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Multidimensional tests as a fundamental diagnostic tool in the prophylactic and therapeutic agonology – the methodological basis of personal safety (Part II: *motor and psychomotor multidimensional tests*)

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Abstract

Background & Study Aim: The author in "Part I: *non-motoric simulation*" defines two types of multidimensional tests (motor and psychomotor) and also simulation (simulation studies) distinguishing *motor* (*psychomotoric) simulations* and *non-motor simulation.* These tests and simulations applied in positive health and ability to survived diagnosis. The aim of this study is scientific argumentation create multidimensional tests for the diagnosis of positive health and ability to survive in the universal sense.

Material & Methods: Secondary analysis of the results obtained while studying the multidimensional military specific test (MMST-10) comprises 10 tasks (motor and psychomotor) performed at a distance of 3 km of simulated attack. Each task is assessed individually in terms of its effectiveness using scores according to the T scale (from 1 to 100 points). Points are assigned depending on the time needed to perform the task. The assessment of tasks 1, 2, 5, 9 and 10 may be supplemented with relevant information. Time remains the only criterion for the effectiveness of tasks: 4, 6, 7, 8.

Polish military cadets (34 experimental group, 36 control group), who began their studies in academic year 1979/1980 (there were two hostile political and military systems during this period, and terrorism was common). Average age cadets from experimental group 20.41 years, control group 20.55 years. Cadets during the first 8 months of military training four times done an MMST-10.

Results: The actual multidimensional effect of modern military training was reflected by the MMST-10 results achieved after 46 weeks. The only difference which was not statistically significant was the one between the results of task 2 and 9 (throwing a grenade to a facade window). Nearly equal coefficients of partial correlation (r = 0.953; 0.987 and −0.900) between overall results of the MMST-10 and its constituents indicates that the quality of military tasks performed at a distance of 3,000 m and the duration of the test have an identical impact on the quality of military tasks performed.

Conclusions: Associating the results of multidimensional tests in the category of motor or psychomotor simulation with results of simulation research supported by modern technology, but first of all with results of non-motor simulation creates the basis for determining the criteria for safe estimation of survival ability exhibited by persons with a certain probability of complete feasibility of action in given category of threat to life or health.

Keywords: motor competence • the possibility of action • positive health • praxeology • survival ability • terrorism

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Aggression (in psychology) – is deliberate behaviour by the perpetrator intended to either hurt the opponent, harm or distress him/her in any other way, cause pain (regardless of whether this aim is achieved), or destroy things [79, 80].

Aggression (in praxeology) – is to initiate a destructive fight or move in a verbal dispute from material arguments to those causing distressto the opponent [11].

Aggressiveness – a human characteristic is manifesting itself in inclinations to hurtothers, to destructive behaviour. ***Aggressive*** = virulent, truculent, attacking [11].

Intellectual violence – means actions verbal or preserved in a text as well as symbolic actions (mimics, gestures, leaving a group in a demonstrational way to which an entity being subject of intellectual violence had joined, failure to reply to the letter, letter, etc.) undertaken by a given person towards specified entity (individual or a group) which result in ***ad hoc*** or relatively long-term humiliation of an individual in social environment or causing that this entity experiences reasonable sense of harm, mental and/or emotional discomfort along with negative health effects [76].

Personal safety – a justified sense of survival ability in various emergency situations, either of external nature (e.g. violence, aggression, unintended fall, fire, tsunami) or internal nature (e.g. stress, disease, fear) [1].

INTRODUCTION

The author in "Part I: *non-motoric simulation*" [1] defines two types of multidimensional tests (motor and psychomotor) and also simulation (simulation studies) distinguishing *motor* (*psychomotoric) simulations* and *non-motor simulation*. These tests and simulations applied in positive health and ability to survived diagnosis. Since the publication of the criteria for the creation of the profile of Sense of Positive Health and Survival Abilities (SPHSA) [2], there have been several papers related solely to subjective assessment by the examined person [2-6].

Meanwhile, many existing fitness tests (especially analytical type, like EUROFIT), as well as recommended non-apparatus and quasi-apparatus tests [7-9] are dedicated to the somatic positive health dimension. In addition, there are no publications that verify the declared survival ability, although since 2014 available is recommended multidimensional quasi-apparatus test "precision skills before and during activity: PSBDA" [10] What's more, also the Survival Declaration Questioner (SDQ) [10]. In "Part I: non-motoric simulation" it has been explained that there is a category of difficult situations, which for ethical reasons and due to the safety of studied person cannot be translated into motor simulation [1].

Therefore, the author of both works emphasises two issues. In the "Part I", non-motoric simulations that may apply in the diagnosis of mental health and a sense of social health. In "Part II", mainly survival ability. In the "discussion" section in this work, a synthesis of the existing applications of all types of multidimensional tests and simulations by emphasising the issues of personal safety is made. The methodological basis of this synthesis is briefly described in "Part I" [1] (and repeated in this work) the praxeological concept "possibility of action" (in the sense of *flexible feasibility* and *situational feasibility*).

Flexible feasibility – "(…) power, intellectual or manipulative proficiency and knowledge (ability) and sufficient willingness to carry out given action (…)"; *situational feasibility* – "(…) carrying out given action in determined circumstances is not prevented by this circumstances." [11, p. 124].

Full flexible – "Somebody has full (completed) flexible and situational possibility of action, i.e. has sufficient power, knowledge, and efficiency (intellectual or manipulative) in order to carry the given action out in the moment *t*, possibility of the non-performance of it and has possibility of putting off until later moment of carrying the given act out" [11, p. 124].

Although praxeology is not a science, either widely known or widely used, however, in the global science space there is available knowledge of the methodological aspects of the "possibility of action" in relation to physical fitness and motor competence [12, 13]. This issue is matched by a lack of knowledge and experience by educators, professional trainers of various sports (including combat sports), as well as an increasingly popular personal trainer about broad possibilities of using fun forms of martial arts to adapt to survival [14-18].

The aim of this study is scientific argumentation create multidimensional tests for the diagnosis of positive health and ability to survive in the universal sense.

MATERIAL AND METHODS

Procedures

Secondary analysis of the results obtained while studying the *multidimensional military specific test* (MMST-10) [19, 20] provides in this article an example of *psychomotor multidimensional tests*. MMST-10 comprises 10 tasks (motor

Table 1. A set of MMST-10 tasks along with their description and remarks.

Number and distance from the start (m)		Task description (a possibility of extending the assessment with a number of ^cartridges or ^grenades used is indicated with an asterisk)	Limited range of task points assessed on the T scale
1^	0	shooting (with 10 cartilages available) to the target (a kneeling profile equipped with a sensor at a distance of 100 m) while lying down as if holding a kalashnikov	1 to 90
2^^	100	throwing a grenade (with 2 grenades available) while marching along a distance from 30 to 15 meters to the target (a facade window)	10 to 100
3	700	throwing a grenade (with 1 grenade available) while marching along a distance from 35 to 25 meters to the target (a trench)	20 to 95
4	1100	specific run for 100 m with "jumps" (5 sections, 20 meters long each: a participant had to take a horizontal posture, crawl to the side for 3 m and run again after each section)	**full range**
5^	1900	laic a task 1	1 to 90
6	2000	moving a box with ammunition (30 kg), 2 x 50 m	10 to 90
7	2300	running 200 m in the gas mask	1 to 90
8	2750	running 114 m along the obstacle course	1 to 90
9^^	2900	laic a task 2	10 to 100
10^	3000	laic a task 1	1 to 90
		The result of the entire test (limit range of 1935 points)	
points (limited range of up to 1000 points) as a result of time conversion (in seconds), in which given person completed MMST-10		+	total number of points to be obtained after 10 tasks of MMST-10 (limited range of up to 935 points)

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and psychomotor) performed at a distance of 3 km of simulated attack (Table 1). The test was applied four times during the academic year of 1979/1980 (there were two hostile political and military systems during this period, and terrorism was common).

Each task is assessed individually in terms of its effectiveness using scores according to the T scale (from 1 to 100 points). Points are assigned depending on the time needed to perform the task. The assessment of tasks 1, 2, 5, 9 and 10 may be supplemented with relevant information (see Table 1). Time remains the only criterion for the effectiveness of tasks: 4, 6, 7, 8.

The average estimate of effectiveness of studied persons consists not only of a score expressed in points, but also time, number of cartridges used and % of hits while shooting (tasks: 1, 5, 10); number of grenades and % of hits while throwing grenades to the facade window (tasks: 2, 9); and only % of hits to a trench (task 3).

Failure to perform a task (e.g. the target during the shooting was not hit) results in 0 points. A studied person must take a 5 x 10 m shuttle run (tasks: 1, 2, 5, 9, 10).

Participants

Polish military cadets (34 experimental group, 36 control group), who began their studies in academic year 1979/1980. Average age cadets from experimental group 20.41 years, control group 20.55 years. Respectively: body height 177.31 ±6.11 cm and 175.47 ±5.54 cm; body mass 71.95 ±6.23 kg and 70.84 ±6.75 kg; Rohrer index 1.28 ±0.21 and 1.30 ±0.12). Cadets during the first 8 months of military training four times done an MMST-10.

Statistical analysis

The descriptive statistics of all variables were calculated as means and standard deviations. Independence and response t-tests were performed when the effects of group and time were statistically significant. Pearson's correlation

Praxeology (**praxiology**) – science about good work. *A Treatise on Good Work*, a fundamental lecture of praxiology by T. Kotarbinski (the first edition in 1955) has been translated into a majority of the so-called congress languages (English, German, Russian) and as well: Czech, Japanese, and Serbo-Croatian.

On-demand and uniformed public services – in Poland they consist of professional formations (police, armed forces, border guard, fire service). The characteristic features of these groups are as follows: orders, uniforms, being placed in barracks, restrictions on private and family life, a possibility to receive special perks from the state [64 see also65].

Motor – *adjective* relating to muscle activity, especially voluntary muscle activity, and the consequent body movements [85].

Motor skills – *plural noun* the ability of a person to make movements to achieve a goal, with stages including processing the information in the brain, transmitting neural signals and coordinating the relevant muscles to achieve the desired effect [85].

Psychomotor – *adjective* relating to bodily movement triggered by mental activity, especially voluntary muscle action [85].

Simulation – caused in model an event, which under some circumstances is similar to the event occurring in examined real object [11].

Perfectionism – *noun* rigorous rejection of any performance or level of competence that is less than perfect [85].

Global science space – conventionally, the global science space is associated with the ability to provide the latest scientific knowledge through prestigious electronic scientific journals [86].

Mesocycle – training cycle of medium length, a part of the annual cycle (macrocycle) characterised by dynamic loads and the nature of work in the period of approx. 4 weeks.

Agility – *noun* a combination of physical speed, suppleness and skill [85].

Scuffle – a short, confused fight or struggle at close quarters (in TFVP fights in the vertical posture based on the simplest forms of pressure on the opponent's body); differently than **encounter** (conflict, dash) in praxeology: the fight destructive during the impact phase at each of two warring parties (both sides attacking either one attacking and the other counterattacking [34, p. 231]

Field testing – *noun* testing for something such as biomechanical analysis, carried out at the athlete's usual training ground, for the maximum authenticity of results [85].

Lab testing – *noun* testing for something such as a biomechanical analysis that is carried out in a controlled private environment [85].

coefficients and partial correlation were calculated to identify relationships between variables and the statistical significance was set at a minimum of $p<0.05$.

RESULTS

No significant adaptation changes differentiating cadets from the experimental group compared with the control group (Table 2) were observed after an introductory and basic mesocycles of military training (14 weeks in total). A cumulative effect of military training lasting for 27 weeks which is based on the up-to-date knowledge on sports science and long-term experience is manifested as a greater number of all MMST-10 indicators (expressed as scores on the T scale) associated with cadets from the experimental group (Table 3). Half of them (tasks 2, 4, 7, 8, 10) is reflected by a statistically significant difference. Furthermore cadets from the experimental group completed MMST-10 faster than cadets from the control group and achieved 103 points ($p<0.01$), which translates into a difference of 146 seconds and overall MMST-10 score (a difference of 225 points, $p<0.01$).

The actual multidimensional effect of modern military training was reflected by the MMST-10 results achieved after 46 weeks. The only difference which was not statistically significant (Table 3) was the one between the results of task 2 and 9 (throwing a grenade to a facade window).

Throwing grenades (also to a trench, i.e. task 3) turned out to be the most difficult part of both types of military training. At the beginning (an introductory and basic mesocycle) average results of most (5 out of 6) repeated tasks involving throwing grenades indicate that cadets from the control group exhibit greater precision. These were the cadets who proportionally more frequently hit the target (Table 4). It was only under

Table 2. The MMST-10 result (in scores) achieved by cadets from the experimental (EG and control (CG) group after an introductory mesocycle (6 weeks) and after basic mesocycle (8 weeks: cumulative effect after 14 weeks) of the military training.

Task (a possibility of extending the assessment with a number of ^cartridges or ^grenades used is indicated with an asterisk)		After 6 weeks				The cumulative effect of 14 weeks			
		EG (n = 34)	CG (n = 36)	difference	t	EG (n = 31)	CG (n = 34)	difference	t
1^	shooting	29.28 ±21.64	29.40 ±18.99	0.12	0.024	48.31 ±17.57	45.92 ±14.84	2.39	0.519
2^^	throwing a grenade to facade window	13.65 ±23.84	20.48 ±38.88	6.83	1.022	31.43 ±38.80	28.17 ±31.69	3.26	0.367
3	throwing a grenade to trench	10.41 ±21.71	**23.48 ±27.26**	**13.07**	**2.180****	38.47 ±32.25	33.03 ±33.50	5.44	0.655
4	specific run for 100 m with "jumps"	45.64 ±16.18	49.03 ±12.57	3.39	0.968	38.78 ±20.31	40.12 ±20.78	1.34	0.257
5^	shooting	38.73 ±20.81	43.61 ±4.88	1.139		49.15 ±13.39	42.95 ±17.56	6.2	1.565
6	moving a box with ammunition	47.70 ±13.66	48.81 ±12.82	1.11	0.346	51.76 ±11.42	52.26 ±17.05	0.5	0.135
7	running 200 m in the gas mask	44.70 ±9.54	18.30 ±18.30	4.196	1.390	39.02 ±17.83	34.72 ±16.21	4.3	1.004
8	running 114 m along the obstacle course	40.97±17.35	38.49 ±18.45	2.48	0.570	**51.14 ±17.81**	38.70 ±17.66	**12.41**	**2.776****
9^^	throwing a grenade to facade window	27.61 ±35.85	34.19 ±88.78	6.58	0.726	17.41 ±29.67	32.13 ±36.41	14.72	1.750
10^	shooting	33.02 ±26.36	35.04 ±21.75	2.02	0.345	44.51 ±23.62	40.80 ±23.68	3.71	0.622
Time of the test (points)		319.62±148.72	325.02±155.11	5.4	0.146	451.67 ±138.68	392 ±144.15	59.87	1.677
Results of MMST-10		651.29±262.65	659.79±258.25	8.5	0.134	892.53 ±250.88	772.65 ±248.89	119.88	1.903

**p<0.05

Table 3. The MMST-10 result (in scores) achieved by cadets from the experimental (EG and control (CG) group after a winter mesocycle (13 weeks; cumulative effect after 27 weeks) and after summer mesocycle (19 weeks: cumulative effect after 46 weeks) of the military training.

Task (a possibility of extending the assessment with a number of ^cartridges or ^grenades used is indicated with an asterisk)		After 27 weeks				The cumulative effect of 46 weeks			
		EG (n = 34)	CG (n = 36)	difference	t	EG (n = 31)	CG (n = 34)	difference	t
1^	shooting	61.69 ±20.01	55.72 ±11.97	5.97	1.497	**72.75 ±3.74**	53.4 ±17.16	19.35	5.736**
2^^	throwing a grenade to facade window	**36.63 ±36.03**	13.03 ±25.39	23.60	3.121**	74.85 ±29.12	61.50 ±35.72	13.35	1.922
3	throwing a grenade to trench	43.71 ±34.44	33.05 ±55.55	10.66	1.228	**57.32 ±22.18**	40.86 ±32.46	16.46	2.201*
4	specific run for 100 m with "jumps"	**50.42 ±9.67**	43.20 ±16.07	7.22	2.205*	**60.78 ±9.42**	46.56 ±17.79	14.22	4.059**
5^	shooting	58.89 ±12.14	53.72 ±18.51	5.17	1.331	**70.71 ±6.37**	52.06 ±12.09	18.65	7.131**
6	moving a box with ammunition	51.94 ±14.02	45.58 ±15.59	6.36	1.751	**60.39 ±6.64**	53.30 ±10.23	7.09	3.053**
7	running 200 m in the gas mask	**54.02 ±15.47**	43.48 ±20.63	10.54	2.351*	**57.64 ±7.42**	49.16 ±11.22	8.48	3.411**
8	running 114 m along the obstacle course	**53.16** ±13.39	39.51 ±16.50	13.65	3.701**	**60 ±5.73**	35.56 ±20.01	24.44	6.123**
9^^	throwing a grenade to facade window	52.09 ±44.22	48.27 ±39.61	3.82	0.373	63.03 ±34.76	58.7 ±41.23	4.33	0.423
10^	shooting	**61.85 ±9.14**	55.61 ±13.67	6.24	2.178*	**71.35 ±6.47**	60.53 ±15.74	10.82	3.323**
Time of the test (points)		**559 ±103.04**	455.67±132.37	103.33	3.545**	**662.14 ±95.93**	539 ±91.17	123.14	4.931**
Results of MMST-10		**1126.8 ±147.53**	902.22±220.56	224.56	4.856**	**1311 ±141.7**	1050.66 ±148.25	260.34	6.71**

*p<0.05; **p<0.01

the influence exerted by training stimuli during a winter mesocycle when this trend was reversed. After a summer mesocycle the longer the effort the greater is the difference in the proportion of effective cadets from the experimental group (p<0.01).

Three repeated tasks involving shooting (tasks 1, 5, 10) provide data for the most comprehensive analysis of precision skills before and during activity. On the other hand, the indicator expressed in points is the most general one (Table 2 and 3). A statistically significant difference (p<0.05) while using this indicator was observed after military training which lasted for 27 weeks in the case of task 10 (Table 3). After 46 weeks these differences are noted in the case of all three tasks (1, 5, 10) and all of them are p<0.01. The time needed to take an effective shoot is the most sensitive component of the point indicator. No adaptation changes revealed themselves after military training lasting for 14 weeks (Tables 5 and 6).

After military training lasing for 27 weeks, cadets trained in a modern manner take shots significantly faster (an average result) by 13.02 seconds (p<0.05) after an effort at a distance of 1,900 m and by 8.68 seconds at a distance of 3,000 m (p<0.05) (Table 7). After 46 weeks, the time needed for taking precise shoots of these cadets was reduced compared to cadets trained using traditional methods. The difference was 52.02 seconds, 31.17 seconds and 18.3 seconds before effort (task 1), after 1,900 m (task 5) and after 3,000 m (task 10), respectively (Table 8). It was only after 46 weeks when statistically significant differences revealed another indicator reflecting enhanced precision skills before and during activity (number of cartridges used to hit the target). Cadets from the experimental group needed on

Table 4. Percentage (%) of military cadets from the experimental (EG) and control group (CD) who have successfully performed the tasks involving throwing a grenade at particular stages of the research.

Number of tasks, distance from the start (m), type of grenade throw			Research stage					
			after an introductory mesocycle (6 weeks)			after basic mesocycle (8 weeks: cumulative effect after 14 weeks)		
			EG (n = 34)	CG (n = 36)	difference	EG (n =31)	CG (n = 34)	difference
2	100	to facade	35.29	38.88	3.59	48.38	52.94	4.56
3	700	to trench	32.35	44.44	12.09	61.29	58.82	2.47
9	2 900	to facade	41.17	58.33	17.16	35.48	44.11	8.63
Number of tasks, distance from the start (m), type of grenade throw			after a winter mesocycle (13 weeks: cumulative effect after 27 weeks)			after summer mesocycle (19 weeks: cumulative effect after 46 weeks) of the military training		
			EG (n = 33)	CG (n = 36)	difference	EG (n = 28)	CG (n = 30)	difference
2	100	to facade	54.54	33.33	21.21	89.28	70	19.28
3	700	to trench	72.72	55.55	17.17	89.28	56.67	32.61**
9	2 900	to facade	63.63	63.88	0.25	92.86	56.67	36.19**

**p<0.01

Table 5. A multidimensional assessment of shooting (10 cartridges available each time) as part of MMST-10 of cadets from experimental group (EG, n = 34) and control group (CG, n = 36) after an introductory mesocycle (6 weeks) of military training.

Number of tasks and distance from the start (m)		Indicator								
		time (s)			used cartridges (n)			the ratio of effective cadets (%)		
		EG	CG	difference (t value)	EG	CG	difference (t value)	EG	CG	difference
1	0 (start)	133.5 ±45.85	136.03 ±33.39	2.53 (0.261)	4.76 ±3.75	4.11 ±3.39	0.65 (0.750)	82.35	88.88	6.53
5	1 900	109.7 ±28.04	106.51 ±19.28	3.19 (0.549)	2.52 ±2.65	1.77 ±1.72	0.75 (1.391)	94.11	100	5.89
10	3 000	120.37 ±38.66	123.03 ±48.63	2.66 (0.248)	5.26 ±4.23	4.25 ±3.6	1.01 (1.064)	70.58	83.33	12.75

Table 6. A multidimensional assessment of shooting (10 cartridges available each time) as part of MMST-10 of cadets from experimental group (EG, n = 31) and control group (CG, n = 34) after a basic mesocycle (8 weeks; cumulative effect after 14 weeks) of military training.

Number of tasks and distance from the start (m)		Indicator								
		time (s)			used cartridges (n)			the ratio of effective cadets (%)		
		EG	CG	difference (t value)	EG	CG	difference (t value)	EG	CG	difference
1	0 (start)	93.8 ±21.83	100.22 ±18.56	6.42 (1.263)	2.48 ±1.91	1.88 ±1.7	0.6 (1.318)	100	100	-
5	1 900	95.07 ±18.32	102.37 ±21.76	7.32 (1.43)	1.93 ±1.46	2.61 ±2.15	0.68 (1.459)	100	97.05	2.95
10	3 000	105.38 ±29.82	106.75 ±33.01	1.37 (0.172)	4.29 ±3.56	3.7 ±3.72	0.59 (0.642)	90.32	85.29	5.03

Table 7. A multidimensional assessment of shooting (10 cartridges available each time) as part of MMST-10 of cadets from experimental group (EG, n = 33) and control group (CG, n = 36) after a winter mesocycle (13 weeks; cumulative effect after 27 weeks) of military training.

Number of tasks and distance from the start (m)		Indicator								
		time (s)			used cartridges (n)			the ratio of effective cadets (%)		
		EG	CG	difference (t value)	EG	CG	difference (t value)	EG	CG	difference
1	**0 (start)**	79.31 ±23.88	87.43 ±16.51	8.12 (1.631)	1.96 ±2.28	1.77 ±1.64	0.19 (395)	96.96	100	3.04
5	**1 900**	**78.01 ±16.2**	84.23 ±23.26	**13.02* (2.638)**	1.33 ±1.02	2.11 ±1.86	0.48 (1.295)	100	100	-
10	**3 000**	**75.55 ±11.55**	106.75 ±18.01	**8.68* (2.327)**	1.96 ±1.62	2.02 ±1.78	0.06 (0.144)	100	100	-

Table 8. A multidimensional assessment of shooting (10 cartridges available each time) as part of MMST-10 of cadets from experimental group (EG, n = 28) and control group (CG, n = 30) after a summer mesocycle (19 weeks; cumulative effect after 46 weeks) of military training.

Number of tasks and distance from the start (m)		Indicator								
		time (s)			used cartridges (n)			the ratio of effective cadets (%)		
		EG	CG	difference (t value)	EG	CG	difference (t value)	EG	CG	difference
1	0 (start)	**61.87 ±6.31**	113.94 ±117.42	**52.07* (2.303)**	**1.46 ±0.92**	2.66 ±2.64	**1.2* (2.251)**	100	93.33	6.67
5	1 900	**65.15 ±10.56**	96.32 ±20.25	**31.17** (7.15)**	**1.39 ±0.73**	2.46 ±2.34	**1.07* (1.281)**	100	100	-
10	3 000	**64.21 ±10.9**	82.51 ±25.99	**18.3** (3.394)**	1.78 ±1.03	1.9 ±2.17	0.12 (0.262)	100	96.67	3.33

Table 9. Partial correlation coefficients of the main MMST-10 constituents (in points) [19].

Variables correlations	Variables, the impact of which is reduced	Partial correlation
sum of results 10 tasks with result of MMST-10 (r = 0.863)	execution time of MMST-10	0.953
execution time of MMST-10 with result MMST-10 (r = 0.957)	sum of results 10 tasks of MMST-10	0.987
sum of results 10 tasks with execution time of MMST-10 (r = 0.694)	result of MMST-10	–0.900

average one cartridge less to hit the target before and after an effort at a distance of 1,900 m. After military training lasting for 27 weeks, all cadets from the control group were effective in all shots taken as part of the MMST-10 (Table 7), but they were not able to repeat this feat after 46 weeks and had not obtained such result before. Cadets from the experimental group were in 100% effective in shooting only after modern military training lasting 46 weeks (Table 8).

Nearly equal coefficients of partial correlation between overall results of the MMST-10 and its constituents indicates that the quality of military

tasks performed at a distance of 3,000 m and the duration of the test have an identical impact on the quality of military tasks performed (Table 9).

DISCUSSION

Although MMST-10 was developed and applied during the experiment when there were two hostile political and military systems, its methodological value did not lose its relevance [19, 20]. On the contrary, growing terrorism leads us to a more thorough, secondary analysis of the solutions used for education to survive (personal safety). During the first Gulf War (1990-1991), an "intelligent weapon" put an end to a military doctrine based on a clash of armies consisting of thousands of soldiers [21, 22]. A key element of this doctrine was an attack at a distance of 3 km into the enemy's defensive group (who used trenches, bunkers, buildings and other artificial facilities as well as the natural properties of the surroundings, such as trees, rocks, ditches, prominences, etc. in order to reduce own losses). In a sense, paradoxically terrorism has radically increased after the Gulf War [23]. An attack may take place everywhere (in a city, at an airport, in a park, at a stadium, in a subway) at any time of the day and not necessarily with the use of classic weapons. Moreover, this is what happens in reality. Education programs at all levels are not able to keep up with preparing citizens for protection against terrorism, common crime and other threats also generated by hostile modern technology. Thus a conclusion about the helplessness of authorities, persons and government institutions responsible for public safety and health may be drawn. Furthermore, we can also observe malaise of non-governmental organisations ambitiously advocating the extension of personal safety and health in all dimensions (somatic, mental, and social).

Effective prevention (individually, with the support or interference of a greater number of people before professional help is available) is part of an algorithm of the need to develop precision skills before and during activity (in particular in extreme situations). It is not possible to face this challenge of our times (as a necessity to survive and to stop further dehumanisation of interpersonal relations or dehumanisation of life in many respects at all), ignoring an interdisciplinary approach and innovative knowledge.

Editorial restrictions prevent broader analysis of the presented results of empirical studies in multidimensional approach from taking place. Analysis of the MMST-10 results from the perspective of specific science from sports science, pedagogy, psychology and several others has obvious limitations. In any extreme situation, when health or life is at risk the praxeological concept of "the possibility of action" (dispositional-, situational-, complete feasibility) is a suitable tool which allows us to understand, study and interpret phenomena related to the possibility of overcoming such circumstances.

The author of this article began to develop multidimensional tests in 1973, starting with hand-to-hand fights for military purposes. Out of necessity these tests were based on psychomotor simulations [24-28]. After years of studies, educational experience and verification of the effectiveness of training methods in the field of sport (combat sports) and military all-around events, shooting, survival events, firefighters to solve difficult tasks of rescue [29-32], it turned out that "testing fights in a vertical posture" (TFVP) has the greatest diagnostic value [33-36].

Stanislaw Dadelo rightly concludes that the S-Index (the percentage of scuffles won relative to all scuffles conducted by given subject [37]) and TFVP should be recommended as one of the basic criteria of guards' competence [37, p. 78]. It is logical that in many situations involving self-defence the use of excessive physical force may lead to an unintentional (in particular in a mental sense) accidence of criteria for this elementary human right. On the one hand neogladiatorship based on bloody fights promoted in electronic media [38] and on the other hand indifference to these negative phenomena shown by important social entities, in particular influential politicians, leaders of non-governmental organisations dealing with human rights and health promotion, celebrities are linked to each other [39, 40].

Dadelo [37] correlated the S-Index with six generalised indicators of empirical variables, and all of them proved to be statistically significant ($p<0.01$): physical fitness (0.300); superior's evaluation (0.300); **professional activity** (0.270); morphological characteristics (0.240); **theoretical and practical preparation** (0.210); **mental traits** (0.210). Three of these correlations (in bold) reveal a relationship between the TFVP results

and indicators directly informing us about intellectual potential (118 male guards from Lithuania were enrolled in the study). An important correlation of S-Index TFVP (also F-Index, i.a. the percentage of fights won relative to all fights conducted by given subject [37]) and superior's assessment is of particular importance when analysing the results of unique studies conducted by Dadelo in accordance with praxeological criteria of "possibility of action".

The guards' superiors did not know the test results used in the experiment, and they based their subjective evaluation mainly on long-term observation of their professional activities. It turned out that the better-assessed guards stood out with high values of the F-Index and the S-Index (often beating opponents of higher body mass and physical fitness). Thus it may be concluded that a correlation of F-Index and the S-Index with superior's assessment empirically confirms "complete feasibility" of these guards, who won all test fights and all fights in a vertical posture and at the same time were very highly rated by their superiors. The measure of "dispositional feasibility" are the results of analytical motor tests (it does not matter that according to Hag et al. they are referred to as motor competence [41]), psychological tests, pedagogic tests, etc. "Testing fights in a vertical posture" (TFVP) meets the synthetic criterion of a multidimensional test, and thus a possible assessment of "situational feasibility". TFVP results are, after all, correlated with six generalised indicators of empirical variables (or in fact with indicators of tests of various elements of guards' personality, i.e. mental and morphological test, recommended before Dadelo's experiment.

Dadelo et al. [42] in further studies established the criteria determining the group of elite security guards. Group A (n = 11) was selected according to professional competence assigned by a single expert and measuring the distance between the features that reflect criteria and arithmetic average and also the weight given by a single expert [43]. Group B (n = 11) was selected by independent experts (n = 22) criteria rating by giving different weights. Selection of group B was carried out by adapting multi-criteria decision making (Technique for Order Preference by Similarity to Ideal Solution *TOPSIS*) and (Simple Additive Weighting *SWA*) methods [44-46]. Five people fell into both groups (45% group match). Both groups had six different people (Table 3 in [42]). During A group section procedure *fighting efficiency*, *physical developments*, *mental qualities* were emphasised as most important, and in group B: *theoretical and practical preparing*, *mental qualities*, *motor abilities*; while *fighting efficiency* criterion was considered of moderate importance [42].

Dadeło et al. [42] recommended the following levels of criteria for selection: very important (*theoretical and practical preparing*; *mental qualities*; *motor abilities*), important (*fighting efficiency*) and moderate importance (*professional activity*; *physical developments*).

In the future, a more in-depth assessment of "complete feasibility" of guards may be provided by correlation of the TFVP results (which belong to the category of "situational feasibility") and indicators for most prognostic analytical tests diagnosing mental and morphological dimensions („dispositional feasibility") with cumulated results pertaining to effectiveness in actual interventions of professional guards' and Police officers [47]. The result of such analyses would become the basis used to optimally select the guards to a given category of tasks. The prospect is to complete the task and to achieve a high probability that the guards will survive. This strategy is a part of general criteria (forecasting, programming, planning, including a selection of optimal methods and means of continuous training) for the personal safety of every human being, and not only professional guards, police officers, military police officers, etc.

Nearly 40 years ago the MMST-10 results were correlated only with general (fitness) and specific (military) motor competences [19]. After military training lasting for 6 weeks, the following indicators correlate with the overall MMST-10 result: body height, body mass, maximum work (kGm) on a cycloegometer, standing broad jump, 1000 m run. The test was more effectively performed by cadets, who were better physically developed, stronger and able to sustain more effort in laboratory and field conditions. The greater number of interactions between MMST-10 tasks and tests performed in laboratory and field conditions was determined in the following cases: (1) "running 114 m along the obstacle course" (after an effort of 2,750 m) and body height, work on a cycloegometer, standing broad jump, specific military agility obstacle course; (2)

"a specific 100 m run with «jumps»" (after an effort of 1,100 m) and work on a cycloegometer, specific military agility obstacle course, standing broad jump, 1,000 m run; (3) "throwing a grenade to a trench" (after an effort of 700 m) and work on a cycloegometer, HR max, throwing a grenade to a trench (military field test which was not preceded by physical effort). The results of individual MMST-10 tasks did not correlate with any indicator obtained during laboratory and field testing which is associated with general fitness. Task 4 "a specific 100 m run with «jumps»" (after an effort of 1,100 m) does not correlate with specific military field tests (throwing a grenade to a trench; the test not preceded by physical effort and the military obstacle course of 200 m). Correlations between task 10 (shooting after an effort of 3,000 m), zigzag run and negative results of with hand-to-hand fights tests should be considered accidental.

After 46 weeks of modern military training with the overall result of MMST-10 correlated the following results of cadets from the experimental group: work on a cycloergometer and 1000 m run. Most often the result was connected task 8 ("running 114 m along the obstacle course" after 2750 m effort) with following morphological indicators: body height, standing broad jump, 1000 m run, 200 m the military obstacle course, gymnastic jump test, 50 m swim, general assessment of physical fitness (field testing: military category).

From the methodological point of view, two universal (empirically verified) recommendations of MMST-10 [19] are important. Firstly, subsequent approximations and the partial correlation coefficient (Table 9) were used to develop an algorithm to establish multidimensional tests of precision skills before and during activity. Secondly, no correlation between military hand-to-hand fights tests based on pre-determined motor simulation (studied participants are aware of their roles along with offensive and defensive techniques) and MMST-10 tasks proves that the form of hand-to-hand fights tests is not accurate. Most MMST-10 tasks involve coordination skills, muscle strength, speed and flexibility; and these abilities determine success in self-defense and offensive battles to a not lesser extent than fighting technique and tactics.

PhD theses of Andrzej Chodała [48], Andrzej Tomczak [49], Danuta Bukowiecka [50] and Joanna Syska [51] based pedagogical experiments were derived from this methodological current. All these scientists applied "situational feasibility" associated with psychomotor competence in hand-to-hand fights, TFVP ("testing fights in a vertical posture"). Chodała [48], Bukowiecka [50] and Syska [51] correlated the TFVP result (the F-Index and the S-Index) with morphological indicators (which constitute an important part of "dispositional feasibility"). While studying motor competence, Chodała [48] and Bukowiecka [50] measured eight analytical attempts using the ICSPFT (International Committee on the Standardisation of Physical Fitness Test [52]), whereas Syska [51] used EUROFIT (eight analytical attempts [53]).

When the results of TFVP apply to all studied male cadets [48], female and male Police officers [50], female students after 66 training sessions of special course of modern gymnastic forms with self-defence elements [51] and are correlated with ICSPFT or EUROFIT attempts, the following significant correlations ($p<0.05$ or $p<0.01$) may be distinguished: F-Index: bend trunk [50] and only control group [48]) or sit and reach [51]; 4x10 m shuttle run [50] and only control group [48]; 50 m dash [50] and only control group [48]; standing broad jump [50, 51]; sit-ups [50, 51], pull-up only male [50] or bet arm hang [51]; total ICSPFT [50] and only control group [48], long run 1000 m [50], plate tapping [51].

A number of significant correlations with the S-Index is slightly lower. Correlations between S-Index with these indicators, except sit and reach [51], an attempt which measures flexibility disappear in case of young females ($n = 6$) who won all TFVP. On the other hand, a strong negative correlation ($r = -0.966$, $p<0.01$) of S-Index with fear and aggressiveness ($r = -0.856$, $p<0.05$) was observed. This means that young female participants who are able to win all testing fights in a vertical posture exhibit a low degree of fear and aggressiveness.

Furthermore, unique studies of Polish Police officers (265 males, 55 females) due to the use of innovative multidimensional tests provided knowledge of precision skills exhibited during these two types of interventions. The first one involved a use of a pistol in a close contact: 4 shoots (a pistol is coupled with the laser system) to the target at

a distance of 5 m, after three runs 3 x 5 m along the so-called "zigzag" and running to a target at a distance of 20 m. Male participants performed this specific multidimensional tests in on average 47.43 s (running along an "zigzag": 25.21 s, running to a shooting position located at a distance of 20 m: 4.74 s, shooting: 17.49 s, break between running to a position and shooting for the first time: 4.99 s, break between first and second shoot: 4.35 s, break between second and third shoot: 4.14 s, break between third and fourth shoot: 4.01 s). Female participants performed other tasks slower by 6.81 seconds (on average in 54.24 s): 27.22 s, 5.08 s, 21.94 s, 6.10 s, 5.45 s, 5.16 s, 5.23 s. The percentage of male (21%) and female (20%) Police officers who hit the target four times (were 100% effective) is comparable. The second type of intervention was based on TFVP. All fights (F-Index) were won by 45 male participants (17%), but only 3 of them (1.13%) won all scuffles (S-Index). Ten (18%) female participants won all fights (F-Index) but none of them won all scuffles [50].

The most interesting result estimating the "situational feasibility" of these Police officers is provided by percentage of those who together proved their maximum effectiveness during these two multidimensional tests. Sixteen (6.04%) male participants and 2 female (3.36%) participants hit the target with all bullets and won all competitions (F-Index). However, no person won all scuffles (S-Index) and hit the target with all bullets. Only 2 (0.75%) male Police officers with 100% S-Index hit the target with the first bullet but not all of them and one (0.38%) hit the target with at least one bullet, but it was neither the first nor the second one [50]. This analysis, including the results of the Dadeło's study [47], reveals not only the complexity but also the scale of responsibility associated with the selection of appropriate specialists for extreme intervention tasks, which entail the risk of death.

Using the results of unique experiments described above, Andrzej Tomczak [49] cumulated *multidimensional tests* with *psychomotor simulation* in the most comprehensive manner. During *survival multi-discipline events* (1st task- shooting after a 800 m run, 2nd task- team paintball fight, 3rd task- TFVP), he studied 24 participants among 6 four-person teams (one team of Police anti-terrorists, one team of air force cadets, three teams of land forces cadets, one team consisting of cadets from Chodała [48] experimental group). Combination of the results of three tasks of *survival multi-discipline events*, revealed only one out of 24 participants (a Police anti-terrorist), who achieved the 80 points (on a scale up to 100) associated with the likelihood of survival (Survival Index). Ranking places of the remaining participants who exceeded Survival Index of 80 points: Police anti-terrorist (76.3), cadet from experimental group (69.99), air force cadet (67.46), a cadet from experimental group (62.32). The remaining Police anti-terrorists were 6 and 9, while cadets from Chodała experimental group were 7 and 12. This means that 12 (half) of participants were classified as all professional anti-terrorist [49] and cadets who participated in military training based mainly on hand-to-hand fights and fun forms of martial arts [48].

Many other non-apparatus and quasi-apparatus tests have been derived on a methodology based on the MMST-10 results [19]. These tests are applied in studies of various aspects of personal safety [7-10, 26-30, 32-37, 48-51, 54-63] and nearly all of them may be broadly used in the selection process of candidates to on-demand and uniformed public services and periodic assessment of dispositional and situational feasibility [64, 65]. It is possible to correlate the results of this category of multidimensional tests with the results of simulation research supported by modern technology [66-69]. The most results are for falls [68, 70] and collisions with vertical obstacles [71] or with objects in motion [72].

Association of these results with current observations of effectiveness in real interventions and rescue actions provides the basis for estimating the "possibility of action" in the entire scope. This means that persons with the complete feasibility of action in given category of extreme situations may be selected (establishing appropriate Survival Index by each specialist who will master this methodology remains an open question). This methodology is a feature of prophylactic and therapeutic agonology (innovative agonology) [1, 39, 40, 74-78].

The prospect of implementing a modern self-defence against intellectual violence and psychological aggression [75, 77] shows the possibilities of overcoming many paradigms in the field of education and health prevention. The fact that the catharsis theory based on imagination and watching scenes of violence and aggression turned out to be counterproductive is a good example [79, 80].

Martial arts bibliotherapy promoted as part of innovative agonology may bring positive preventive and therapeutic effects, the scale of which is currently difficult to be estimated [81-83]. At first, it is necessary to overcome formulaic paradigms of ineffective continuing education and infamous role of electronic media in degrading mental health and social health.

CONCLUSIONS

Associating the results of multidimensional tests in the category of motor or psychomotor simulation with results of simulation research supported by modern technology, but first of all with results of non-motor simulation creates the basis for determining the criteria for safe estimation of survival ability exhibited by persons with a certain probability of complete feasibility of action in given category of threat to life or health. Cumulative scientific knowledge (theoretical and empirical) fills in innovative agonology and is available in publications mainly in *Archives of Budo* and in branch journal *Archives of Budo Science of Martial Arts and Extreme Sports*.

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