 TS Groningen, the Netherlands.

²Research and Innovation, Researchable, Assen, the Netherlands.

³Ministry of Defence, the Netherlands.

Author Note

Correspondence concerning this article should be addressed to Rik Huijzer. Email:
t.h.huijzer@rug.nl. Data and study materials are available via <https://osf.io/ysfu6>.

Funding

This research was supported by the Ministry of Defence, the Netherlands. BFJ was supported by
a NWO Veni grant #016.195.405.

Abstract

Dutch special forces operators, also known as *commandos*, perform in mentally and physically tough environments. An important question for recruitment and selection of commandos is whether they have particular personality traits. To answer this question, we first examined differences in personality traits between 110 experienced Dutch male commandos and a control sample of 275 men in the same age range. Second, we measured the personality traits at the start of the special forces selection program, and compared the scores of candidates who later graduated ($n = 53$) or dropped out ($n = 138$). Multilevel Bayesian models and t -tests revealed that commandos were less neurotic ($d = -0.58$), more conscientious ($d = 0.45$), and markedly less open to experiences ($d = -1.13$) than the matched civilian group. Furthermore, there was a tendency for graduates to be less neurotic ($d = -0.27$) and more conscientious ($d = 0.24$) than dropouts. For selection, personality traits do not appear discriminative enough for graduation success and other factors need to be accounted for as well, such as other psychological constructs and physical performance. On the other hand, these results provide interesting clues for using personality traits to recruit people for the special forces program.

Keywords: Big Five, Military, Neuroticism, Extraversion, Conscientiousness

**Personality Traits of Special Forces Operators:
Comparing Commandos, Candidates and Controls**

Dutch special forces operators, also known as *commandos*, perform in tough high stakes contexts that require specific physical, mental and emotional characteristics (Brailey, 2005). Commandos must remain focused and calm in combat situations despite overwhelming intense smells, sounds and images, and depend with their lives on their team's functioning. Furthermore, they work under conditions of extreme threat, isolation and complexity, and often need to interact with other cultures in politically sensitive situations (Picano et al., 2002). The individual characteristics needed to operate in such situations are typically operationalized in terms of personality dimensions; what we feel, think, need, want and do. Our research aim was to identify whether there are personality traits that are characteristic for commandos (e.g., Banks, 2006; Ones et al., 2007).

Personality of Commandos

In contemporary psychology, the highest level of the personality hierarchy is summarized in terms of five broad trait dimensions (the Big Five): neuroticism, extraversion, openness to experience, agreeableness and conscientiousness (John et al., 2010, see also Table 1). Since the second world war, the United States of America (U.S.) selects commandos on their emotional and interpersonal traits (emotional stability, social relations and security), intelligence processing (effective IQ, observing and reporting) and agency/surgency (motivation for assignment, energy and initiative leadership, physical ability; see Banks, 2006; Picano et al., 2002). This procedure suggests that emotional stability (low neuroticism) and extraversion (activity and sociability) are key personality competencies for success in high-risk operational personnel, next to cognitive

abilities. However, so far, few studies examined the personality traits of commandos and quantified how they actually compare to civilian samples.

Table 1

Definition of Personality Based on the Big Five

Big Five Domain	High scoring individuals tend to be ...
Neuroticism	emotionally unstable, anxious, self-conscious, vulnerable, and experiencing negative affect.
Extraversion	sociable, assertive, energetic, excitement seeking, risk-taking, and experiencing positive affect.
Openness	perceptive, creative, reflective, flexible, curious, and appreciative of fantasy, aesthetics, and novelty.
Agreeableness	kind, cooperative, altruistic, trustworthy, trusting, generous, and empathic.
Conscientiousness	ordered, dutiful (norms/rules), self-disciplined, reliable, persistent, and achievement oriented.

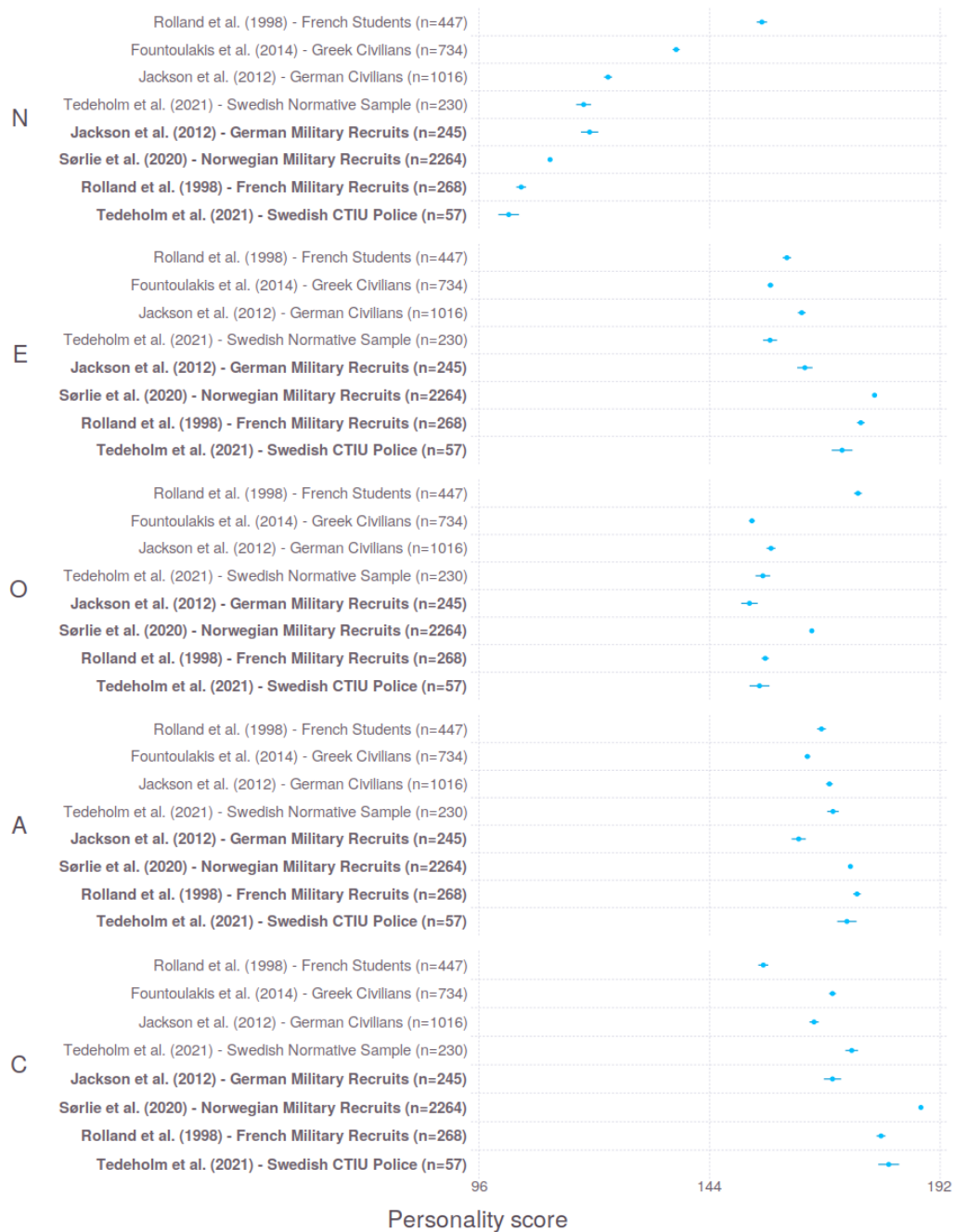
In one of those studies, personality trait scores among 139 U.S. Navy Sea-Air-Land (SEAL) operators were compared to scores of U.S. civilians (Braun et al., 1994). In line with the above mentioned key personality competencies, SEALs reported lower average neuroticism and agreeableness scores than civilians, but higher conscientiousness and extraversion. Additionally, more experienced SEALs reported higher conscientiousness. Although research on the personality traits of commandos is scarce, several studies examined Big Five measures of other military personnel and police officers who work in high stakes contexts. For instance, a sample of 57 Swedish counterterrorism intervention unit police officers showed lower mean neuroticism scores (Cohen's $d = 0.70$) and more extraversion ($d = 0.70$) and conscientiousness ($d = 0.40$) than the general Swedish population (Tedeholm et al., 2021). Furthermore, a comparison of 268 French military candidates with 447 students indicated that candidates reported lower openness

($d = 2.04$) than the students (Rolland et al., 1998). Similarly, people who entered the German military were marked by lower openness ($d = 0.15$ with a propensity-score model) than people who did not enter the military (Jackson et al., 2012). The large differences between the studies in terms of effect sizes could arise from differences in sampling or methodology. For example, Jackson et al. (2012) used propensity score matching which may have increased bias and imbalance (King & Nielsen, 2019).

In Figure 1, we visually summarized studies of personality traits of workers in high stakes contexts, such as special forces units (Fountoulakis et al., 2014; Jackson et al., 2012; Rolland et al., 1998; Sørli et al., 2020; Tedeholm et al., 2021). This shows that high stakes context workers score relatively high on conscientiousness and low on neuroticism compared to control groups. Differences in the other personality traits were less consistent. This could indicate that there is not strictly one personality trait that allows people to be proficient in high stakes contexts. However, little is known about how commandos and civilian men with a similar age and background actually differ in their personality traits. Therefore, our first research question was: how do the personality traits of experienced commandos differ from those of a matched sample of civilians in the general population?

Figure 1

An Informal Review of Personality Traits of Workers in High Stakes Contexts Compared to Civilians.



Note. The means and standard errors (SEs) for personality scores obtained in previous research. The upper four studies focused on high stakes military contexts and the lower four on civilian populations (control groups). The means and SEs are similar to independent samples *t*-tests. Scores were transformed to the range [1, 5], resulting in a total score in the range [48, 240]. For example, studies scored in the range [0,4] have lower bound $l = 0$ and upper bound $u = 196$. Any mean m in the range $[l, u]$ was transformed to a mean m' in the range $[48,240]$ via $m' = 48 + ((m - l) / (u - l)) \cdot (240-48)$. Similarly, any standard deviation s was transformed to s' via $s' = (s / (u - l)) \cdot (240-48)$. The ranges for Fountoulakis et al. (2014), Jackson et al. (2012), Sørli et al. (2020) and Tedeholm et al. (2021) were respectively [0,192], [0,4], [0,192] and [0,192], and obtained by author correspondence.

Assessments and Measures

Next to the question of how commandos differ from civilians, we examined whether personality traits of candidates, who successfully completed the selection program, differed from those who dropped out. Personality assessments are often part of the special forces selection procedure (e.g., Hartmann et al., 2003; Saxon et al., 2020), but relatively little scientific research has been conducted on this topic. Specifically focusing on the Big Five domains, a study by McDonald et al. (1990) shows that U.S. graduates scored lower on neuroticism than the dropouts. Another U.S. study on reconnaissance marines found that higher extraversion was associated with graduation (Saxon et al., 2020). Other studies focused on the Big Five personality traits on the facet level, which are more narrow personality dimensions. For example, Picano et al. (2002) studied elite military personnel screened for a non-routine military assignment and identified two facet traits that predicted success; “activity” in the extraversion domain (E4, being lively) and “straightforwardness” in the agreeable domain (A2; having high morale). Training completion in the Norwegian naval special forces was not associated with any of the Big Five domains or facets (Hartmann et al., 2003, 2009), in discord with the findings by McDonald et al. (1990), Picano et al. (2002) and Saxon et al. (2020).

When looking at less extreme contexts, a lower neuroticism score and a higher agreeableness score were found to be related to graduation in the Canadian forces basic training (Lee et al., 2011). In the Netherlands, a large study of multiple datasets showed that successful military candidates were more likely to score high on extraversion, conscientiousness, agreeableness and openness, and low on neuroticism (van der Linden et al., 2011). A meta-analysis on military aviators showed that lower neuroticism and higher extraversion scores were related to training success (Campbell et al., 2010). Despite the frequent measurement of

personality in special forces training programs, the degree to which the outcomes can be used for selection in such programs remains unclear. Overall, most research suggests that successful commando candidates were less likely to be neurotic and more likely to be extraverted and agreeable (e.g., Jackson et al., 2012), but not all commando studies supported these differences (e.g., Hartmann & Grønnerød, 2009). Therefore, the present study examines whether and which personality differences predict success during the commando selection procedure in the Netherlands. More specifically, we examined whether graduates and dropouts of the special forces selection program could be distinguished based on their measured personality traits.

The Current Study

The purpose of the current study was to examine whether measured personality traits differ between (1) commandos and civilians and (2) graduates and dropouts. We therefore examined the personality of a sample of Dutch male commandos, a matched control group from the Dutch population, and candidates in the special forces selection program. Our first hypothesis was that commandos reported lower neuroticism, higher conscientiousness and more extraversion than civilians (see Braun et al., 1994; Rolland et al., 1998; Tedeholm et al., 2021). No differences in agreeableness and openness were expected. Our second hypothesis was that graduates report lower neuroticism than dropouts (Campbell et al., 2010; Lee et al., 2011; McDonald et al., 1990) and more extraversion and agreeableness (Campbell et al., 2010; Hartmann et al., 2003; Lee et al., 2011; Picano et al., 2002; Saxon et al., 2020). No specific expectations were set for openness to experience and conscientiousness.

Method

Participants

Data from the, exclusively male, commandos and candidates were obtained via the Commando Corps of the Royal Netherlands Army. Commandos were approached by email, including an information letter about the study. We received active consent from 110 experienced commandos, that is, commandos who successfully finished the entire special forces training. The matched controls were derived from a large Dutch crowd-sourced dataset (van der Krieke et al., 2016) from which 275 males aged 18 to 35 were selected ($M_{age} = 27.7$, $SD_{age} = 4.62$). New candidates were invited to participate in this study during their pre-selection training. Both candidates and instructors were informed that participation was completely voluntary and that their participation and results would not be used for selection purposes. All candidates actively consented to participate in the study and the procedure was approved by the institutional review board with code PSY-1920-S-0512. Of the 223 candidates who started the selection period, 53 graduated ($M_{age} = 25.2$, $SD_{age} = 2.70$) and 138 dropped out for non-medical reasons ($M_{age} = 25.9$, $SD_{age} = 2.96$). We excluded 32 participants who dropped out for medical reasons. The selection is based on a combination of objective and subjective measures. Candidates can drop out for non-medical reasons if they do not meet the physical requirements at any point during the selection, if they are caught in an offense such as stealing, or if the instructors unanimously agree that a person is unfit to become an operator. Furthermore, the sample sizes were limited by the number of participating operators and the number of candidates who started the selection in the period in which we collaborated with the army. Given the sensitivity of the samples that we studied, more detailed descriptions were not provided.

Procedure

For both the commandos and candidates, participation occurred via our Your Special Forces platform (<https://yourspecialforces.nl>), which was specifically built for the purpose of the research project. The commandos received instructions and credentials via email, and were invited to participate in the questionnaire during their work hours. For the candidates, data collection took place at the training camp. In the first week of the selection, participants completed the assessments using tablets in a large room which was set up like a traditional classroom. Once participants entered the room, they were informed about the consent procedure, study goal, and that participation would not affect their graduation chances. We provided the participants with a pseudo-anonymous username. After logging in with their usernames, the participants accessed multiple questionnaires including the personality questionnaire, and received as much time as they needed to fill it in. Most participants finished within one hour. The matched sample of Dutch civilians completed their questionnaires online via the HowNutsAreTheDutch platform at their own time and convenience (see van der Krieke et al., 2016 for details). Both the commandos and civilians could use a digital device of their own choosing.

Measures

The commandos and candidates completed the Dutch version of the NEO-PI-3 (Hoekstra & De Fruyt, 2014) which captures the big five personality domains with 240 items, each rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire contains 48 items per domain and this is further split into 8 items per facet (6 facets per domain). The NEO-PI-3 was chosen due to its high reliability and validity and its prevalence in military personality research. The validity of the English version has been shown in multiple settings

(e.g., Costa Jr et al., 2008; De Fruyt et al., 2009; Egger et al., 2003). Furthermore, the reliability and validity of this instrument are thoroughly assessed by the Dutch Committee on Tests and Testing (COTAN), across different norm groups (including 594 male civilians and 339 civilians between 23 and 35 years of age, see Hoekstra & Fruyt, 2014 for details). As an additional check of the validity in our sample, we conducted an Exploratory Structural Equation Modeling (ESEM) analysis, which combines the exploratory and confirmatory factor analyses (Marsh et al, 2014). The ESEM model is accepted with a reasonable fit ($p < 0.05$, CFI = 0.89, TLI = 0.83, RMSEA = 0.07) (Marsh, 2007, p. 785; see Table S2 in the supplemental material for more information). The internal reliability of the scale was good, with a McDonald's omega coefficient of 0.87 and a 95% bootstrapped confidence interval ranging from 0.80 to 0.93 as calculated via the psych package (Revelle, 2015). The Dutch civilians completed the shortened NEO-FFI (60-items) which was derived from the more comprehensive NEO-PI-3 (van der Krieke et al., 2016).

Analyses

To examine whether commandos differed in their personality traits from matched civilians (hypothesis 1) and whether graduates differed from dropouts (hypothesis 2), we fitted a multilevel Bayesian model and t -tests.¹ With 2 groups and 5 personality domains per research question, we performed Bayesian analyses to avoid the multiple comparison problem, which leads to overestimation of effect sizes or estimating them to be in the wrong direction (Gelman, 2017). We interpreted the posterior model probabilities directly (McElreath, 2020; Tendeiro & Kiers, 2019). Bayesian techniques also allow us to conclude that there is no effect, which is an

¹ Latent profile analyses (LPA) were considered as well, upon request by our reviewer, but appeared less suited given the sample size. Since we calculated the results, we have added them in Table S3. For LPA, one of the best information criteria is the Bayesian information criterion (BIC) according to NyLund et al. (2007). In accordance with the results reported, the BIC metric indicated that the 2-profile model (graduates vs. dropouts or commandos vs. controls) is suitable for our data.

additional benefit over classical hypothesis testing (Gelman et al., 2012). We used a multilevel model with partial pooling which is a regularization technique that allows the model to combine information from different groups, and reduces the chances of detecting false-positive results (McElreath, 2020). In our study, the Bayesian approach estimates the population parameters directly which, in our case, are the population means. We defined and fitted the models using the Julia programming language (Bezanson et al., 2017) with the Bayesian inference package Turing.jl (Ge et al., 2018). The model is defined as

$$\begin{aligned}\alpha &\sim \text{Normal}(144, 15) \\ \sigma &\sim \text{Cauchy}(0, 2) \\ \alpha_{\text{group}[i]} &\sim \text{Normal}(\alpha, \sigma) \\ \mu_i &= \alpha_{\text{group}[i]} \\ S_i &\sim \text{Normal}(\mu_i, \sigma),\end{aligned}$$

where S_i denotes the personality score for participant i . Here, we set the prior for α to 144, which is in the middle of the lower and upper bound of the scoring range. Specifically, the number is obtained via $(240 - 48) / 2 + 48 = 144$. This model assumes that all groups should look similar. Arguably, this common mean α (partial pooling) will favor solutions where differences between groups are minimized. Hence, as a validity check of our Bayesian analysis, we fitted t -tests. The benefit of the t -tests is that they can be compared to existing literature more easily and are more familiar to many readers. In this study, we considered the Bayesian results as leading and, therefore, used the t -tests as a backup. Note that both our Bayesian model and the t -test compare the means of different groups. Also, the Bayesian model is expected to be more conservative due to partial pooling.

For the t -tests, the statistical power is as follows. For hypothesis 1, the most suitable source for estimating the expected effect size compares counterterrorism police officers to

civilians. The Cohen's d scores on the NEOAC dimensions were -0.7, 0.7, 0, 0.2 and 0.4, respectively (Tedeholm et al., 2021). Based on this, we expect an effect size of around 0.5 which gives a power of $d \approx 0.96$ (Champely et al., 2017). For hypothesis 2, we can leverage a related meta-analysis for an estimate of the effect size: the true validity for neuroticism and extraversion in a meta-analysis on military aviation training success is estimated to be $r = -0.25$ and $r = 0.17$ respectively (Campbell et al., 2010). In terms of Cohen's d , this is $d \approx -0.52$ and $d \approx 0.34$ respectively (Hunter & Schmidt, 2004, Eq. 7.11). Given such a medium Cohen's d effect size of 0.4, the power for the comparison of graduates and dropouts (hypothesis 2) is $d \approx 0.69$.

We report Bayesian distribution estimates and credible intervals that show probabilistic uncertainty in the parameter value. This differs from the Frequentist confidence interval and the uncertainty about whether it contains the true value. Also, we provided standardized group differences by means of Cohen's d and interpreted effect sizes as very small to small (below 0.20), small to medium (0.20 to 0.50), medium to large (0.50 to 0.80), or large to very large (0.80 and higher) (Sawilowsky, 2009). As a reference, the average Pearson correlation coefficient between personality and important life outcomes is $r = 0.22$ (95% CI = [0.18, 0.29], Richard et al., 2003; Soto, 2019) up to $r = 0.30$ with other (non-test) behaviors (Caspi & Shiner, 2006; Saucier & Goldberg, 1998), thus, small to moderate effects. The code and data to reproduce the results will be made publicly available at the Open Science Framework and can be accessed at <https://osf.io/ysfu6> (Huijzer et al., 2022).

Results

Since Bayesian samplers start at a random point, the results can vary when doing multiple runs, that is, run multiple chains. Following common practice (McElreath, 2020), three chains were run and their results were consistent. We also checked stationarity and good mixing by

visually inspecting graphs of the posterior samples. In Figure 2 and 3, the posterior distributions show the aggregated results from the chains. The results for the t -tests are described in the text below; together with the results for the first and second hypotheses. The descriptives are shown in Table 2.

Table 2

Descriptive Statistics for Commandos, Graduates, Dropouts and Civilians.

	Commandos	Civilians	Graduates	Dropouts
Number of participants	110	275	53	138
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Neuroticism	111.9 (16.7)	130.9 (37.2)	110.3 (15.5)	114.6 (15.4)
Extraversion	161.6 (12.8)	157.4 (33.1)	164.3 (11.0)	161.9 (14.9)
Openness	148.2 (14.9)	174.1 (25.2)	148.9 (13.2)	149.2 (13.9)
Agreeableness	164.2 (13.4)	160.1 (24.1)	172.5 (13.9)	171.4 (14.4)
Conscientiousness	178.3 (15.6)	166.4 (29.3)	183.9 (14.5)	180.5 (13.6)

Note. SD = Standard deviation. Civilians refers to a male sample from the general Dutch population matched to the commandos on age and education.

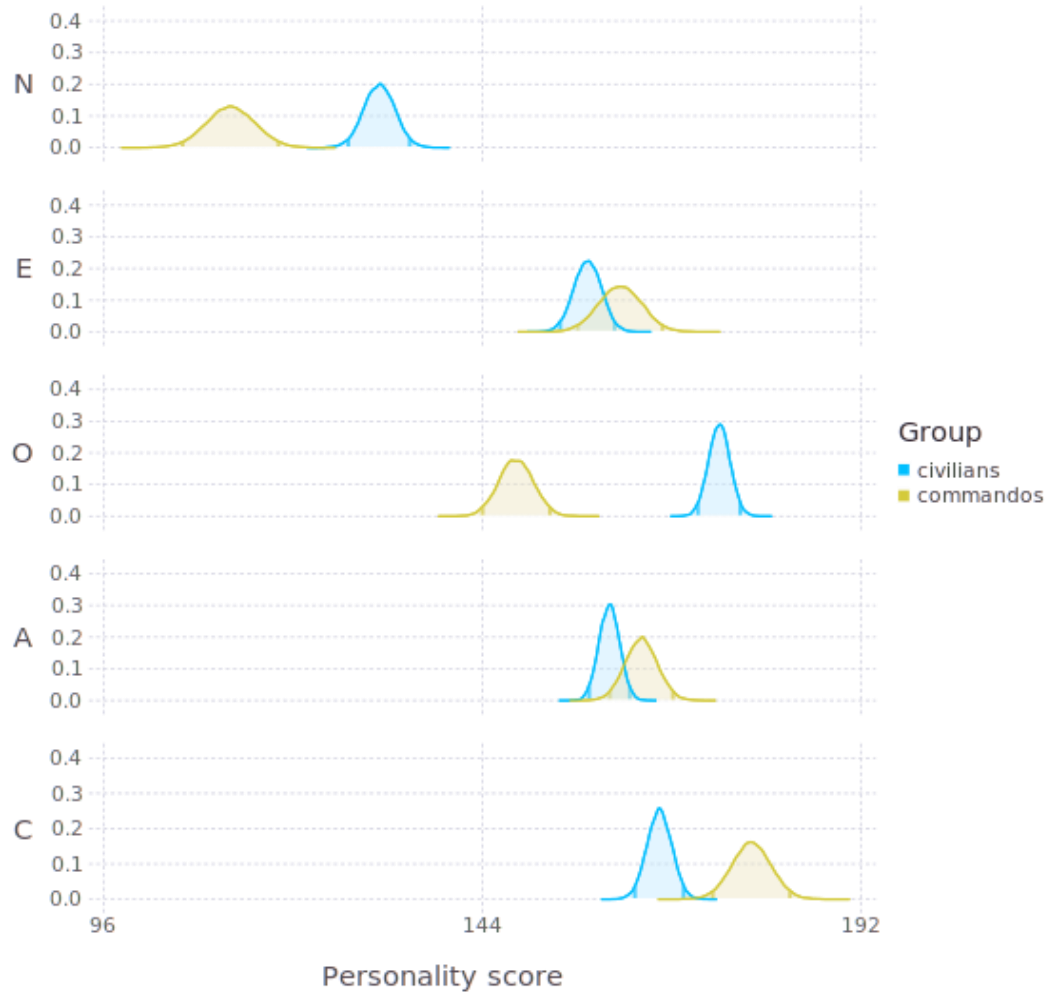
Hypothesis 1 - Commandos versus Controls

First, we examined whether commandos differed in their Big Five personality traits from civilians. We fitted Bayesian models (Figure 2) and performed t -tests (described in the text). In line with hypothesis 1, these models demonstrate that commandos score lower than civilians on neuroticism ($t_{(383)} = -5.15, p < 0.001, d = -0.58$) with a medium to large effect size and higher on conscientiousness ($t_{(383)} = 4.01, p < 0.001, d = 0.45$) with a small to medium effect size. Commandos also score lower on openness than civilians ($t_{(383)} = -10.1, p < 0.001, d = -1.13$) with a large to very large effect size. There were no clear differences between the groups for

extraversion ($t_{(383)} = 1.30, p = 0.19, d = 0.15$) and agreeableness ($t_{(383)} = 1.69, p = 0.09, d = 0.19$) with both a very small to small effect size.

Figure 2

Comparison of Civilians with Commandos on the Big Five Personality Domains



Note. Neuroticism (N), extraversion (E), openness (O), agreeableness (A) and conscientiousness (C). The small vertical bars in the posterior distributions show the 95% credible interval.

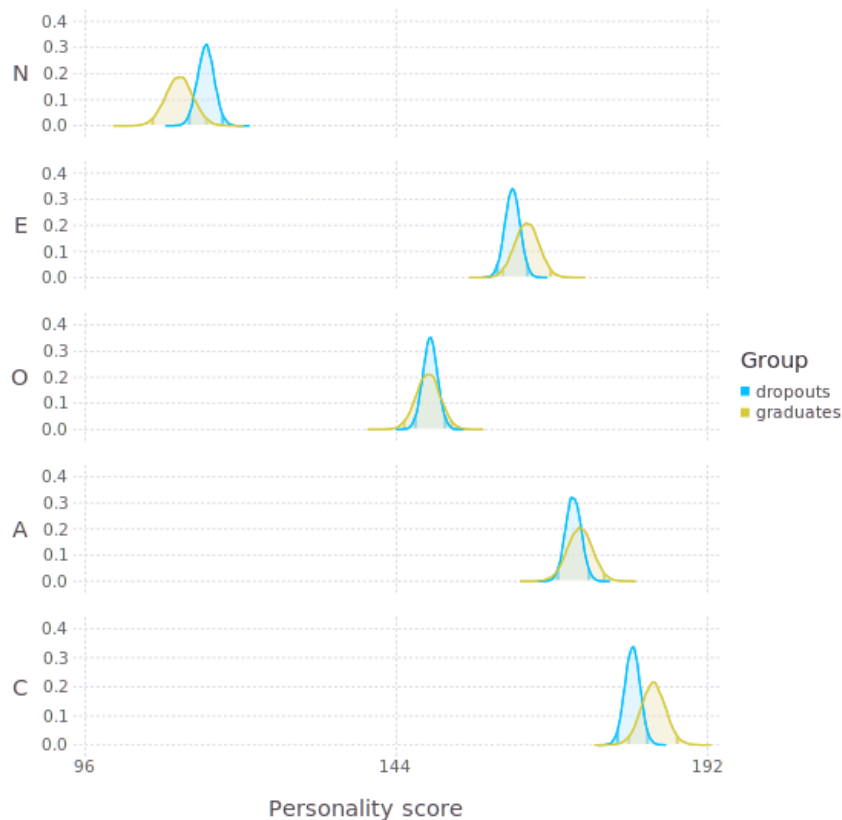
Hypothesis 2 - Graduates versus Dropouts

To examine whether commando graduates differed in their Big Five personality traits from dropouts, we again fitted a Bayesian model (Figure 3) and performed t -tests (described in

the text). In contrast with hypothesis 2, none of the results were significant. Yet, the clearest effect size differences are visible for neuroticism and conscientiousness, where graduates score lower than dropouts on neuroticism ($t_{(189)} = -1.71, p = 0.09, d = -0.27$) with a small to medium effect size. For conscientiousness, graduates score higher ($t_{(189)} = 1.51, p = 0.13, d = 0.24$) with a small to medium effect size. Smaller effect sizes were visible for the other domains, namely openness ($t_{(189)} = -0.14, p = 0.89, d = 0.02$) with a very small to small effect size, extraversion ($t_{(189)} = 1.04, p = 0.30, d = 0.17$) with a very small to small effect size and agreeableness ($t_{(189)} = 0.49, p = 0.63, d = 0.08$) with a very small to small effect size.

Figure 3

Comparison of Graduates with Dropouts on the Big Five Personality Domains



Note. Neuroticism (N), extraversion (E), openness (O), agreeableness (A) and conscientiousness (C). The small vertical bars in the posterior distributions show the 95% credible interval.

To derive a more nuanced insight into commando personalities we subsequently examined differences between commandos and matched controls in 30 more specific facet traits, generally thought to be informative when predicting consequential outcomes (Stewart et al., 2021). We refrain from an interpretation of the facet differences between commandos and civilians because none was significant in our models (all d below 0.30 and p above 0.07), see Table S1 in the supplemental material for details. Finally, we explored whether graduates and dropouts differed in more specific facet traits, no significant differences were detected (see Table S1 for details).

Discussion

This study was aimed to investigate (1) personality differences between experienced commandos and civilian controls and (2) whether and how personality traits distinguished graduates from dropouts during the selection period. To investigate the hypotheses, a large-scale study was conducted in collaboration with the Royal Netherlands Army. Our key observation was, first, that the group of commandos was less neurotic, more conscientious, and markedly less open to experience than civilians matched on age and education. Second, successful candidates tend to report lower neuroticism and higher conscientiousness. The other personality traits showed inconsistent results, and more nuanced facet traits did not differ between graduates and dropouts.

Hypothesis 1 - Commandos versus Controls

In line with our first hypothesis, the commandos scored lower on neuroticism and higher on conscientiousness compared to matched civilian controls. This pattern is in accordance with studies of more experienced U.S. Navy SEALs (Braun et al., 1994) and Swedish counterterrorism intervention police officers versus Swedish civilians (Tedeholm et al., 2021).

For extraversion, we found no evidence to support, nor to reject, the idea that operators are more extraverted than civilians. Although the direction of the effect that we found is in accordance with previous research, Braun et al. (1994) and Tedeholm et al. (2021) found clearer evidence that U.S. Navy SEALs score higher on extraversion than less experienced SEALs, and that counterterrorism intervention police officers score higher on extraversion than civilians, respectively. For agreeableness, we had no specific expectations, and also found no meaningful differences between commandos and controls.

Our analysis provided strong evidence for a marked difference in openness to experience between commandos and matched controls, a novel contribution to the literature on personnel selection and military psychology. This result suggests that, compared to civilians, commandos prefer routines, consistency, traditions, and familiarity, and approach new things with great caution and are less likely to be overwhelmed by emotions (Larsen et al., 2020). Openness also differed between French military candidates and general students (Rolland et al., 1998), and between German students who decided to join the military or not (Jackson et al., 2021). Contrarily, a comparison of counter-terrorism intervention unit police officers and civilians showed trivial differences in openness (Tedeholm et al., 2021). Compared to previous research, it seems that the civilians in our sample scored higher on openness than the control groups and the commandos score lower than the military groups (to see this, compare Figure 1 and 2). This may be due to the nature of our matched control group, which comprised relatively young men who voluntarily participated in an online questionnaire (Marcus & Schütz, 2005).

Finally, our results are partly in line with the study of multiple military datasets by van der Linden et al. (2011) who concluded that successful military candidates in general were more

likely to score low on neuroticism, and high on extraversion, conscientiousness, agreeableness, and openness.

Hypothesis 2 - Graduates versus Dropouts

For the comparison between graduates and dropouts, the results were less evident. This is likely to be caused by the homogeneity of the group in combination with the limited statistical power. Interestingly, as with the comparison between commandos and controls, the clearest patterns were found in neuroticism and conscientiousness. For neuroticism, our results suggest that graduates score lower on neuroticism than dropouts, which in the hypothesized direction. This result is also in line with the study by McDonald et al. (1990) on U.S. Navy SEAL candidates, which showed that graduates were less neurotic than those who did not graduate. Similarly, in a study on Canadian Forces basic training, it was found that lower neuroticism was associated with training success (Lee et al., 2011). Furthermore, a meta-analysis concluded that lower neuroticism predicted military aviation training success (Campbell et al., 2010). People with lower neuroticism scores tend to experience lower subjective threat, impulsivity, vulnerability to stress, and anxiety, which may be important characteristics to become a commando.

For conscientiousness, the result was in the hypothesized direction, but was not significant. A stronger pattern was found in a study on Navy SEALs who found that more experienced SEALs score higher on conscientiousness (Braun et al., 1994). We also found that graduates scored on average half a standard deviation higher on extraversion than dropouts. A clearer difference has previously been reported in a meta-analysis on military aviators (Campbell et al., 2010), a study with Navy SEALs (Hartmann et al., 2003) and a study with reconnaissance marines (Saxon et al., 2020). A likely explanation for these results is that extraverted people are

more prone to seek excitement, be active, and take risks, all of which are important qualities for commandos (Keinan et al., 1984; Stewart, 2017).

Contrary to our hypothesis and previous research we did not find that graduates score higher on agreeableness (Campbell et al., 2010; Hartmann et al., 2003; Saxon et al., 2020). A possible explanation for the difference between previous findings and our outcomes is the lower power of our study or that the trait agreeableness contains facets that can be positive as well as negative for a commando. For example, having high trust and straightforwardness is important for effective teamwork (Jones & George, 1998), but being modest might not contribute to a successful mission. This observation is in line with studies of leadership that indicate that leaders tend to be extraverted and low on neuroticism, but results for agreeableness tend to be fuzzy, which suggests that a broader range of scores can be proficient strategies (Do & Minbashian, 2020; Judge et al., 2002). Finally, we did not have a hypothesis for openness to experience, and our results did not reveal a strong enough difference between the graduates and dropouts to conclude that they differ in this trait.

Limitations and Future Directions

In our study, we used the NEO-PI-3 with 240 items for the candidates and commandos, and the NEO-FFI for the civilians. This difference appeared to result in different variances in scores on personality dimensions. Indeed, upon further investigation, and comparison with other personality research, we found that the difference in variance is likely caused by the difference in length in questionnaires, and not by the group under study. In hindsight, this difference made sense because more questions imply that it is more likely that the mean score of a participant averages out, that is, that the score is less extreme. However, we do not expect that this has notably affected the conclusions. For future directions, more research is needed to investigate

individual facets. Since this increases the number of comparisons one likes to make, Bayesian analyses provide an intuitive way to handle this (Gelman et al., 2012). Also, more research is needed to investigate personality *profiles* instead of personality traits. Mixed models such as latent profile analysis provide an interesting avenue in this regard (Oberski, 2016; Wanders et al., 2016, see also Table S3), assuming that model requirements such as statistical power can be met. Moreover, other factors than personality may also be important to become a commando (see introduction). Therefore, an important avenue is to discover not only the psychological but also the physical predictors of successful graduation in the special forces selection period (e.g., Saxon et al. 2020).

Conclusion

In this study, male commandos differ from a group of age-matched civilians by being less neurotic, less open to new experiences, and more conscientious. People who started the commando training showed similar differences, namely, that graduates score lower on neuroticism and higher on conscientiousness than dropouts. Our finding that the directions are the same for both comparisons adds certainty to the effects that we have found. Given the relatively small differences between the graduates and dropouts, we would argue that a personality test would not provide a strong selection instrument by itself. This is likely due to the fact that the group of people who decide to join the commandos is quite homogeneous. Hence, for selection purposes, examining additional psychological and physical measures is an important avenue. For recruitment purposes though, the use of personality tests can provide important clues as our study showed relatively strong differences between commandos and civilians.

References

- Banks, L. M. (2006). The history of special operations psychological selection. *Psychology in the service of national security*, 83-95.
- Bezanson, J., E., A., Karpinski, S., & Shah, V. (2017). Julia: A Fresh Approach to Numerical Computing. *SIAM review*, 59 (1), 65-98. <https://doi.org/10.1137/141000671>
- Brailey, M. (2005). *The Transformation of Special Operations Forces in Contemporary Conflict: Strategy, Missions, Organisation and Tactics*. Land Warfare Studies Centre.
- Braun, D., Prusaczyk, W., Goforth, H., & Pratt, N. (1994). *Personality Profiles of U.S. Navy sea-air-land (SEAL) personnel* (tech. rep.). Naval Health Research Center, San Diego, CA.
- Campbell, J.S., Castaneda, M., & Pulos, S. (2010). Meta-analysis of personality assessments as predictors of military aviation training success. *The International Journal of Aviation Psychology*, 20(1), 92-109. <https://doi.org/10.1080/10508410903415872>
- Caspi, A., & Shiner, R. (2006). *Personality development, in handbook of child psychology* [Edited by Eisenberg N. Hoboken]. New Jersey, John Wiley & Sons, Inc.
- Costa Jr, P. T., McCrae, R. R., & Martin, T.A. (2008). Incipient adult personality: The NEO-PI-3 in middle-school-aged children. *British Journal of Developmental Psychology*, 26(1), 71-89. <https://doi.org/10.1348/026151007X196273>
- De Fruyt, F., De Bolle, M., McCrae, R. R., Terracciano, A., & Costa Jr, P. T. (2009). Assessing the universal structure of personality in early adolescence: The NEO-PI-R and NEO-PI-3 in 24 cultures. *Assessment*, 16(3), 301-311. <https://doi.org/10.1177/1073191109333760>
- Do, M. H., & Minbashian, A. (2020). Higher-order personality factors and leadership outcomes: A meta-analysis. *Personality and Individual Differences*, 163, 110058. <https://doi.org/10.1016/j.paid.2020.110058>

- Egger, J. I., de Mey, H. R., Derksen, J. J., & van der Staak, C. P. (2003). Cross-cultural replication of the five-factor model and comparison of the NEO-PI-R and MMPI-2 PSY-5 scales in a Dutch psychiatric sample. *Psychological assessment, 15*(1), 81. <https://doi.org/10.1037/1040-3590.15.1.81>
- Fountoulakis, K., Siamouli, M., Moysidou, S., Pantoula, E., Moutou, K., Panagiotidis, P., Kemeridou, M., Mavridou, E., Loli, E., Batsiari, E., ... McRae, R. (2014). Standardization of the NEO-PI-3 in the Greek general population. *Annals of general psychiatry, 13*(1), 36. <https://doi.org/10.1186/s12991-014-0036-9>
- Ge, H., Xu, K., & Ghahramani, Z. (2018). Turing: A language for flexible probabilistic inference. In A. Storkey & F. Perez-Cruz (Eds), *Proceedings of the Twenty-First International Conference on Artificial Intelligence and Statistics (AISTATS), Vol. 84* (pp 1682-1690).
- Gelman, A. (2017). The failure of null hypothesis significance testing when studying incremental changes, and what to do about it. *Personality and Social Psychology Bulletin, 44*(1), 16-23. <https://doi.org/10.1177/0146167217729162>
- Hartmann, E., & Grønnerød, C. (2009). Roschach Variables and Big Five Scales as Predictors of Military Training Completion: A Replication Study of the Selection of Candidates to the Naval Special Forces in Norway. *Journal of Personality Assessment, 91*(3), 254-264. <https://doi.org/10.1080/00223890902794309>
- Hartmann, E., Sunde, T., Kristensen, W., & Martinussen, M. (2003). Psychological measures as predictors of military training performance. *Journal of Personality Assessment, 80*(1), 87-98, 254-264. <https://doi.org/10.1080/00223890902794309>
- Hoekstra, H., & De Fruyt, F. (2014). NEO-PI-3 en NEO-FFI-3: *Persoonlijkheidsvragenlijsten:*

handleiding. Hogrefe.

Hunter, J. E., & Schmidt, F. L. (2004). *Methods of meta-analysis: Correcting error and bias in research findings* (2nd ed.). Thousand Oaks, CA: Sage.

<http://dx.doi.org/10.4135/9781412985031>

Jackson, J. J., Thoemmes, F., Jonkmann, K., Lüdtke, O., & Trautwein, U. (2012). Military training and personality trait development: Does the military make the man, or does the man make the military? *Psychological Science*, 23(3), 270-277.

<https://doi.org/10.1177/0956797611423545>

John, O., Robins, R., & Pervin, L. (2010). *Handbook of Personality: Theory and Research*. Guilford Press.

Jones, G., & George, J. (1998). The experience and evolution of trust: Implications for cooperation and teamwork. *Academy of Management Review*, 23(3), 531-546.

<https://doi.org/10.2307/259293>

Judge, T. A., Bono, J. E., Ilies, R., & Gerhardt, M. W. (2002). Personality and leadership: A qualitative and quantitative Review. *Journal of Applied Psychology*, 87(4), 765-780.

<https://doi.org/10.1037/0021-9010.87.4.765>

Keinan, G., Meir, E., & Gome-Nemirovsky, T. (1984). Measurement of risk takers' personality.

Psychological Reports, 55(1), 163-167. <https://doi.org/10.2466/pr0.1984.55.1.163>

King, G., & Nielsen, R. (2019). Why propensity scores should not be used for matching.

Political Analysis, 27(4), 435-454. <https://doi.org/10.1017/pan.2019.11>

Larsen, R., Buss, D., Wismeijer, A.A.J., Song, J., van den Berg, S.M., Jeronimus, B.F. (2020).

Personality psychology, domains of knowledge about human nature. McGraw-Hill.

Lee, J., McCreary, D., & Villeneuve, M. (2011). Prospective multifactorial analysis of Canadian

- Forces basic training attrition. *Military Medicine*, 176(7), 777-784.
<https://doi.org/10.7205/MILMED-D-10-00375>
- Huijzer, R., Jeronimus, B. F., Reehoorn, A., Blaauw, F. J., Baatenburg de Jong, M., de Jonge, P., Hartigh, R. J. R. (2022). Personality Traits of Special Forces Operators. Open Science Framework. <https://osf.io/ysfu6>
- Marcus, B., & Schütz, A. (2005). Who are the people reluctant to participate in Research? Personality correlates of four different types of nonresponse as inferred from self- and observer ratings. *Journal of Personality*, 73(4), 959-984. <https://doi.org/10.1111/j.1467-6494.2005.00335.x>
- Marsh, H. W. (2007). Application of confirmatory factor analysis and structural equation modeling in sport and exercise psychology. In G. Tenenbaum & R. C. Eklund (Eds.), *Handbook of sport psychology* (pp. 774–798). John Wiley & Sons, Inc.
- Marsh, H. W., Morin, A. J., Parker, P. D., & Kaur, G. (2014). Exploratory Structural Equation Modeling: An Integration of the Best Features of Exploratory and Confirmatory Factor Analysis. *Annual review of clinical psychology*, 10, 85-110.
<https://doi.org/10.1146/annurev-clinpsy-032813-153700>
- McCrae, R. R., Zonderman, A. B., Costa, P. T., Jr., Bond, M. H., & Paunonen, S. V. (1996). Evaluating replicability of factors in the Revised NEO Personality Inventory: Confirmatory factor analysis versus Procrustes rotation. *Journal of Personality and Social Psychology*, 70(3), 552–566. <https://doi.org/10.1037/0022-3514.70.3.552>
- McDonald, D. G., Norton, J. P., & Hodgdon, J. A. (1990). Training success in U.S. Navy Special Forces. *Aviation, Space, and Environmental Medicine*, 61(6), 548–554.
- McElreath, R. (2020). *Statistical Rethinking: A Bayesian course with examples in R and Stan*.

CRC press. <https://doi.org/10.1201/9780429029608>

Oberski, D. (2016). Mixture models: Latent profile and latent class analysis. In J. Robertson, & M. Kaptein (Eds.). *Modern statistical methods for HCI* (pp. 275–287). Switzerland: Springer International Publishing.

Ones, D. S., Dilchert, S., Viswesvaran, C., & Judge, T. A. (2007). In support of personality assessment in organisational settings. *Personnel Psychology*, 60(4), 995-1027.

<https://doi.org/10.1111/j.1744-6570.2007.00099.x>

Picano, J., Roland, R., Rollins, K., & Williams, T. (2002). Development and validation of a sentence completion test measure of defensive responding in military personnel assessed for nonroutine missions. *Military Psychology*, 14(4), 279-298.

https://doi.org/10.1207/S15327876MP1404_4

Revelle, W. (2015). Package ‘psych’. *The comprehensive R archive network*, 337, 338.

Richard, F. D., Bond Jr, C. F., & Stokes-Zoota, J. J. (2003). One hundred years of social psychology quantitatively described. *Review of general psychology*, 7(4), 331-363.

<https://doi.org/10.1037/1089-2680.7.4.311>

Rolland, J., Parker, W., & Stumpf, H. (1998). A psychometric examination of the French translations of NEO-PI-R and NEO-FFI. *Journal of Personality Assessment*, 71(2), 269-

291. https://doi.org/10.1207/s15327752jpa71-2_13

Saucier, G., & Goldberg, L. R. (1998). What is beyond the Big Five? *Journal of Personality*,

66(4), 495-524. <https://doi.org/10.1111/1467-6494.00022>

Sawilowsky, S. (2009). New effect sizes rules of thumb. *Journal of Modern Applied Statistical*

Methods, 8(2), 26. <https://doi.org/10.22237/jmasm/1257035100>

Saxon, L., DiPaula, B., Fox, G. R., Ebert, R., Duhaime, J., Nocera, L., Tran, L., & Sobhani, M.

- (2020). Continuous measurement of reconnaissance marines in training with custom smartphone app and watch: Observational cohort study. *JMIR mHealth and uHealth*, 8(6), e14116. <https://doi.org/10.2196/14116>
- Sørli, H., Hetland, J., Dysvik, A., Fosse, T., & Martinsen, Ø. (2020). Person-organisation fit in a military selection context. *Military Psychology*, 32(3), 237-246. <https://doi.org/10.1080/08995605.2020.1724752>
- Soto, C. J. (2019). How replicable are links between personality traits and consequential life outcomes? The life outcomes of personality replication project. *Psychological Science*, 30(5), 711-727. <https://doi.org/10.1177/09567976198331612>
- Steward, R., Möttus, R., Seeboth, A., Soto, C. J., & Johnson, W. (2021). The finer details? The predictability of life outcomes from Big Five domains, facets, and nuances. *Journal of Personality*. <https://doi.org/10.1111/jopy.12660>
- Steward, V. (2017). 'Commando Consciousness' and Criminality in Post-Second World War Fiction. *Journal of War & Culture Studies*, 10(2), 165-177. <https://doi.org/10.1080/17526272.2016.1215683>
- Tedeholm, P., Sjöberg, A., & Larsson, A. (2021). Personality traits among Swedish counterterrorism intervention unit police officers: A comparison with the general population. *Personality and Individual Differences*. 168, 110411. <https://doi.org/10.1016/j.paid.2020.110411>
- Tendeiro, J., & Kiers, H. (2019). A review of issues about null hypothesis Bayesian testing. *Psychological methods*, 24(6), 774-795. <https://doi.org/10.1037/met0000221>
- Van der Krieke, L., Jeronimus, B., Blaauw, F., Wanders, R., Emerencia, A., Schenk, H., de Vos,

- S., Snippe, E., Wichers, M., Wigman, J., ... De Jonge, P. (2016). HowNutsAreTheDutch (HoeGekIsNL): A crowdsourcing study of mental symptoms and strenghts. *International Journal of Methods in Psychiatric Research*, 25(2), 123-144.
<https://doi.org/10.1002/mpr.1495>
- Van der Linden, D., te Nijenhuis, J., Cremers, M., & van de Ven, C. (2011). General factors of personality in six datasets and a criterion-related validity study at the Netherlands Armed Forces. *International Journal of Selection and Assessment*, 19(2), 157-169.
<https://doi.org/10.1111/j.1468-2389.2011.00543.x>
- Wanders, R. B., van Loo, H. M., Vermunt, J. K., Meijer, R. R., Hartman, C. A., Shoevers, R. A., Wardenaar, K. J., & de Jonge, P. (2016). Casting wider nets for anxiety and depression: Disability-driven cross-diagnostic subtypes in a large cohort. *Psychological Medicine*, 46(16), 3371-3382. <https://doi.org/10.1017/S0033291716002221>
- Young, M. S., & Schinka, J. A. (2011). Research validity scales for the NEO-PI-R: Additional evidence for reliability and validity. *Journal of Personality Assessment*, 76(3), 412-420.
https://doi.org/10.1207/S15327752JPA7603_04

Supplements

Table S1

Facet Means, Standard Deviations (SDs) and Other Statistics for the Dropouts ($n = 138$) and Graduates ($n = 53$).

Facet	Dropouts		Graduates		p -value	Cohen's d
	mean	SD	mean	SD		
N1 - Anxiety	19.51	4.22	18.47	3.72	0.116	0.25
N2 - Angry hostility	17.7	3.23	17.17	2.93	0.296	0.17
N3 - Depression	19.75	3.59	19	3.67	0.198	0.21
N4 - Self-consciousness	18.58	3.86	17.87	3.23	0.235	0.19
N5 - Impulsiveness	22.88	4.18	22.25	4.32	0.355	0.15
N6 - Vulnerability	16.14	2.65	15.57	2.83	0.186	0.21
E1 - Warmth	29.57	4.09	30.32	3.46	0.24	-0.19
E2 - Gregariousness	26.17	4.27	26.83	3.63	0.324	-0.16
E3 - Assertiveness	25.99	4.78	26.3	4.27	0.674	-0.07
E4 - Activity	26.86	3.42	27.47	2.63	0.238	-0.19
E5 - Excitement seeking	28.38	3.51	28.11	3.78	0.65	0.07
E6 - Positive emotions	24.97	2.34	25.23	2.64	0.516	-0.1
O1 - Fantasy	23.27	4.02	22.77	3.6	0.435	0.13
O2 - Aesthetics	21.87	5.05	21.98	5.49	0.894	-0.02
O3 - Feelings	26.27	3.89	26.66	3.11	0.512	-0.11
O4 - Actions	27.34	3.89	27.42	3.74	0.905	-0.02
O5 - Ideas	27.65	4.54	26.98	4.3	0.354	0.15
O6 - Values	22.83	2.51	23.11	3.09	0.519	-0.1
A1 - Trust	29.57	3.61	29.98	3.69	0.48	-0.11
A2 - Straightforwardness	29.33	4.86	30.57	4.02	0.1	-0.26
A3 - Altruism	30.51	3.12	30.98	2.63	0.336	-0.15
A4 - Compliance	24.2	3.25	23.68	3.09	0.32	0.16
A5 - Modesty	30.44	4.49	29.75	4.66	0.35	0.15
A6 - Tender-mindedness	27.31	3.83	27.51	3.82	0.75	-0.05
C1 - Competence	31.09	2.49	31.32	2.79	0.587	-0.09
C2 - Order	28.19	3.65	29.28	3.98	0.072	-0.29
C3 - Dutifulness	33.14	2.93	33.74	2.84	0.204	-0.2
C4 - Achievement striving	31.7	3.74	32.38	3.12	0.24	-0.19
C5 - Self-discipline	29.09	2.78	29.51	2.95	0.356	-0.15
C6 - Deliberation	27.28	3.88	27.64	4.3	0.572	-0.09

Table S2*Factor Loadings for All Special Forces Operators, Graduates and Dropouts.*

Facet	N	E	O	A	C
N1 - Anxiety	0.75	0	0.05	0	-0.01
N2 - Angry hostility	0.59	0.35	-0.14	-0.33	-0.01
N3 - Depression	0.73	0.01	0.1	0	-0.02
N4 - Self-consciousness	0.67	-0.2	-0.05	-0.13	0.01
N5 - Impulsiveness	0.44	0.63	-0.04	-0.17	-0.28
N6 - Vulnerability	0.62	-0.09	-0.15	0.07	-0.3
E1 - Warmth	-0.16	0.41	0.11	0.67	-0.17
E2 - Gregariousness	-0.12	0.56	-0.12	0.4	-0.44
E3 - Assertiveness	-0.39	0.46	0.17	-0.12	0.12
E4 - Activity	0	0.59	-0.01	0.05	0.09
E5 - Excitement seeking	-0.01	0.56	0.17	0.09	-0.12
E6 - Positive emotions	0.12	0.03	-0.07	-0.2	0.16
O1 - Fantasy	-0.03	0.11	0.47	-0.05	-0.35
O2 - Aesthetics	0.01	0	0.75	0.01	-0.01
O3 - Feelings	0.08	0.38	0.42	0.17	0.04
O4 - Actions	-0.38	0.14	0.22	0.12	-0.12
O5 - Ideas	-0.17	-0.14	0.81	-0.13	0.22
O6 - Values	0.32	0.09	-0.16	0.11	0.16
A1 - Trust	-0.21	0.03	0.02	0.57	-0.14
A2 - Straightforwardness	0.11	-0.35	-0.15	0.49	0.19
A3 - Altruism	0.01	0	-0.01	0.73	0.04
A4 - Compliance	-0.07	-0.53	-0.01	0.43	-0.08
A5 - Modesty	0.14	-0.43	-0.02	0.4	0.15
A6 - Tender-mindedness	0.01	-0.19	0.26	0.5	0.01
C1 - Competence	-0.48	0.09	0.08	-0.06	0.42
C2 - Order	0	-0.02	-0.01	-0.01	0.64
C3 - Dutifulness	-0.02	-0.22	0.05	0.3	0.61
C4 - Achievement striving	0	0.21	0.14	0.07	0.62

C5 - Self-discipline	-0.28	0.05	0.01	0.09	0.54
C6 - Deliberation	-0.25	-0.46	0.16	0.09	0.58

Note. Calculated via ESEM (Marsh et al., 2014). Ordering and boldface of the loadings are reported in-line with McCrae et al. (1996). Loadings greater than 0.40 are in bold font.

Table S3

Bayesian Information Criterion (BIC) and Conditional Akaike Information Criterion (cAIC) Scores for Latent Profile Analysis.

Number of classes	Question 1 - Civilians and commandos		Question 2 - Graduates and dropouts	
	BIC	cAIC	BIC	cAIC
1	18210	18220	7826	7836
2	17994	18010	7758	7774
3	17970	17992	7772	7794
4	17978	18006	7778	7806
5	18007	18041	7795	7829
6	17976	18016	7819	7859
7	18020	18066	7827	7873
8	18020	18072	7853	7905

Note. A lower cAIC or BIC score is generally considered a better model fit.