SCANDINAVIAN JOURNAL OF WORK AND ORGANIZATIONAL PSYCHOLOGY

Predictors in the Swedish Counterterrorism Intervention Unit selection Process

ORIGINAL ARTICLE

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STOCKHOLM UNIVERSITY PRESS

ABSTRACT

This study examines the importance of physical and psychological predictors of work sample performance within the Swedish police Counterterrorism Intervention Assessment and Selection (CTIAS) process (N = 160). CTIAS consists of a 4-day prescreening (Phase 1) and a 10-day work sample test (Phase 2). Applicants may withdraw freely or be stopped by a CTIAS board (if they do not fulfill the CTIAS requirement criteria) at any moment throughout Phases 1 and 2. The dependent variable was applicants being approved at the end of CTIAS Phase 1. Biserial correlations were used to determine relationships between the predictors' age, general mental ability, executive functions, personality, physical strength, coordination, running capacity and the dependent variable. Significant ($p < 0.01$) results in the biserial correlations were strength ($r = 0.217$), coordination ($r = 0.223$), and running capacity ($r = 0.412$). In conclusion, the logistic regression analysis with all predictors revealed that only running capacity (2800 meters) was significant for approval to CTIAS. Implications for the practical selection of CTIAS are discussed, and suggestions for future investigation are proposed.

Public significance statement: The current study examined physical and psychological predictors in a selection process within a tactical unit in the Swedish Police Authority. Higher running capacity was the only predictor that increased the odds of approved applicants.

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KEYWORDS:

counterterrorism intervention units; personnel selection; predictors; Police; SWAT

TO CITE THIS ARTICLE:

Tedeholm, P. G., Larsson, A. C., & Sjöberg, A. (2023). Predictors in the Swedish Counterterrorism Intervention Unit selection Process. *Scandinavian Journal of Work and Organizational Psychology*, 8(1): 3, 1–13. DOI: https://doi.org/10.16993/sjwop.194

INTRODUCTION

The present study investigates the validity of predictors in the Swedish Counterterrorism Intervention Assessment and Selection (CTIAS). The outcomes of this research may identify psychological and physical predictors linked to high performance under mentally and physically demanding conditions.

To prevent terrorist attacks, several countries have organized special intervention units (On the improvement of cooperation between the special intervention units of the Member States of the European Union in crisis situations, 2007) within their military, Special Operation Forces (SOF), and police Counterterrorism Intervention Units (CTIUs). SOF and CTIU officers frequently experience high-pressure situations, i.e., combating terrorist operations, making high-risk arrests, and managing hostage situations; thus, they subsequently face mental, physical, and emotional endurance stressors. Few investigations have identified the characteristics of SOF (Skoglund et al., 2020) and CTIU (Tedeholm et al., 2021) officers, nor have they studied how these characteristics predict future job performance or lead to a pool of approved applicants in SOF and CTIUs work sample tests (Bartone et al., 2008; Kilcullen et al., 1999). The lack of studies may negatively influence the selection process and consequently, job performance in SOF and CTIU. Establishing a structured and research-based personnel selection system is crucial (Principles for the Validation and Use of Personnel Selection Procedures, 2018); otherwise, CTIUs might fail to select applicants with suitable characteristics and capacity.

This study is based on the theory of individual differences (Scott, 1920), which has been a guide for developing measurement methods for use in personnel selection (Murphy, 2012). Traditionally, the individual differences in personnel selection are cognitive (Spearman, 1927) and physical abilities (Hogan, 1991b), personality traits (Allport, 1937), interests, and self-evaluations. These individual differences have a biological component (Plomin & Rende, 1991), which is presumptive and provides individuals with different opportunities to succeed in the job. They are, therefore, beneficial in personnel selection processes. This study includes abilities and personality traits but not interests and self-evaluation variables.

Researchers have widely examined and identified valid predictors of overall job performance in personnel selection (Gonzalez-Mule et al., 2014; Gottfredson, 1997; Hunter & Hunter, 1984; Judge et al., 2013; Kuncel et al., 2010; Ones et al., 2012; Salgado & Moscoso, 2019; Schmidt & Hunter, 1998; Schmidt et al., 2008). These include General Mental Ability (GMA) (Spearman, 1927), personality (Barrick, 2005), physical abilities (Hogan, 1991b), and the selection method of work sample tests (Roth et al., 2005).

GMA is hierarchically constructed with an underlying general mental ability factor (Spearman, 1927), affecting one's ability to learn, comprehend, and solve logical problems. GMA displays the high predictive validity of future success in overall work performance, task performance, learning, training, problem-solving, and life in general (Hunter & Schmidt, 1996; Hunter et al., 2006; Hülsheger et al., 2007; Kuncel et al., 2010; Schmidt & Hunter, 1998; Schmidt et al., 2008). A higher GMA provides greater benefits the more complex and demanding a job assignment becomes, resulting in successful job performance (Gottfredson, 1997).

Personality traits are consistent characteristic patterns of thoughts, feelings, and behaviors (Johnson, 1997). While the relationships between GMA and task performance are strong, personality traits and GMA predict organizational citizenship behavior; however, almost only personality traits predict counterproductive work behavior (Gonzalez-Mule et al., 2014). The most common and accepted taxonomy of personality is the Five-Factor Model (FFM) (McCrae & John, 1992), with the following five factors: neuroticism, extraversion, conscientiousness, openness to experience, and agreeableness. Personality traits, particularly neuroticism and conscientiousness, predict work performance in several jobs (Barrick, 2005; Barrick & Mount, 1991; Barrick et al., 2001a; Barrick et al., 2001b; Costa & McCrae, 1992; Judge et al., 2013; Salgado, 1997; Salgado, 2002; Viswesvaran et al., 2005). Neuroticism, especially the anxiety facet, is negatively related to success in military aviation training (Campbell et al., 2009) and work sample tests in SOF (Hartmann & Gronnerod, 2009; Hartmann et al., 2003), comparable to CTIU high-risk situations. Further, low levels of neuroticism (Skoglund et al., 2020), high levels of conscientiousness (Huijzer et al., 2022), and high extroversion and emotional stability (Garbarino et al., 2012; Tedeholm et al., 2021; Young et al., 2018) typically characterize SOF, special weapons and tactics (SWAT), and CTIU (Tedeholm et al., 2021) officers. For example, the personality trait conscientiousness adds incremental validity beyond GMA in personnel selection when predicting work and training performance (Schmidt & Hunter, 1998).

Tactical personnel should have a certain physical fitness level to successfully complete intense training and selection and excel in their careers (Dawes et al., 2017; Maupin et al., 2018; Thomas et al., 2019). Differences in physical abilities may influence performance in stressful and physically demanding jobs, such as firefighters, construction workers, military personnel, and law enforcement (Sackett et al., 2017; Tipton et al., 2013). Unlike GMA, physical abilities do not have an apparent straightforward hierarchical structure (Fleishman et al., 1984). Thus, it is critical to ascertain the specific qualities required for a given position. This study investigates three physical abilities: muscular strength, running capacity, and coordination (Fleishman & Reilly, 1992; Hogan, 1991b; Myers et al., 1993; Sheppard & Young, 2006).

"Executive function" (EF) is a multidimensional term to describe the cognitive processes for inhibitory control, working memory, and cognitive flexibility (Bagetta & Alexander, 2016; Friedman et al., 2006). EF regulates thoughts, actions, and attention and also enables dynamic adaptation in a changing environment (Diamond, 2013; Jacobson & Matthaeus, 2014; Shields et al., 2016; Zelazo, 2015). EF may be essential for decision-making during challenging situations with a high degree of mental stress and pressure (Causse et al., 2011; Sakamoto et al., 2018). Although researchers disagree on whether EF explains other capacities than GMA (Friedman & Miyake, 2017; Engelhardt et al., 2016), EF may provide further incremental validity for job performance in SOF and CTIU and is therefore included in this study.

Studies of military SOF applicants showed that physical performance tests were the best predictors of job performance (i.e., tactical movement, carrying ladders), followed by cognitive tests (Beal, 2010; Eisinger, 2006; Kilcullen et al., 1999). Thomas et al. (2019) found that higher selection rates correlated with upper body and trunk power, stamina, high aerobic capacity, and the ability to carry loads over distances. Even researcher Farina et al. (2019) identified that physical performance is a strong predictor of selection outcomes in military Special Operations Forces (SOF) assessment, followed by demographic and psychological measures.

Thus, personnel selection research suggests that high levels of cognitive abilities, well-suited personalities (Schmidt & Hunter, 2004; Schmidt et al., 2008), and high physical abilities are beneficial in complex, psychologically, and physically challenging situations (Smith & Barrett, 2019), such as terrorist attacks i.e., in Stockholm 2017, Copenhagen 2015, Brussels 2016, Utöya 2011, London 2005, or Nice 2016. However, CTIU's work environments, criteria, and predictors in CTIU selection are poorly researched, particularly concerning predictive validity. Therefore, this study contributes to unique and novel knowledge focusing on these processes. The search for more accurate predictors in CTIAS is presumably motivated by the significant expenses associated with selection and training, the human suffering associated with failure, and the importance of finding competent individuals well-suited for CTIU missions. The dearth of evidence on competent and efficient CTIAS impedes the process's credibility and increases the risk of suboptimal performance.

PURPOSE

This study contributes to understanding which predictors are actually used in the selection for this type of police force. The study aims to identify psychological and physical predictors that increase the odds of completing Phase 1 of the Swedish CTIAS. The hypotheses are as follows: Completing CTIAS Phase 1

H1: is associated with personality traits, particularly low neuroticism and high conscientiousness.
H2: is positively associated with GMA.
H3: is positively associated with visual and auditory attention and response control, representing EF.
H4: is positively associated with physical strength.
H5: is positively associated with coordination and speed.
H6: is positively associated with running capacity.

CTIAS

CTIAS is a voluntary process conducted by the Swedish Police Authority to identify applicants suitable for becoming Swedish CTIU officers. It is comprised of a 4-day prescreening, including a short work sample test (Phase 1), as well as a 10-day work sample test (Phase 2). The performance of each applicant is assessed in several cognitively, mentally, and physically demanding situations: learning tactics, team problem-solving, teamwork, terrain navigation exercises, marches, timed runs, obstacle courses, simulation exercises, and combat fighting. Throughout CTIAS, a board of CTIAS personnel assesses, scores, and selects the most suitable applicants, who can then proceed to basic training. Applicants may withdraw or be removed for failing to meet CTIAS requirements throughout Phases 1 and 2. This study focuses on predictors for completing CTIAS Phase 1.

CTIAS Phase 1

The study criteria, CTIAS Phase 1, first includes physical tests; psychological assessments (including interviews and personality and GMA tests); background checks; shooting tests; phobia tests (water, heights, cramped spaces), and a work sample test, an 8-hour physical and mental stress test (running, carrying equipment, wrestling, boxing, marching, and teamwork).

MATERIAL AND METHODS

PARTICIPANTS

Out of 302 applications, 79 applicants were excluded because they did not meet the basic eligibility criteria or had incomplete application documents. Two hundred twenty-three were called to CTIAS Phase 1. Nevertheless, only 162 of the 223 arrived at CTIAS Phase 1. No more data for the research group was available for the excluded applicants or the 43 applicants who were called up but did not show up for CTIAS Phase 1. Data from CTIAS Phase 1 physical tests are not used to rank applicants.

The study cohort consisted of CTIU (N = 160) with 160 males and zero females. Two females were excluded from the initial pool of 162 applicants, who were gathered from these professions: police officers, Swedish customs officers, coast guard officers, and military officers. The dependent data, CTIAS Phase 1 approved applicants (n

= 28), ranged from 25–42 years (M = 30.64, SD = 3.78). The independent data, CTIAS Phase 1 rejected applicants (n = 132), ranged from 25–47 years (Mean, M = 30.68, Standarddeviation, SD = 4.11). Data that was included for each independent variable were age (n = 160), strength (n = 160), running capacity (n = 160), GMA (n = 159), coordination (n = 158), EFs (n = 147), neuroticism (n = 152), extraversion (n = 152), openness (n = 152), agreeableness (n = 152), and conscientiousness (n = 152). Missing data was added through the imputation expectation maximization method (Dempster et al., 1977). All scores were transformed into Z-scores to compare different variables with different scales.

CRITERION

The dependent variable was coded 1 for approved applicants CTIAS Phase 1 and 0 for not approved applicants.

PREDICTORS

For the reliability (Hayes & Coutts, 2020) of predictors, when possible, we used both McDonald's (1999) omega (ω) and Cronbach's (1951) alpha (α); otherwise, only Cronbach's alpha.

PHYSICAL PREDICTORS

Applicants completed physical tests to assess their coordination, strength, and running capacity.

Coordination and speed

Applicants performed Harre's (1976) steeplechase, an obstacle course of predetermined order involving several motor actions and requiring spatial abilities, turning, forward rolling, jumping, crawling, and changing directions (Hoyek et al., 2014). Participants were allowed three trials, with the best result counting towards the judgment of their ability.

Strength

Strength was measured as the mean value of the maximum repetitions of chin-ups (wearing a 25-kilo weight 'vest'), dips (wearing a 25-kilos weight 'vest'), and deadlifts (120 kilos).

Running capacity

A flat running capacity test of 2800 meters was measured by time.

PSYCHOLOGICAL PREDICTORS

Applicants completed psychological tests to assess their GMA, personality traits, and EF.

General mental ability (GMA)

GMA was operationalized as the total raw score of nine subtests from the cognitive test battery BasIQ. BasIQ measures a combination of verbal, spatial, and numerical abilities. The BasIQ manual (2013) shows ω = 0.85, and BasIQ correlates with Raven's matrices at 0.78 ($p < 0.05$) (Mårdberg et al., 2000). In our study, the BasIQ internal consistency reliability measurement, based on the nine subtests, shows ω = 0.614 and α = 0.606.

Executive function (EF) measured by IVA-AE2

EF testing included visual and auditory attention and response control functioning (Sandford & Turner, 2009). EF was measured using Integrated Visual and Auditory Continuous Performance (IVA-AE2, Advanced Edition), a computer-based test to evaluate visual and auditory attention and response control. A combined score was used for statistical analysis with a mean value of attention and response control scores (α = 0.712).

Personality

Personality was measured using the NEO Personality Inventory for assessing the five-factor model of personality (Costa & McCrae, 1985). This study used the latest Swedish paper version of the NEO PI-3, which has shown good psychometric properties in the Swedish standardized sample; the internal consistency reliability (Cronbach's α, alfa) of the five factors ranged between 0.90–0.94, and the facets' internal consistency ranged between 0.54–0.83 (Källmen et al., 2016). The internal consistency reliability is comparable with the original version (McCrae & Costa, 2010). The Swedish and English revised versions (NEO-PI-3) have 240 items and are rated on a five-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The scale evaluates the five factors (neuroticism, extraversion, openness, agreeableness, and conscientiousness) and their respective facets (Källmen et al., 2016; McCrae & Costa, 2010). Gendered Swedish norms were used for the five factors and 30 facets. Table 1, presents the reliability, based on each of the six facets scores, and the NEO factors in this study.

ETHICS

The regional ethical committee approved the study; Dnr: 2017/2175-32. The study was conducted in full compliance with the Declaration of Helsinki.

MCDONALD'S OMEGA (ω) AND CRONBACH'S ALPHA (α) FOR PREDICTORS

TEST	ω	α
Neuroticism	.869	.869
Extraversion	.691	.683
Openness	.730	.711
Agreeableness	.750	.743
Conscientiousness	.877	.870

Table 1 Reliability of NEO factors.

TEST PROCEDURE AND STUDY FLOW

Two weeks before CTIAS, applicants were informed by email that voluntary research would occur during CTIAS. After registration (07:00) on test day 1, all applicants were informed written and verbally about the research project and voluntary participation. All applicants in the study signed to confirm their informed consent. CTIAS professional test leaders conducted the evaluations. The applicants completed the NEO-PI-3 while waiting to perform physical tests. On day 1 (between 13:00–15:00), applicants completed cognitive testing (BasIQ and IVA-AE2). From 15:00–23:00, applicants completed the 8-hour extreme physical and mental stress test, followed by an 8-hour rest period. The following day, applicants completed shooting and phobia tests (water, heights, cramped spaces). A few days later (5–15 days), applicants completed an interview, reference screenings, and psychological assessments.

STATISTICS

Independent variables (the predictors) were age, EF, strength, coordination, running capacity, GMA, and the five personality factors. Moreover, the dependent variable (the criteria) was approved or not approved in CTIAS Phase 1.

For determining eventual multicollinearity which means the correlations are close to or higher than r = 0.8, collinearity is likely to exist between predictors, the Pearson correlation coefficient (r) was used (Barton & Peat, 2014; Shrestha, 2020); for measuring the strength of association between the predictors and the criteria, point-biserial correlation analysis was used. Finally, a logistic regression analysis was used to test the relationships between the predictors and the criteria.

RESULTS

PEARSON CORRELATION ANALYSIS FOR DETECTING MULTICOLLINEARITY

The Pearson correlation analysis (*$p < .05$, **$p < .01$) presented in Table 2 revealed that coefficients are less than 0.8, which shows multicollinearity is less likely to exist.

POINT-BISERIAL CORRELATION ANALYSIS BETWEEN DEPENDENT AND INDEPENDENT VARIABLES.

The Point-biserial correlation analysis (*$p < .05$; **$p < .01$) presented in Table 3 revealed the significant biserial correlations between approved applicants in Phase 1 and running capacity (r = 0.412**), strength (r = 0.217**), and coordination (r = 0.223**).

	APPROVED PHASE 1
Age	–.004
GMA	–.034
EF	.009
Neuroticism	–.084
Extraversion	.111
Openness	–.095
Agreeableness	.144
Conscientiousness	.146
Strength	.217**
Coordination	.223**
Running capacity	.412**

Table 3 Biserial correlations between independent variables and the dependent variable approved applicants in Phase 1. ** p < .05 ** p < .01.*

	1	2	3	4	5	6	7	8	9	10
1. Age										
2. GMA	0,060									
3. EF	–0,142	,183*								
4. Neuroticism	0,056	–0,023	–0,011							
5. Extraversion	–0,004	0,033	–0,074	–,351**						
6. Openness	–0,001	,197*	0,133	0,078	,396**					
7. Agreeableness	–0,058	–0,138	0,074	–,450**	,362**	0,057				
8. Conscientiousness	–0,034	0,064	0,030	–,678**	,352**	–0,108	,508**			
9. Strength	0,111	–0,043	–0,022	–0,143	0,000	–0,134	0,111	,189*		
10. Coordination	0,016	0,015	0,059	–0,137	–0,048	–0,049	0,111	0,106	,194*	
11. Running capacity	0,067	–0,028	–0,071	0,004	0,119	–0,060	0,069	0,101	,300**	,238**

Table 2 Pearson correlations between predictors. ** p < .05 ** p < .01.*

Note: GMA = General mental ability. EF = Executive functions.

REGRESSION ANALYSIS

Table 4 displays the logistic regression results for approved applicants in CTIAS Phase 1. The Hosmer and Lemeshow test indicated a good model fit (chi-square = 5.705, df = 8, p = 0.680), as did the Omnibus tests of model coefficients (chi-square = 50.851, df = 10, p < .001). Only the predictor running capacity was significant (B = (0.336), S = 0.085, *Wald* = 15.783, $p < .001$).

REGRESSION ANALYSIS WITH ONLY THE PREDICTOR RUNNING CAPACITY

Table 5 shows the logistic regression results for approved applicants in CTIAS Phase 1. The Hosmer and Lemeshow test indicated a good model fit (chi-square = 8.291, df = 8, p = 0.406), as did the Omnibus tests of model coefficients (chi-square = 30.808, df = 1, p < .001). The constant was B = (–19.369), SE = 3.839, *Wald* = 25.449, $p < .001$ and for running capacity with B = (0.373), SE = 0.078, *Wald* = 22.549, $p < .001$.

DISCUSSION

This study examines the importance of measured physical and psychological predictors of work sample performance within the police Counterterrorism Intervention Assessment and Selection (CTIAS) process. Despite assessing 160 male applicants looking at their personality traits, GMA, EFs, running capacity, physical strength, and coordination, only running capacity was a significant predictor for approval by CTIAS Phase 1.

Overall, the results significantly supported H6, but H1–H5 were not supported. One hundred thirty-two applicants were approved, and 28 applicants were not approved in CTIAS Phase 1. The model with all predictors identified 125 out of 132 (94.7%) not approved, but only predicted 9 out of 28 (32.1%) of the approved applicants in CTIAS Phase 1. In conclusion, this model correctly classified 83.8% of cases, and only the predictor running capacity was significant (p < .001).

The logistic regression model with only the predictor running capacity identified 128 out of 132 (94.7%) as not approved, but only identified 7 out of 28 (25%) of the approved applicants in CTIAS Phase 1.

Selection studies assess prediction where criteria differ and can affect the results. Of the initial 160 applicants, 28 (17.5%) were approved in CTIAS Phase 1, and according to the experience of CTIAS test leaders, 5–10% of all applicants will be approved in Phase 2. Success rates in similar studies differ from our findings. For example, in other CTIU and SOF studies, 31% of applicants passed the Australian specialist police field test, and 45–55 % of applicants succeeded in the US Army Special Forces selection (Bartone et al., 2008). However, the difference in applicants' termination rates may be because some units only terminate applicants as a base in the selection process. In contrast, others terminate them during the selection process and the training period after the selection. These differences should therefore be considered in the validation processes.

The analysis for a valid selection process should ensure that the components represent critical facets of the job (Brannick et al., 2012) with the purpose that no suitable applicants should fail or that unsuitable applicants should pass. When comparing applicants who pass the work sample test to those who fail in the SOF, SWAT, and CTIUs, specific characteristics become apparent (Farina et al., 2019; Hunt et al., 2013; Schram et al., 2020; Soccorso et al., 2019). However, when comparing our study with other investigations, it must be considered that the criteria, preselection, and predictors are inconsistent and differ in other studies (Bartone et al., 2008; Beal, 2010; Farina et al., 2019).

H1 (personality traits) was not supported by the current findings, contrary to previous research predicting SOF and CTIU work sample test outcomes. In the SOF, low neuroticism (Hartmann et al., 2003), high hardiness (Bartone et al., 2008), high extraversion (Johnson, 2018), and high commitment (Soccorso et al., 2019) were found to predict selection outcome. However, it should be added that most studies have not included both physical

	B	SE.	WALD	DF	SIG.
GMA	–0,006	0,013	0,208	1	0,648
EF	0,129	0,157	0,676	1	0,411
Neuroticism	0,000	0,018	0,000	1	0,983
Extraversion	0,028	0,024	1,427	1	0,232
Openness	–0,023	0,020	1,333	1	0,248
Agreeableness	0,014	0,022	0,439	1	0,508
Conscientiousness	0,003	0,023	0,021	1	0,885
Strength	0,100	0,107	0,878	1	0,349
Coordination	0,491	0,273	3,237	1	0,072
Running capacity	0,336	0,085	15,783	1	0,000
Constant	–20,564	6,076	11,454	1	0,001

Table 4 Regression analysis with all predictors.

Note: *Dependent variable = Approved applicants CTIAS Phase 1.*

** p < .05 ** p < .01.*

	B	S.E.	WALD	DF	SIG.	EXP(B)
Running capacity	0,373	0,078	22,549	1	0,000	1,452
Constant	–19,369	3,839	25,449	1	0,000	0,000

Table 5 Logistic regression.

Note: *Dependent variable = Approved applicants CTIAS Phase 1.*

** p < .05 ** p < .01.*

and psychological predictors, and personality traits may be more critical in Phase 2, where a lot of pressure and teamwork in stressful situations are evaluated. In addition, it should also be considered that psychological personality evaluation methods utilized in the selection are in our study, self-report based, thus leading to potential bias, especially in extreme situations (Matthews et al., 2011).

The study's H2, which tested GMA, was neither supported by the findings nor aligned with Soccorso et al. (2019), who found successful applicants were more cognitively strong. Few studies have investigated the impact of cognitive abilities on SOF and CTIU work sample tests. The aptitude test used by Soccorso (2019) tested only verbal ability. In our study, BasIQ measures verbal, spatial, and numerical ability. Furthermore, GMA is likely to correspond to extreme work sample tests such as CTIAS Phase 2, where complex challenges such as limited information availability, lack of individual performance feedback, and problem-solving tasks need to be navigated (Gottfredson, 1997; Schmidt & Hunter, 1998). Due to the findings that the GMA model did not account for variance in the ability to complete CTIAS Phase 1, extensive research shows that GMA is a very important ability for work performance (Schmidt & Hunter, 1998). Thus, a follow-up study is required to measure other study criteria, such as CTIAS Phase 2 or future job performance from a longitudinal perspective.

According to previous research, EF measured in H3 by visual and auditory attention and response control found no effect on applicant success (Vestberg & Tedeholm et al., 2021). Vestberg & Tedeholm et al. (2021) used a different test to measure EF, a design fluency test for higher-order EFs, and found that EF predicted CTIAS Phase 2 outcomes. However, the study did not include physical and other psychological predictors, i.e., GMA and personality traits. Therefore, based on that study, it is impossible to comment on how good EF is as a predictor in addition to GMA, physical abilities, and personality.

H4 tested physical strength; it did not predict CTIAS applicant success. Previous validation research of the selection process shows that successful SOF applicants are physically fitter than those who fail (Farina et al., 2019; Hunt et al., 2013). All applicants are relatively physically fit (including strong), and only small differences exist between applicants tried in CTIAS Phase 1. The physical strength definitions used in other SOF and CTIUs studies are not comparable. Thus, some studies use chin-ups as a predictor, whereas others use push-ups. There is no international consensus in the SOF and CTIU communities.

The applicants are self-selected to a certain extent, which may have affected the variation in the studied predictors (e.g., range restriction). All applicants have undergone selection processes for the military and police forces before the CTIU selection process, which also may affect the range restriction. All applicants have also passed the Swedish CTIUs' minimum requirements for physical ability (this information is restricted and unknown).

Physical abilities are not as hierarchically correlated as cognitive abilities. Important physical abilities such as psychomotor abilities, hand steadiness, static strength, and physical flexibility have not been available for the research group (Fleishman & Reilly, 1992). All parts of the physiological taxonomy should be included for a complete evaluation of physical abilities.

H5 tested whether applicants' coordination predicted success, but no support for this was found. The selection process, Phase 1, may not include challenges in which coordination determines success. Therefore, predicting the effect of these variables is difficult. Hypothetically, coordination is important in close-quarter combat tactics, where the body is used dynamically and movements require high coordinative ability.

Regarding H6, a significant relationship was shown between running capacity and predicted success. When the physical load is extreme, running capacity will determine if a candidate can recover quickly, keep up the pace, avoid accumulating lactic acid in the muscles, and have the energy to make good decisions under physical and mental pressure. Previous research indicated that SOF applicants who completed the work sample test performed better in road marches (Farina et al., 2019; Hunt et al., 2013) and were generally more physically fit (Beal, 2010). Furthermore, in general, special operations police officers, such as CTIU officers, are very physically fit (Zwingmann et al., 2021).

It is and has been common in selection programs for SOF and CTIU to be affected and influenced by other special forces selection programs. Therefore, there is a possibility that the actual selection procedures criteria will be verified in validation studies and confirm itself, but the selection criteria itself will never be challenged. At the same time, according to Annell, Lindfors & Sverke (2015), in Swedish research about Swedish police officers, physical fitness exams are beneficial for recruiting healthy, high-performing police officers.

One possible explanation for the results is that previous job analyses of CTIU have focused mostly on physical ability but not on cognitive abilities and personality. It is not easy to assess whether the actual job analysis is a valid job analysis that concerns the real job. If the study criteria are valid for predicting future work performance, then aerobic capacity is important for success in the selection process.

One factor that plays a role is that the CTIAS Phase 1 has several minimum requirements for physical and cognitive ability and other components included in CTIAS Phase 1. However, these are confidential and not known to the authors.

Our study is noteworthy for its comprehensive evaluation of multiple factors that could influence the selection process of emergency personnel, which allows for a complete understanding of the topic and potential implications for practical selection. The conclusions drawn from our study concur with several previous studies on SOF, SWAT, and CTIU. However, it is worth mentioning that few studies have focused on the combined impact of physical, cognitive, and personality traits in the selection of SOF, SWAT, and CTIU. Instead, many previous studies have focused solely on physical variables.

Dawes et al. (2017), Maupin et al. (2018), and Thomas et al. (2019) all suggest that physical fitness, specifically running capacity, is an important factor in the selection process, as well as during training and missions for various roles, such as patrol officers and elite tactical units. Dawes et al. (2017) found that participants with a high performance on an occupationally specific physical agility test for patrol officers had significantly better running capacity than low performers. Maupin et al. (2018) conducted a critical review of fitness profiles in elite tactical units and concluded that running capacity is an important physical attribute for success in these roles. Thomas et al. (2019) similarly found that fitness testing, including running capacity, was a good predictor of survivability in selecting specialist tactical personnel.

It is noteworthy that these studies were conducted on different groups, but they reached a similar conclusion: cardiorespiratory fitness is crucial in the selection process.

A question that arises from the results of this study is why multiple selection instruments are used when running performance seems to be the only predictor of success. The other predictors may be used later in the selection process or have different purposes, such as to assess other aspects in combination with running performance or to have a more holistic assessment of the candidates. This area of research can be further investigated to improve the selection process and make it more efficient.

STUDY LIMITATIONS

Generalizing these results outside the Swedish CTIU context can lead to uncertainty because of the study's criteria restrictions, sample size, restriction range, and measurement instruments.

The Phase 1 criteria may limit the generalization of the results. Phase 2 is not included because of difficulties concerning the small sample size and security restrictions.

The sample in this study was relatively small (n = 160), which increases the chance of assuming a distorted basis as true (Faber & Fonseca, 2014). CTIUs are usually organized into small, exclusive teams, limiting the selection studies' samples and statistical strength. We found only two previous studies that assessed CTIUs and selection success, with no more than 40 participants (Schram et al., 2020; Soccorso et al., 2019). Only six out of eight studies assessing SOF selection success had samples of over 200 (Bartone, 2008, n = 1138; Beal, 2010, n = 824; Farina, 2019, n = 800; Johnson, 2018, n = 389). For generalization of correlations, the sample size should not be less than n = 260 (Schönbrodt & Perugini, 2013).

In general, when CTIU and SOF applicants reach the work sample test of the application process, they have already been subjected to prescreening procedures (i.e., they are in the military or police forces or have a particular interest in the specific context), leading to a restricted range of studies.

As a result of selection research, theoretically, work sample tests should be a valid selection method for future work performance (Schmidt & Hunter, 1998; Sackett, 2021). However, the work sample test loses its predictive validity if the work includes extensive basic training where the employee can learn what is needed, or if the future work is not the same as assessed in the work sample test. CTIUs worldwide normally provide extensive basic training after the selection process, which may diminish work sample tests' predictive validity.

Our research holds significance for multiple reasons. Our findings reveal a significant correlation between running ability and selection decisions for Phase 2 of the CTIAS training programs. Additionally, it suggests that a high level of physical fitness, specifically in running ability, is likely a requirement for acceptance into these training programs. However, further investigation is needed to determine what other factors may influence selection decisions for Phase 2 and later job performance.

Validation studies are essential for identifying criterion-related issues, such as a lack of relevance between measurement, criteria, and job performance (Guion, 1965; Austin & Villanova, 1992). These studies stress the importance of examining criterion-related validity to determine the measurement's predictive power for job performance. Poor prediction of job performance can occur in personnel selection due to a lack of criterion representativeness (Schmidt & Hunter, 1998). In our study, we may encounter issues where the criterion of the CTIU selection process is not relevant to work performance.

The abovementioned issues demonstrate the importance of caution when evaluating the predictive validity of variables gained via SOF and CTIU research. Even when the physical predictor is included, a lot of the variance in applicant success remains unexplained. While the findings are interesting, we suggest a larger study that includes the whole selection process. Researchers could continue to strengthen the data through replication studies. Additionally studies to investigate predictive measures, may further elucidate other predictors that can explain selection process outcomes.

CONCLUSION

Our study shows running capacity as an important predictor in personnel selection for the Swedish CTIAS Phase 1. This is in accordance with other studies of SOF, SWAT, and CTIUs.

DATA ACCESSIBILITY STATEMENTS

Third-party limitations apply to data, according to a memorandum of cooperation between the Swedish Police Authority and the Karolinska Institutet. This data was utilized and subject to restrictions on its distribution.

AUTHOR CONTRIBUTIONS

Peter Tedeholm: Conceptualization, methodology, formal analysis, data collection, investigation, writing – original draft, visualization, project administration, funding acquisition.

Agneta Larsson: Conceptualization, formal analysis, writing – review & editing, supervision.

Anders Sjöberg: Conceptualization, formal analysis, writing – review & editing, supervision.

COMPETING INTERESTS

The authors have no competing interests to declare.

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TO CITE THIS ARTICLE:
Tedeholm, P. G., Larsson, A. C., & Sjöberg, A. (2023). Predictors in the Swedish Counterterrorism Intervention Unit selection Process. *Scandinavian Journal of Work and Organizational Psychology*, 8(1): 3, 1–13. DOI: https://doi.org/10.16993/sjwop.194

Submitted: 29July 2022 **Accepted:** 24 January 2023 **Published:** 10 March 2023