

DEVELOPMENT OF A SET OF CONTROL EXERCISES BASED ON THE ASSESSMENT OF COMBAT CAPABILITIES

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Abstract. *As the military environment is characterized by high levels of physical activity, physical activity is an important component of military action. The aim of the present study was to identify the most physically demanding daily and training (expected battle) tasks performed in the Latvian Army Land Force units (NAF LFU) through the development and application of a questionnaire survey. The results obtained in the study were used to start developing a set of NAF physical fitness control exercises. Based on adapted questionnaires, was developed a questionnaire for the NAF LFU, which allowed to determine most physically demanding daily and combat tasks, as well as dominant physical qualities and physical activities. The questionnaire was then distributed to 70 ground combat soldiers (with the most service and deployments experience as well as sports education), of whom 57 responded (81%). A field test – GB Combat test was carried out as part of the case study in the NAF LFU. Test was chosen by specialists and determined as the most suitable, evaluating the results of the questionnaire and the tasks to be performed by the NAF LFU. 52 soldiers participated in the pilot test. The five most physically demanding training tasks were identified: attack/ quick attack, fight in built-up area (FIBUA), defense, retreat/ delay and preparing fighting positions. The most common physical activities that characterize these tasks are indicated: crawling, running and bending, squatting. As the most important physical qualities indicated – muscular endurance 27.74%, less important physical qualities – speed 22.10%, muscular strength 21.32% and agility 20.36%. The five most physically demanding daily tasks were identified: field training, maintenance of equipment, marching, relocation of equipment and physical fitness training. The most common physical activities that characterize these tasks are indicated: carrying, lifting and running. As the most important physical qualities indicated - muscular endurance 33.08% and muscular strength 31.54%. The GB Combat test, evaluating by a rating system developed by the British Armed Forces (system - pass/fail), was not passed by 11 soldiers.*

Keywords: *control exercises, military, physical qualities, professional skills.*

Introduction

Physical fitness standards may serve a wide range of goals, including improving general well-being, increasing productivity, reducing injuries and lost workdays, boosting unit morale and eliminating stress. Depending on the goal,

the standards could be the same for everyone or applied differentially, e.g., by age or sex. Standards developed for specific occupational tasks would be applied to all who perform those tasks (Robson et al., 2017).

In order to find out the level of a person's physical readiness, it is necessary to perform control exercises or tests. With the help of control exercises, the physical properties and the level of these properties are checked. The results of these tests, especially the dynamics of the results, indicate the efficiency of the training process or, on the contrary, the shortcomings and errors in the training process (Payne & Harvey, 2010). The compilation of standardized, uniform test results provides the opportunity to obtain regular and the latest data on the level of physical fitness, working capacity and development of people, which is one of the most important indicators (Payne & Harvey, 2010; Karpljuk, Meško, Videmšek, & Tkavc, 2009; Jackson & Andrew, 2000).

The ideal test battery should include as many components of fitness as possible. The components of fitness can be broken down into 2 major categories: health related and skill related. Health-related components of fitness include body composition, flexibility, muscular strength, muscular endurance, and cardiovascular endurance (encompassing both aerobic and anaerobic capacity). Skill-related components of fitness include power, speed, agility, coordination, reaction time and balance (Baechle & Earle, 2008).

For a test battery to effectively measure physical fitness, it needs to be valid, reliable, and feasible (Miller, 2012). Validity means that a particular test measures what it is supposed to measure. Reliability means that the test is repeatable and free from individual bias. Feasibility means that the test is easily administered and does not require a great deal of skill or equipment (Peterson, 2015).

In addition to being valid, reliable, and feasible, a test battery should also be operationally relevant. Operational relevance (also known as face validity) refers to the extent that a particular test mimics actual occupational and/or battlefield requirements. Current research suggests that traditional military physical fitness tests have poor operational relevance (Peterson, 2015).

Leading NATO members, as well as the armed forces of other countries, have changed their physical fitness systems in recent years and, in the meantime, Army physical fitness tests (APFT) (British army, 2018; Canadian Forces, 2017; Foulis et al., 2017; Kirknes & Aandstad, 2016; Rayson, Holliman, & Bell, 1994). APFT are designed in such a way that the most typical battlefield activities are simulated and the obtained results of control exercises facilitate the task of unit commanders to assess the true combat capabilities of their units (Worden & White, 2012; Knapik et al., 2004; Lee et al., 1992). It is possible to make sure that a soldier is comprehensively physically trained by performing various physical fitness tests, and the wider the range of these tests, the more objective results can be obtained by assessing the soldiers' physical fitness (Foulis et al., 2017; Robson et al., 2017; Panichkul, Hatthachote, Napradit, Khunphasee, & Nathalang, 2007).

To date, the Latvian NAF Land Force units has not performed an analysis of the most physically demanding tasks and performance criteria while the armies of other countries have performed such an analysis. For example, Canadian forces identified digging, marching and manual materials handling as the most physically demanding tasks (Jaenen, 2009), Swedish army research show that transport of wounded, carrying heavy loads, care of wounded, movement in combat and attack in urban terrain are the most physically demanding work tasks in Swedish Army Land force units (Larsson, Dencker, Olsson, & Bremander, 2020) while Ukrainian army research identified the main types of combat actions carried out by future officers are march, defense, duty at checkpoints and guard (Oderov et al., 2017), but the British army identified four key activities - single lift, carry, repetitive lift and loaded march (Rayson, 1998).

The aim of the study is to determine the most physically demanding daily and training (expected combat) tasks with the help of questionnaires based on the results obtained, as well as to test the soldiers according to the most appropriate combat test chosen by specialists within the framework of the pilot study. This is the second in a series of studies and intends to serve as a foundation for the development of a valid physical work capacity test applicable to the Latvian army Land force units.

Methodology

Development of a work task analysis questionnaire: in order to reach the forwarded aim, the questionnaire was applied as a data collection method. The data were collected in the period November – December 2021.

The questionnaire consisted of 3 parts: questions related to the soldier's age, sex, anthropometric data (height, weight), questions related to the self – assessment of physical fitness – 7 questions and analysis of the most physically demanding daily and combat tasks – 40 questions, with the answers arranged in the Likert scale and an open question of soldier's comments was also given (see Table1). The questionnaire was disseminated electronically to 70 respondents, receiving back 57 valid answer sheets.

In part of physically demanding tasks analysis the tasks were grouped into 4 scales: importance, frequency, duration, intensity. The scale of importance contained 5 statements on the Likert scale from 1 to 5 where 1 meant “Not important”; 2 – “Somewhat important” 3 – “Moderately important”; 4 – “Very important”; 5 – “Very, very important”. The scale of frequency contained 5 statements where 1 meant “Never performed”; 2 – “Seldom performed” (e.g., once or just a few times during deployment) 3 – “Occasionally performed” (e.g., between once a week to a few times a month); 4 – “Often performed” (e.g., at least a few times each week); 5 – “Always Performed” (e.g., daily to several times a day)”. The scale of duration contained 5 statements where 1 meant “0 to 2

minutes”; 2 – “Between 2 to 30 minutes”; 3 – “Between 30 minutes to 1 hour”; 4 – “Between 1 to 2 hours”; 5 – “More than 2 hours”. The scale of intensity contained 5 statements where 1 meant “Very Light”; 2 – “Light”; 3 – “Somewhat Hard”; 4 – “Hard”; 5 – “Very Hard”. As well as each task was described in terms of physical activity: lifting, carrying, pushing or pulling, bending, squatting or kneeling, walking, running, crawling, climbing, shoveling or digging, using hand-held tools (prepared by the author based on Robson, Leamon, Lytell, Matthews & Chamberlin 2021) and the relative distribution of usage of physical qualities – strength, endurance, speed, agility and flexibility in combat actions (tasks) in terms of "personal feelings" in the questionnaires were carried out (prepared by the author based on Oderov et al., 2017).

The study was approved by the Ethical commission of the Latvian Academy of Sport Education, as well as permission was received from the NAF commander. Individual responses to the questionnaire could not be traced by the researchers since the survey was designed to be non-identifiable.

The Combat test was organized in the Infantry Brigade, as a protocol was taken Great Britain (GB) Army combat test (ADR009651, Issue 13.1 – Jan 2021). Subjects in this combat test were 32 soldiers from the Infantry Brigade (32 male). Tests are evaluated according to the system – pass/fail. Between exercises is 5-15 min rest and total test time is 160 min. The combat test consists of 6 exercises: 1. Loaded March (minimum standard – 4km (with 40kg) in 50min + 2km (with 25kg) in 15min); 2. Fire & Movement + 15m crawling and 15m sprinting (minimum standard – 20 x (7.5m overrun – 8sec, holding the shooting position – 8sec) + crawling 15m and sprinting 15m – 55sec); 3. Casualty Drag (minimum standard – 110kg pulled over 20m in 35sec); 4. Water Can Carry (minimum standard – carry two 22kg cans over 240m in 4min); 5. Vehicle Casevac (minimum standard – 70kg lift, hold for 3sec); 6. Repeated lift & carry (minimum standard – shifting bags weighing 20kg 20 times over a 30m distance in 14min).

In each study, incumbents were told that they were participating in a project to develop new army physical tests. All were assured that their ratings or scores were confidential and would not be used for any purpose beyond the research.

Data analysis: descriptive data were expressed as mean, standard error (SE), standard deviation (SD) and coefficient of variation (CV). The statistical calculations were performed with an Excel software package. The analysis of the predominant physical properties - endurance, strength, speed, agility and flexibility of the tasks was performed separately.

Table 1 Structure of the questionnaire (created by the authors)

Area of interest	Question
Background	Soldier's age, sex, anthropometric data, unit, position, and duration of military service.
The self – assessment of physical fitness	The result of the APFT. Amount of physical activity. Type of physical activity. Coach – led sports training experience. Individual training experience. Physical feeling. Mental feeling.
Characterization of the most physically demanding daily and training (combat) tasks.	5 the most physically demanding daily tasks: <ul style="list-style-type: none"> - importance, frequency, duration, intensity; - identify the 3 most typical physical activities while performing a task; - dominance of physical qualities in performing tasks 5 the most physically demanding training (combat) tasks: <ul style="list-style-type: none"> - importance, frequency, duration, intensity; - identify the 3 most typical physical activities while performing a task; - dominance of physical qualities in performing tasks

Results

Subjects - out of 70 soldiers invited to participate in the study, 57 soldiers (81%) accepted the invitation (4 women and 53 men), the age of the respondents was between 20 and 46 years ($M=29$; $SD=8.86$), 44% were aged 21– 29, 28% were 30– 35, another 18% were 36– 40, and 10% were 41– 46. The mean body weight (kg) of soldiers was 82.4 ± 9.5 and the mean body height (cm) was 179 ± 8.6 . 100% ($n=57$) soldiers were from the Land Force Mechanized Infantry Brigade. The average duty experience of the soldiers was 10.91 years ($SD=6.92$). The shortest work experience was 3 years, the longest work experience was 26 years.

Summarizing the results of the questionnaires there were determined the 5 most characteristic daily actions (tasks) of the Land force units, which require the greatest physical effort. In total, 18 separate tasks were described by respondents (the Table 2 shows the five most frequently mentioned tasks).

Analyzing various daily tasks to determine the most appropriate ones, the author took into account the questionnaire results of combatants who identified their main types of daily tasks, evaluated by importance, frequency, duration and intensity - march ($\bar{x} - 4.48$), field training exercise ($\bar{x} - 4.4$), physical fitness training ($\bar{x} - 4.33$), relocation of equipment, machinery and weapons ($\bar{x} - 3.95$) and maintenance of equipment, machinery and weapons ($\bar{x} - 3.9$).

Table 2 Daily Task Categories and Average Ratings (created by the authors)

Tasks	n	Importance	Frequency	Duration	Intensity	\bar{x}	Physical activity
1. March	29	4.9	3.6	4.5	4.9	4.48	Carry – 100% Run – 100% Walk – 80%
SE		0.02	0.04	0.03	0.02		
SD		0.42	0.73	0.71	0.40		
CV		0.11	0.20	0.16	0.08		
2. Field training exercises	48	4.3	4.7	4.5	4.1	4.4	Walk – 70% Run – 55% Crawl – 50%
SE		0.03	0.02	0.02	0.02		
SD		0.63	0.69	0.77	0.57		
CV		0.19	0.15	0.17	0.14		
3. Physical fitness training	28	4.8	3.5	4.1	4.9	4.33	Run – 90% Lift – 85% Bend, squat – 40%
SE		0.03	0.05	0.03	0.02		
SD		0.56	0.84	0.73	0.44		
CV		0.15	0.24	0.18	0.09		
4. Relocation of equipment, machinery, weapons	29	4.9	3.1	3.7	4.1	3.95	Lift – 100% Carry – 95% Push or pull – 55%
SE		0.02	0.03	0.04	0.04		
SD		0.42	0.49	0.75	0.86		
CV		0.11	0.16	0.20	0.21		
5. Maintenance of equipment, machinery, weapons	36	4.5	4.1	3.9	3.1	3.9	Lift – 80% Carry – 70% Push or pull – 55%
SE		0.04	0.03	0.03	0.03		
SD		0.75	0.70	0.64	0.65		
CV		0.21	0.17	0.16	0.21		

More than 50 percent of the tasks described involved some degree of carrying, lifting and running, 49 percent of the tasks included some degree of walking and pushing or pulling and 29 percent of the tasks included some degree of bending or squatting and crawling.

General physical qualities during the different types of daily actions (tasks) are given in Table 3.

Table 3 Comparative table of usage of general physical qualities during the different types of daily actions (tasks) (created by the authors)

Tasks	n	Physical qualities, %				
		Strength	Endurance	Speed	Agility	Flexibility
Field training exercises	48	24.4	32.6	12.2	18.6	12.2
Maintenance of equipment, machinery, weapons	36	44.5	12.0	16.2	17.8	9.5
March	29	14.2	51.6	11.0	12.4	10.8
Relocation of equipment, machinery, weapons	29	49.0	28.0	6.0	9.0	8.0
Physical fitness training	28	36.5	36.5	12.0	8.0	7.0
\bar{x}		33.7	32.1	11.5	13.2	9.5

The relative distribution of usage of physical qualities in daily actions (tasks) in terms of "personal feelings" in the questionnaires were carried out. The ratio of usage of general physical qualities in all of the types of daily actions showed the leading role of the endurance level in forming of high degree readiness of troops for daily activity. The high level of endurance is defined by experts as a leading physical quality in a march (51.6%), field training exercises (32.6%) and physical fitness training, except maintenance of equipment, machinery, weapons, and relocation of equipment, machinery, weapons where strength is rated as a leading physical quality – 44.5% and 49.0% (mainly due to the carrying out of some actions that are inherent in not only special but also all other military positions). In addition, analysis shows relatively balanced distribution of the rest of physical qualities with a slight predominance of agility and speed over flexibility.

Summarizing the results of the questionnaires were determined the 5 most characteristic combat actions (tasks) of the Land Force units, which require the greatest physical effort. In total, 22 separate tasks were described by respondents (the Table 4 shows the five most frequently mentioned tasks).

Analyzing various combat tests to determine the most appropriate, the author took into account the questionnaire results of combatants who identified the main types of combat actions, evaluated by importance, frequency, duration and intensity - defense (\bar{x} - 4.58), retreat/delay (\bar{x} - 4.45), establishment of defense positions (\bar{x} - 4.4), attack/quick attack (\bar{x} - 4.38) and fight in built-up area (FIBUA) (\bar{x} - 4.35).

More than 60 percent of the tasks described involved some degree of running, 40 percent of the tasks included some degree of walking, crawling and operating with tools and 19 percent climbing, bending and carrying.

Table 4 Combat action categories and average ratings (created by the authors)

Tasks	n	Importance	Frequency	Duration	Intensity	\bar{x}	Physical activity
1.Defense	32	4.9	3.7	4.7	5.0	4.58	Crawl – 100% Bend, squat– 60% Run – 40%
SE		0.02	0.04	0.02	0.02		
SD		0.39	0.78	0.66	0.45		
CV		0.10	0.21	0.14	0.09		
2.Retreat/ delay	29	4.9	3.4	4.6	4.9	4.45	Crawl – 95% Bend, squat– 70% Run – 50%
SE		0.02	0.04	0.03	0.02		
SD		0.39	0.75	0.73	0.43		
CV		0.10	0.22	0.16	0.09		
3.Establish ment of defense positions	21	4.8	3.7	4.2	4.9	4.4	Dig – 100% Lift – 75% Operate with hand tools –70%
SE		0.03	0.04	0.03	0.02		
SD		0.59	0.66	0.59	0.42		
CV		0.15	0.18	0.14	0.09		
4.Attack, quick attack	52	4.7	3.7	4.6	4.5	4.38	Run – 80% Walk – 75% Crawl, sneak – 60%
SE		0.03	0.03	0.02	0.02		
SD		0.73	0.71	0.73	0.73		
CV		0.20	0.19	0.16	0.16		
5.FIBUA	36	4.4	3.9	4.4	4.7	4.35	Run – 70% Climb, clamber – 70% Operate with hand tools –50%
SE		0.04	0.04	0.03	0.02		
SD		0.77	0.87	0.81	0.65		
CV		0.23	0.22	0.18	0.14		

General physical qualities during the different types of combat actions (tasks) are given in Table 5.

Table 5 Comparative table of usage of general physical qualities during the different types of combat actions (tasks) (created by the authors)

Tasks	n	Physical qualities, %				
		Strength	Endurance	Speed	Agility	Flexibility
Attack, quick attack	52	17.7	31.2	21.6	24.1	5.4
FIBUA	36	17.8	13.5	24.7	28.2	15.8
Defense	32	25.8	32.8	17.2	18.1	6.1
Retreat/ delay	29	20.9	31.0	22.9	17.8	7.4
Establishment of defense positions	21	33.7	30.2	14.5	14.9	6.7
\bar{x}		23.2	27.7	20.2	20.6	8.3

The relative distribution of usage of physical qualities in combat actions (tasks) in terms of "personal feelings" in the questionnaires were carried out. The

ratio of usage of general physical qualities in all of the types of combat actions showed the leading role of the endurance level in forming of high degree readiness of troops for combat activity. The high level of endurance is defined by experts as a leading physical quality in attack (31.2%), defense (32.8%) and retreat/delay (31.0%), agility is defined as a leading physical quality in FIBUA (28.2%) and strength in establishment of defense positions (33.7%). Strength is defined by experts as a second leading physical quality in combat actions. In addition, more detailed analysis shows relatively balanced distribution of the rest of physical qualities with slight predominance of agility and speed over flexibility.

In order to assess the combat capability of soldiers based on the results of the survey, the soldiers were tested with the GB combat test (chosen by LFU specialists). The test was organized in September 2022 and 52 soldiers from the Infantry brigade took part in the test. The age of the test participants was between 21 and 32 years ($M=26$; $SD=4.36$), 54% were aged 21– 25, 38% were 26– 30, another 8% were 31– 32. The mean body weight (kg) of soldiers was 88.7 ± 7.6 and the mean body height (cm) was 182.4 ± 8.2 . The soldiers' results (see Table 6) are as follows: the test was not passed by 11 or 21.2% from all participants, of which 2 soldiers did not pass 2 exercises. 1. Exercise $\bar{x} = 1;02:31h$ (pass – 47 soldiers), 2. Exercise $\bar{x} = 50sec$ (pass – 48), 3. Exercise $\bar{x} = 31.1 sec$ (pass – 49), 4. Exercise $\bar{x} = 03:39min$ (pass – 51), 5. Exercise 100% – pass, 6. Exercise $\bar{x} = 13:33min$ (pass – 51).

Table 6 **GB combat test results** (created by the authors)

Participants	Loaded march 4+2km	Fire & Movement + 15m crawling and 15m sprinting	Casualty Drag	240m Water Can carry 2x22kg	70kg Vehicle Casevac	20kg Repeated lift & carry 20x30m
n- 52	$\bar{x} = 1; 02:31h$	$\bar{x} = 50 sec$	$\bar{x} = 31.1 sec$	$\bar{x} = 03:39 min$	$\bar{x} = 100\% - pass$	$\bar{x} = 13:33 min$

Exercise No.1 “March” was carried out by soldiers individually without a tempo holder, thus disregarding the developed protocol of combat test – to complete the distance as a part of the unit (up to 10 soldiers), finishing all together at the same time. 5 soldiers withdrew from the exercise (all 5 soldiers withdrew in the 2nd part of the exercise, performing a 2km march with 25kg). The main reason for the withdrawal was the high pace of the second part of the exercise. According to the evaluation criteria - the minimum standard for the performance of the exercise is 1;05 h but the average score of the test group was 1; 02:31h. The high value result indicates a developed physical qualities of the NAF LFU soldiers – endurance and strength endurance.

Exercise No.2 “Fire & Movement” was not completed by 4 soldiers (1 soldier in the 1st part of the exercise performing a movement with fire and 3 soldiers in the 2nd part of the exercise performing a 15m crawl with the following

15m sprint). The main reason for not completing the exercise mentioned by soldiers was the lack of recovery after Exercise No.1 and the "unordered" equipment. According to the evaluation criteria - the minimum standard for the performance of the exercise is 55sec but the average score of the test group was 50sec. The results show that NAF LFU soldiers have well-developed physical qualities - agility and speed.

Exercise No.3 "Casualty Drag" was not completed by 3 soldiers. The main reason mentioned by soldiers for not completing the exercise was the towing weight and grip problems. According to the evaluation criteria - the minimum standard for the performance of the exercise is 35sec but the average score of the test group was 31.1sec. The results show that NAF LFU soldiers have developed lower and upper body musculature and explosive power.

Exercise No.4 "Water Can carry" was not passed by 1 soldier who refused to perform the exercise, adverted physical fatigue after previous exercises as the main reason. According to the evaluation criteria - the minimum standard for the performance of the exercise is 4min but the average score of the test group was 3;39min. The results show that NAF LFU soldiers have developed upper body musculature.

Exercise No.5 "Vehicle Casevac" was passed 100% by all soldiers. The soldiers stated that the exercise was too easy. The results show that NAF LFU soldiers have developed lower and upper body musculature.

Exercise No.6 "Repeated Lift & Carry" was not passed by 1 soldier. The soldier mentioned physical fatigue after previous exercises as the main reason for his withdrawal. According to the evaluation criteria - the minimum standard for the performance of the exercise is 14min but the average score of the test group was 13;33min. As in the first exercise, the results once again confirm that NAF LFU soldiers have developed physical qualities - endurance and strength endurance.

Discussion

Analyzing the results of the research according to the criteria of importance, frequency, duration and intensity, we determined that the most physically demanding combat task, according to the soldiers of the LFU, is defense, mainly due to the intensity and duration of the task (Table 4). Defense has also been identified as one of the most physically demanding military tasks in the armed forces of other countries (Oderov et al., 2017). The most physically demanding daily task, according to the questionnaire of the LFU, is the march, mainly due to the intensity and duration of the task (Table 2). The results of both sexes did not show different views on the march as the most physically demanding daily task in the LFU. In several studies in other countries, the march has also been identified

as one of the most physically demanding military tasks (Oderov et al., 2017; Jaenen, 2009).

The results of the soldiers' questionnaires detect the dominant physical qualities of the most physically demanding daily tasks (Table 3) and combat tasks (Table 5). The analysis of the results shows that the dominant physical properties in performing daily and combat tasks are muscular strength and muscle endurance.

In other studies, muscular strength (Pandorf et al., 2003; Rayson et al., 1998) and muscular endurance (Robson et al., 2021; Oderov et al., 2017; Friedl et al., 2015) have also been cited as predominant physical properties in military actions.

Results of the questionnaires show that main physical activities in daily and combat actions are running, carrying, lifting, pushing and pulling (Table 2, Table 4). According to the author, this is due to the increased performance of combat support tasks on a daily basis. The role of combat support tasks in performing high-intensity tasks such as lifting various materials as military equipment, medical equipment, accessories, food, tools and sandbags is undeniable. Other studies also indicate that the dominant physical activities in the military environment are carrying, lifting, pushing, and pulling (Tipton, Milligan, & Reilly, 2013; Rayson, Holliman, & Belyavin, 2000; Sharp, Patton, & Vogel, 1996).

The analysis of the results shows that the dominant physical properties in performing combat tasks are muscle endurance, speed and muscle strength (Table 5). The speed of reaction is another important form of physical quality for a soldier due to quick reaction, which is important in every day's military tasks (such as quick response in shooting – pulling a trigger, hitting the target).

In relation to the adapting the set of GB combat test exercises to the Latvian Infantry Brigade, it has to be concluded that the requirements for the performance and minimum standard of certain exercises should be reviewed. For example, comparing the armament and quantity of military equipment of the British and Latvian armies, it can be concluded that a soldier of the Latvian army will have to march in full combat gear over a longer distance compared to British soldiers. As well as the amount and duration of the wounded evacuation should be reviewed, as an average soldier in full combat gear weighs 110 – 120 kilograms and the time taken to bring the wounded soldier under cover is 30sec to 1min. As the main reason for the relatively low evaluation standards, the authors state - the age and gender neutrality of the test.

Conclusions

The results of this study show that the process and methodology can be used to identify the most physically demanding tasks in the National Armed Forces of

Latvia. Five daily and five training (combat) tasks were identified as the most physically demanding for Latvian Army Land Force unit soldiers.

Based on the results of the survey, LFU specialists conducted an analysis of the tests of 6 NATO member states, recognizing the GB combat test as the most suitable for LFU soldiers of the Latvian Army, as well as starting the testing of soldiers as part of a pilot study.

The analysis of the most physically demanding daily and combat tasks, based on the assessment of physical characteristics and physical activities, as well as military skills, provides an opportunity to develop a physical test and would allow more accurate evaluation of combat capabilities of soldiers from different specialties.

References

- Baechle, T.R., & Earle, R.W. (Eds.). (2008). *Essentials of Strength Training and Conditioning Human Kinetics*.
- British army. (2018). Retrieved from: <https://www.army.mod.uk/>
- Canadian Forces. (2017). Force Evaluation. Retrieved from: <https://www.cafconnection.ca/National/Programs-Services/For-Military-Personnel/Military-Fitness/FORCE-Program/FORCE-Evaluation.aspx>
- Foulis, S. A., Sharp, M. A., Redmond, J. E., Frykman, P. N., Warr, B. J., Gebhardt, D. L., & Zambraski, E. J. (2017). U.S. Army Physical Demands Study: Development of the Occupational Physical Assessment Test for Combat Arms soldiers. *J Sci Med Sport*. 20(4), 74–78. DOI: <https://doi.org/10.1016/j.jsams.2017.07.018>
- Friedl, K. E., Knapik, J. J., Häkkinen, K., Baumgartner, N., Groeller, H., Taylor, N. A. S., Duarte, A. F. A., Kyröläinen, H., Jones, B. H., Kraemer, W. J., & Nindl, B. C. (2015). Perspectives on aerobic and strength influences on military physical readiness. *Journal of Strength and Conditioning Research*, 29(11), 10-23. DOI: <https://doi.org/10.1519/JSC.0000000000001025>
- Jackson, A., & Andrew, S. (2000). Types of Physical Performance Tests. The Process of Physical Fitness Standards Development, Wright-Patterson Air Force Base, Ohio: *Human Systems Information Analysis Center*. 101–138. Retrieved from: https://archive.org/stream/DTIC_ADA495349/DTIC_ADA495349_djvu.txt
- Jaenen, S. P. (2009). Identifying the most physically demanding tasks.
- Karpljuk, D., Meško, M., Videmšek, M., & Tkavc, S. (2009). The relationships between tests, measurements and evaluation in human performance. *CISM International Symposium – Prague, September 2009*, Abstract, 50-53.
- Kirknes, J., & Aandstad, A. (2016). New physical fitness tests and employment standards in the Norwegian Armed Forces.
- Knapik, J. J., Bruce, H. J., Sharp, M. A., Darakjy, S., Jones, S., Hauret, K. G., & Piskator, G. (2004). The Case for Pre-Enlistment Physical Fitness Testing: Research and Recommendations. Aberdeen Proving Ground, Md.: U.S. *Army Center for Health Promotion and Preventive Medicine*. 12-HF-OIQ9D-04, 8–17. Retrieved from: <https://apps.dtic.mil/sti/pdfs/ADA426848.pdf>
- Larsson, J., Dencker, M., Olsson M. C., & Bremander, A. (2020). Development and application of a questionnaire to self-rate physical work demands for ground combat soldiers. *Applied Ergonomics*. 83. DOI: <https://doi.org/10.1016/j.apergo.2019.103002>.

- Lee, S. W. (1992). Task-related aerobic and anaerobic physical fitness standards for the Canadian Army. Edmonton, Alberta, Canada: University of Alberta, Department of Physical Education and Sports Studies. PhD Dissertation.
- Miller, T. (Eds.). (2012). *NSCA's Guide to Tests and Assessments*. Human Kinetics.
- Oderov, A., Romanchuk, S., Fedak, S., Kuznetsov, M., Petruk, A., Dunets– Lesko, A., Lesko, O., & Olkhovyi, O. (2017). Innovative approaches for evaluating physical fitness of servicemen in the system of professional training. *Journal of Physical Education and Sport*, 17(1), 23 – 27. DOI: <https://doi.org/10.7752/jpes.2017.s1004>
- Pandorf, C. E., Nindl, B. C., Montain, S. J., Castellani, J. W., Frykman, P. N., Leone, C. D., & Harman, E. A. (2003). Reliability Assessment of two military relevant occupational physical performance tests. *Can. J. Appl. Physiol.* 2827-2837. DOI: <https://doi.org/10.1139/h03-003>
- Panichkul, S., Hatthachote, P., Napradit, P., Khunphasee, A., & Nathalang, O. (2007). Systematic review of physical fitness testing to evaluate the physical combat readiness of Royal Thai Armed Forces. *Military Medicine*, 172(12), 1234-1238. DOI: <https://doi.org/10.7205/MILMED.172.12.1234>
- Payne, W., & Harvey, J. (2010). A framework for the design and development of physical employment tests and standards. *Ergonomics*, 53(7), 858–871. DOI: <https://doi.org/10.1080/00140139.2010.489964>
- Peterson, D. (2015). The Navy Physical Fitness Test. A Proposed Revision to the Navy Physical Readiness Test. *Strength and Conditioning Journal*, 37(4), 60-68. DOI: <https://doi.org/10.1519/SSC.0000000000000122>
- Rayson, M.P. (1998). The development of physical selection procedures. Phase 1: Job analysis. *Contemporary Ergonomics*, 393-397.
- Rayson, M., Holliman, D. E. & Bell, D. G. (1994). Physical selection standards for the British Army: Phase 3 Development of physical selection tests and pilot study (Report NO. DRA/CHS/WP94006). Farnborough, UK: Defence Research Agency.
- Rayson, M., Holliman, D., & Belyavin, A. (2000). Development of a physical selection procedure for the British Army. Phase 2: Relationship between physical performance tests and criterion tasks. *Ergonomics*, 73–105.
- Robson, S., Lytell, M. C., Sims, C. S., Pezard, S., Manacapilli, T., Anderson, A., Bohusch, T., & Haddad, A. (2017). Fit for Duty? Evaluating the Physical Fitness Requirements of Battlefield Airmen. Retrieved from: <https://bootcampmilitaryfitnessinstitute.com/elite–special–forces/us–elite–special–forces/afsoc–us–air–force–special–operations–command/us–air–force–battlefield–airmen–fitness–assessment–bafa/>
- Robson, S., Leamon, I., Lytell, M.C., Matthews, M., & Chamberlin, M. (2021). A Review of the Air Force Fitness Assessment. *RAND Corporation*, Santa Monica, California.
- Sharp, M. A., Patton, J. F., & Vogel, J. A. (1996). A data base of physically demanding tasks performed by US army soldiers. *Proc Hum Factors Ergonom Soc*, 40, 673–677.
- Tipton, M. J., Milligan, G. S., & Reilly, T. J. (2013). Physiological employment standards. I. Occupational fitness standards: Objectively subjective? *Eur J Appl Physiol*, 113, 2435–2446.
- Vickers, R. R. Jr. (2002). Physical Strength and Performance of Moderate Duration Physical Tasks. Technical Report No. NHRC-03-08. San Diego, CA: *Naval Health Research Center*.
- Worden, T., & White, E.D. (2012). Modifying the U.S. Air Force Fitness Test to reflect physical combat fitness: one study's perspective. *Mil Med*, 177(9), 1090-1094. DOI: [10.7205/milmed-d-12-00066](https://doi.org/10.7205/milmed-d-12-00066)