

# Methods for measurement of somatic health and survival abilities in the framework of the SPHSA questionnaire – methodological aspects

## Authors' Contribution:

- ✍ **A** Study Design
- 📁 **B** Data Collection
- 📊 **C** Statistical Analysis
- 📄 **D** Manuscript Preparation
- 📁 **E** Funds Collection

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## Abstract

|                                    |  |
|------------------------------------|--|
| <b>Background &amp; Study Aim:</b> | Previously published studies using the Profile of Sense of Positive Health and Survival Abilities (SPHSA) are based on subjective assessments of the respondents. The actual allocation questionnaire SPHSA relies on reviewing these assessments in an empirical way. The main objective of the article is a method of the measurement somatic health (dimension A) and survival abilities (dimension D) defined in method of SPHSA.  |
| <b>Material and Methods:</b>       | Measurement of somatic health indicators based on expert designing method using (except systolic and diastolic blood pressure) non-apparatus and quasi apparatus tests. Five survival abilities indicators measured by quasi apparatus tests, while two indicators are estimated on the basis of the declaration of the respondents. Delphi methods (three scientists specialists of an extreme physical activity) was used in the development of criteria of empirical verification for this group of indicators. Profiles six female (3 declared engagement in everyday physical activity whereas 3 were occasionally active) selected from 45 students examined this method are empirical justification is the relevance of the method. |
| <b>Results:</b>                    | Empirical data and logical reasoning prove that measurement of somatic health (dimension A) and survival abilities (dimension D) may be made by any person who will learn the methodology of questionnaire SPHSA and earlier will make subjectively estimated of these indicators. Empirical evaluation of mental health (dimension B) and social health (dimension C) SPHSA can only be done by a qualified professionals.  |
| <b>Conclusions:</b>                | Comparatistic of profiles based on subjectively estimated indicators and empirically diagnosed indicators is a prerequisite for the rational development and planning of health related training and correction programs and training plans based on periodic inspection.  |
| <b>Key words:</b>                  | Delphi method · designing method · health related training · mental and social health · non-apparatus tests · quasi apparatus tests  |
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**Abilities (motor abilities)** – Stable, enduring traits that, for the most part, are genetically determined and that underlie a person's skill in a variety of tasks. People differ with respect to their patterns of strong and weak abilities, resulting in differences in their levels of skill [21].

**Motor safety** – is consciousness of the person undertaking to solve a motor task or consciousness the subject who has the right to encourage and even enforce from this person that would perform the motor activity, who is able to do it without the risk of the loss of life, injuries or other adverse health effects [26].

**Skill** – The underlying potential for performance in a given task, which changes with practice experience, and a host of situational and environmental factors [21].

**STBIDF** – the susceptibility test of the body injuries during the fall [31].

**The Delphi method (Delphi technique)** – a method of group decision-making and forecasting that involves successively collating the judgments of experts [46].

## INTRODUCTION

There are three elementary assumptions at the roots of the rational health-related training: ability to measure health is a methodological derivative of the need to have control over one's health; after adopting certain criteria positive health becomes measurable; various positive health indicators which meet the requirements of sufficient diagnostic usefulness are available [1]. However, there is no universal method to measure positive health, although the proposals of various authors and institutions share certain similarities. Furthermore, references to the somatic health are almost exclusively prevailing [2]. The necessity to assess capacity, muscle strength, flexibility, body stability and to maintain proper body weight are constantly emphasised. Various tests, indicators and health standards have regard to age and sex [1-4]. Such proposals remain similar to the recommended methods for measurement of motor abilities and aerobic capacity [5-22].

SPHSA questionnaire is used in diagnostics based of the measurement of all dimensions of health and survival abilities [23]. The use of the Profile of Sense of Positive Health and Survival Abilities (SPHSA) may be limited solely to the answers of persons surveyed – declared profile (subjective assessment). Reports from such surveys have been published since 2012 [23-25]. The profile was based on the subjective sense of various positive health indices covering three dimensions: somatic A, mental B, social C (these letters and "D" symbolize these variables in a special protocol SEPSA [23]) and D dimension, which represent a sense of indices and assessment reflecting an individual's survival abilities.

The actual allocation of the SPHSA questionnaire relies on reviewing these assessments in an empirical way. It is clear and simple form implies the need for simple measurement methods (objective assessment), which may be used in any circumstances. The primary condition is to provide motor safety and effort safety [26] while testing the high standards so that the diagnosed profile may be developed on its basis.

Previously published studies using the Profile of Sense of Positive Health and Survival Abilities (SPHSA) are based on subjective assessments of the respondents [23-25]. The actual allocation of the SPHSA questionnaire relies on reviewing these assessments in an empirical way.

The main objective of the article is to present a

method for the measurement somatic health (dimension A) and survival abilities (dimension D) defined in method of SPHSA.

## MATERIAL AND METHODS

### Participants

The Delphi method (three scientists engaged in an extreme physical activity, sport science, health science) were used in the development of criteria for empirical verification of this group of indicators. Profiles of six female participants (3 of them declared engagement in everyday physical activity whereas other 3 were occasionally active) selected from 45 physiotherapy students (23 years old each) and examined by means of this method are empirical justification of the relevance of the method.

The study was conducted under the research project of the Academy of Physical Education in Katowice: "Reducing vulnerability to body injuries during the fall of people categorized as group being at high risk of losing balance and falling" (Resolution No. 04/2013 Bioethics Committee at the Jerzy Kukuczka Academy of Physical Education, Katowice, Poland).

### General methodological criteria for the measurement of somatic health (dimension A)

There are four assumptions which determine the assumed methodological criteria for measurement of somatic health of adults (aged from 19 to 65 years) for the SPHSA questionnaire: firstly, the major premise to adopt uniform standards of somatic health for a broad range of adults' age (from 19 to 65 years) is the need to perform identical professional activities on certain positions until retirement (e.g. firefighter, farmer); secondly, there is a large probability of recommended indicators, thus 8 indicated by the Delphi method (by 3 competent judges) satisfy the criteria of reliability required; thirdly, a five-grade rating system of somatic health (Index A) prefers recommended methods, which are not only based on the indicators adopted in the SPHSA questionnaire but also on the five-grade rating scale (standards); fourthly, it is necessary to adjust the recommended standards based on criteria other than the five-grade scale with regard to elementary biometric, statistical and logical criteria; fifth, due to the application goal of the SPHSA questionnaire they should be used mainly during non-apparatus and quasi-apparatus tests (Table 1).

The standards of 12-minute Cooper Test [13] (in Table 1 code A5 alternative) and blood pressure

standards recommended by the American Heart Association (AHA) [27] – codes A3, A4, meet the third assumption. In accordance with the fourth assumption, the standards of other indicators result from two types of adjustment procedures. Indicators A1, A2, A8 (alternative: non-apparatus test [28]) have been established by three competent judges (by means of Delphi method). Indicators A5, A6, A7, A8 result from decomposition of test standards based on T-scale. As 50 points correspond to the central value and 10 points to one standard deviation, the value of Index A for the “average” standard is equal exactly to the sum of two halves  $\pm$ SD, i.e. it ranges from 45 and 55 points on the T-scale. The ranges of “high” and “very high” standards are increased by 10 points, i.e. by one SD, whereas “low” and “very low” standards are decreased by 10 points.

In many applications of the SPHSA questionnaire (objective assessment), it is most difficult to conduct aerobic capacity tests (A5): 1000 m run or 12-minute Cooper Test. In accordance with the fifth assumption, we have developed 4 x 30-sec Burpee Test which may be applied under any circumstances in a small space. It is a quasi-apparatus test and a part of PSBDA Test (precision skills before and during activity). Its description is provided below (dimension D). The descriptions of other tests listed in Table 1 are widely available in the cited works (there are so many publications about A1 and A2 that we have omitted the references).

Male anaerobic capacity may be measured either with the 60-sec Burpee Test [5] or 30-sec Burpee Test (modification under PSBDA Test). As far as the assessment of capacity, muscle strength and flexibility is concerned (in line with the criteria established by the International Committee on the Standardisation of Physical Fitness Test: ICSPFT [13]), one should use the ICSPFT tables relevant for men (boys) and women (girls). The standards of 12-minute Cooper Test listed in Table 1 (A5) are divided into age and include chronological age [13, p. 132].

#### General methodological criteria for the measurement of survival abilities (dimension D)

Index D in the SPHSA questionnaire includes also an additional criterion, namely “lack of ability (0)”. The assumptions related to the methodological measurement criteria of survival abilities are even more demanding: firstly, the opportunities to overcome most situations of extreme danger to life or health are not determined by age or sex, but by certain

abilities, fitness, knowledge, intelligence, character etc., therefore the standards used in the majority of survival abilities tests should be universal; secondly, the possibility of using motoric test is limited, thus the significant element of Index D (Table 2) includes declarations of the person surveyed – Survival Declaration Questioner (SDQ) D8 (Table 3).

Descriptions of motoric tests listed in Table 2 (D1, D3, D4) are commonly available in the manuscripts cited [29-32]. If the STBIDF is used (the susceptibility test of the body injuries during the fall [31]), there are no logical grounds to link the “0” result” (i.e. lack of body control errors during three tasks in the test) with “very high” safe falling skills. Therefore, the “0” result” in Index D<sub>3</sub> is synonymous with „high” safe falling skills. This is logical. Many people who have never participated in the safe fall course fall on the hard ground and do not sustain body injuries. This is proof of their natural adaptation to this event category. Furthermore, the extreme result of STBIDF, i.e. 14 points, was assumed in Index D<sub>3</sub> as the criterion indicating “lack of ability (0)”.

#### Specific motor tests

##### *Precision skills before and during activity:* *PSBDA (Index D<sub>2</sub>)*

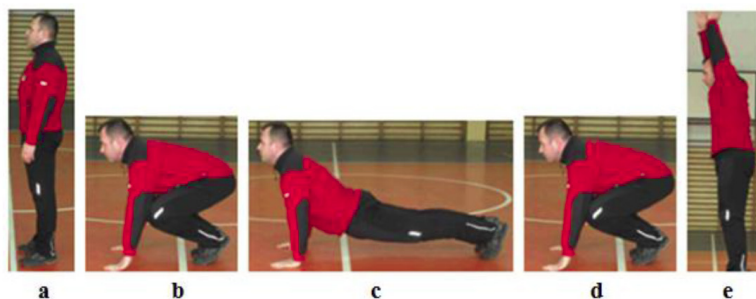
The test consists of 10 tasks: 1, 2, 4, 6, 8, 10 (*precision skills*) consist each time of five throws with a tennis ball to the basket with a diameter of 28 cm located 250 cm away, performed within 10 seconds (Figure 1). The examined person should perform a total of 30 throws during *PSBDA*. Each task is preceded by the command “ready” and then “GO”. The task is to end after the command “STOP”. If the starting line is crossed, a hit is not counted. Tasks 4, 6, 8, 10 should be started after 5 second from the end of Burpee Test. The assessment criterion (Index D<sub>2</sub>) consists of the proportion of hits (%), whereas the sum of hits should be divided by 30 (throws possible to be made), regardless of the number of throws.



**Figure 1.** A manner in which throws to the basket were made during *PSBDA* Test (to prevent the basket from moving and balls from falling away, e.g. with a 3-5 kg weight covered with a sponge or other soft material should be placed on its bottom).

**Aerobic capacity (Index A<sub>3</sub>)**

Tasks 3, 5, 7, 9 (Figure 2) constitute 4 x 30 sec Burpee Test (intensive effort, during each 30 seconds divided by a 60-second break, during which the *precision skills* are measured). The sum of repetitions is an indicator of aerobic capacity (Index A<sub>3</sub>). An incomplete cycle is documented as 0.5 points, when the command “STOP” coincides with push up position (“c”). In turn, when it coincides with squat position „b”, the number of repetitions from the completed cycle is valid, while from squat position „d” number of repetitions of the cycle being completed at that time. The results should be recorded in a special PSBDA sheet (Table 4). Table 5 is to facilitate the calculation of repetitions into Burpee Test points.



**Figure 2.** Phases during a full cycle of a repetition during the Burpee Test [5].

By means of successive approximations (based on observations made at the same time), the competent judges assumed that adequate effort criterion for males is to increase the Burpee Test criteria developed for women [5] by two points to 80 points on T-scale. At the level of 90 points the difference amounts to 2.5 repetitions, whereas at 100 points there are 3 cycles of repetitions. This, the sum of 265 points divided by 4 amounts to 66.25 points which corresponds to a very high of aerobic capacity (see Index A<sub>3</sub> in Table 1).

**Anaerobic capacity (Index A<sub>6</sub>)**

The results of task 3 is at the same time an indicator of anaerobic capacity (Index A<sub>6</sub>). If only anaerobic capacity is determined under certain conditions, the use of 60 seconds Burpee Test while testing males is justified (changes number of repetitions on the points in Table 5).

**Test of survival in water: TSW (Index D<sub>3</sub>)**

Task 1: descent into the water on a ladder (maximal depth of 4 metres – Figure 3) or staying under water for 5 seconds at depth of 1 metre. Task 2: after descending into a depth of 4 metres (or after staying under water for at least 5 seconds) moving for at least

5 metres (Figure 4). Task 3: swimming towards a raft (pontoon) for approx. 50 metres with any swimming style in no more than 1 minute (Figure 5). (Task 4: climbing to the raft (pontoon) on one’s own and putting on the clothes (Figure 6). Task 5: jump from the raft (pontoon) to the hoops in the water, swimming to the shore (for a distance of at least 5 metres) and getting off water with any method (Figure 7) [33].

**Survival Declaration Questioner: SDQ (within the Index D)**

SDQ is a tool which allows for alternative assessment of survival abilities in solitude (D<sub>8</sub>). Declarations D<sub>6</sub> and D<sub>7</sub> are binding because these indicators do not correspond to specific tests. Thus, the arithmetic average “Evaluated index” points of motoric test: D<sub>1</sub> to D<sub>5</sub> and indicators D<sub>6</sub>, D<sub>7</sub> are the main values of D<sub>8</sub>.

However, the use of alternative motor test in the diagnosis of safe falling skills (D<sub>3</sub>) is also possible. Since the result of more accurate test is binding, the *test for safe falls* meets this criterion [30]. The issue of alternative use of the STBIDF test [31] has been explained above. If all seven indicators listed (Index D) have the highest value possible, the alternative application of STBIDF test slightly modifies the average score (4.86 points). Thus, the overall D<sub>8</sub> indicator still corresponds to the very high standard (Table 2), i.e. 5 „evaluated index” points questionnaire SPHSA [23].

If all motoric tests cannot be used while determining the indicators from D<sub>1</sub> to D<sub>5</sub>, the indicator D<sub>8</sub> is estimated on the basis of SDQ Index (Table 3). The example results of 3.00 corresponds to the low standard in the SPHSA questionnaire (Table 2). SDQ should be used directly after SPHSA questionnaire in order to draw up a profile declared. Notwithstanding the possibility of carrying out all the specific motor tests, data from the SDQ are used for the final determination (indicators D<sub>6</sub>, D<sub>7</sub>).

If at least one motor test was used while determining the indicators D<sub>1</sub> or D<sub>2</sub> (the score of an indicator undetermined with a motor test amounts to 1 point), the indicator D<sub>8</sub> becomes the average points of indicators from D<sub>1</sub> to D<sub>7</sub> evaluated according to the criteria listed in Table 2.

**RESULTS**

Profile 1 (in the excluded part of the SPHSA questionnaire [23]) provides an example of extreme





**Figure 3.** Task 1 *Test of survival in water* (Index  $D_5$ )



**Figure 4.** Task 2 *Test of survival in water* (Index  $D_5$ )



**Figure 5.** Task 3 *Test of survival in water* (Index  $D_5$ )



**Figure 6.** Task 4 *Test of survival in water* (Index  $D_5$ )



**Figure 7.** Task 5 *Test of survival in water* (Index  $D_5$ )

declarations related to perceived health indicators and to the ability to survive in a homogeneous manner. Determination confirmed only one compatibility ( $D_7$ ) per 16 indicators. Evaluated Index A is identical in terms of average result but it is not consistent with even one detail. Detailed indicators of Index D range from 0 to 4 points and verified profile (low) differs from the respondent's declarations (average) by one level.

Profile 2 which is shown in more simplified manner (as each subsequent is) is based on declarations of physiotherapy female student with long-lasting sports experience (swimming). Both dimensions (A and D) of declared profile (symbol X) are in fact described in a manner indicating an attempt of more in-depth self-assessment. The indicators of the profile determined are even more varied and show that self-assessment is overestimated. Dimension D differs from the student's conception by nearly two level (a difference of 1.625 point).

Profile 3 (female athlete with long-lasting experience in martial arts) and profile 4 (a female student with no sports experience who is active every day) reveal that both of them were able to make accurate self-assessment. More than half of the indicators verified empirically are consistent with their self-awareness (62% and 81%, respectively), whereas an error does not exceed  $\pm 1$  point of „evaluated index”.

Profile 5 and profile 6 of female students who declare occasional physical activity show extremely divergent ideas about their own indicators of positive health and survival abilities. One of them overestimated the self-assessment (profile 5). The second one (profile 6) provided very low self-assessment.

## DISCUSSION

The existing applications of SPHSA questionnaire [23-25] are based only on profiles of female students who differ in daily physical activity and sports experience. It is the level of daily physical activity which was a factor differentiating within certain indicators the profiles of active and less active female students (young women in similar age). Furthermore, surveys of these young women which participate in the extended programme of activities involving different forms of physical activity (mainly at the Faculty of Tourism and Recreation [24] and Faculty of Physical Education [25]), revealed a certain regularity. The lowest one is the average level of declared survival abilities (Index D).

As far as the issues related to measurement of positive health and survival abilities are concerned, making a determination of survival abilities is a particularly complex notion. First of all, they are marginalised during the course of studies [34-39], thus there is no reliable reference system for the persons surveyed. Only after being broadly verified in practice combined with reliable research (also in terms of mental approval and disapproval), the proposed criteria and methods for measurement of survival abilities will allow for verification of the following hypothesis: the regularity involving the lower self-assessment of survival abilities' indicators compared to all dimensions of health (A, B, C) is confirmed by the profiled determined by SPHSA questionnaire.

The prospect of tests (with the use of SPHSA questionnaire) involving professional soldiers, police officers and security services is interesting. Due to the open formula to measure i.a. indicators of survival abilities, these professional groups and students of these specialties may be surveyed with the use of specialist tests applied in these formations. *The test of survival in water* developed by Szwarc et al. [33] for the military is an example which was used in our method (Index D<sub>3</sub>).

This methodological note applies to any creative professional engaged in health-related training, personal trainer, PE teacher, etc. The main issue is to adjust the evaluation criteria for the test used to five-grade scale of SPHSA questionnaire, according to the principles specified in the chapter about methods. If one is to create own test, the methodological principles for measurement of human motor skills should be followed [7, 9, 12, 14, 16-19, 21, 40-42]. If an investigator has a sufficient number of measurements performed on a representative sample, it is convenient to first decompose the results on the T-scale and afterwards to apply the principle described above (subchapter 1. General methodological criteria for the measurement of somatic health). The tests recommended for the elderly [43] or the youth may be adjusted according to the same principles, based on recommendations for national populations [44, 45].

The profiles presented reveal the didactic advantages of SPHSA questionnaire when all its capabilities are used. This condition is met if the indicators declared

are verified by the reliable tests. Profile 2 and profile 3 reveal declarations of students with long-term sports experience. Nevertheless, one of them who trains swimming assessed her survival abilities very inaccurately. The student who trains martial arts was more precise. Both have greater awareness of their survival abilities than it follows from an empirical analysis. The premise that a person trains certain sport for many years justifies the assumption that he or she should have greater self-awareness of their own health and the motor functioning possibilities in difficult situations. These sample profiles provide evidence that this premise is false.

Profile 5 and profile 6 reveal that physiotherapy studies which involve extended knowledge about health and functioning of the human organism do not directly correspond to possible accurate assessment of indicators of own positive health and even more of survival abilities. Application of the proposed non-apparatus and quasi-apparatus tests has the advantage that regardless of their education students (and also pupils during physical education class) and every physically active human being may use them freely during any break in the training as well as before and after it. This is a simple method to learn how to assess capabilities of one's organism in various states of physiological arousal.

## CONCLUSIONS

Comparison of profiles based on subjectively estimated indicators and empirically determined indicators is a prerequisite for the rational development and planning of health-related training, correction programs and training plans based on periodic inspection.

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## COMPETING INTERESTS

Author has declared that no competing interest exists.

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**Table 1.** Methods and criteria of evaluation indicators of somatic health (dimension A).

| Code Indicator | Method of measurement                  |   | Evaluated somatic health (Index A) |                            |                          |                    |               |
|----------------|--|---|------------------------------------|----------------------------|--------------------------|--------------------|---------------|
|                |  |   | very low (1)                       | low (2)                    | average (3)              | high (4)           | very high (5) |
| A <sub>1</sub> | <b>BMI</b>                             | (kg/m <sup>2</sup> )  | <16<br>≥30                         | 16.00-18.49<br>25.00-29.99 | 18.5-19.99<br>22.1-24.99 | 21.1-22            | 20-21         |
| A <sub>2</sub> | <b>Resting HR</b>                      | (beats per minute)  | 100                                | 81-99                      | 73-80                    | 62-72              | 61            |
| A <sub>3</sub> | <b>Systolic blood pressure</b>         | (mm Hg) [27]  | 160                                | 140-159                    | 130-139                  | 120-129            | <120          |
| A <sub>4</sub> | <b>Diastolic blood pressure</b>        |   | 100                                | 90-99                      | 85-89                    | 80-84              | <80           |
| A <sub>5</sub> | <b>Aerobic capacity (alternative:)</b> | 1000 m run (points scale T) [13] 4 x 30s Burpee Test (points scale T) [5] | <35                                | 35-44                      | 45-55                    | 56-65              | 66            |
|                |  | 12-minute Cooper Test (meters) men [13]                                   | <1910                              | 1920-2290                  | 2300-2690                | 2700-3080          | 3090          |
|                |  | 12-minute Cooper Test (meters) women [13]                                 | <1400                              | 1410-1730                  | 1740-2060                | 2070-2390          | 2400          |
| A <sub>6</sub> | <b>Anaerobic capacity</b>              | 30s Burpee Test (points scale T) [5]                                      |                                    |                            |                          |                    |               |
| A <sub>7</sub> | <b>Muscle strength</b>                 | jump length + handgrip + sit ups (arithmetic mean of points scale T) [5]  | <35                                | 35-44                      | 45-55                    | 56-65              | ≥66           |
| A <sub>8</sub> | <b>Flexibility (alternative:)</b>      | bend trunk (points scale T) [13]  |                                    |                            |                          |                    |               |
|                |  | non-apparatus test (points) [28]  | <b>3.0-</b>                        | <b>2.9- to 2.0-</b>        | <b>1.9- to 1.0-</b>      | <b>0.9- to 0.0</b> | <b>≥1.0+</b>  |



**Table 2.** Methods and criteria of evaluation indicators of survival abilities (dimension D).

| Code Indicator | Method of measurement  | Evaluated survival abilities (Index D) |                  |                            |              |                      |                    |
|----------------|--|--|------------------|----------------------------|--------------|----------------------|--------------------|
|                |  | lack of ability (0)                    | very low (1)     | low (2)                    | average (3)  | high (4)             | very high (5)      |
| D <sub>1</sub> | <b>Body balance disturbance tolerance skills</b><br>Rotational Test (points) [29]  | 16-18                                  | 14-15            | 9-13                       | 4-8          | 2-3                  | 0-1                |
| D <sub>2</sub> | <b>Precision skills before and during activity</b><br>PSBDA Test (%)   | 0                                      | <35              | 35-44                      | 45-55        | 56-65                | ≥66                |
| D <sub>3</sub> | <b>Safe falling skills</b><br>Test for safe falls (verbal evaluation /points) [30]   | insufficient <55                       | sufficient 60-55 | more than sufficient 70-65 | good 80-75   | more than good 90-85 | excellence 100-95  |
|                | STBIDF (points) [31]   | 14                                     | 9-13             | 4-8                        | 1-3          | 0                    | -                  |
|                | <b>(alternative: Da<sub>3</sub>)</b><br>declarations Index SDQ   | according subjective assessment        |                  | 0.25 point                 | 0.5 point    | 1 point              | -                  |
| D <sub>4</sub> | <b>Self-defence skills</b><br>(verbal evaluation /points) [32]   | insufficient 0-50                      | poor 55-80       | average 85-170             | high 175-250 | very high 255-280    | excellence 285-300 |
|                | <b>(alternative: Da<sub>4</sub>)</b><br>declarations Index SDQ   | according subjective assessment        |                  | 0.25 point                 | 0.5 point    | 1.0 point            | -                  |
| D <sub>5</sub> | <b>Swimming ability</b><br>TSW (combining of tasks) [33]   | 0                                      | task I           | +task II                   | +task III    | +task IV             | +task V            |
|                | <b>(alternative: Da<sub>5</sub>)</b><br>declarations Index SDQ (D <sub>5</sub> )   | according subjective assessment        |                  | 0.25 point                 | 0.5 point    | 1 point              | -                  |
| D <sub>6</sub> | <b>Lifesaving skills in water</b><br>declarations Index SDQ (D <sub>6</sub> )  | according subjective assessment        |                  | 0.25 point                 | 0.5 point    | 1 point              |                    |
| D <sub>7</sub> | <b>First aid skills</b><br>declarations Index SDQ (S6)   | according subjective assessment        |                  | 0.25 point                 | 0.5 point    | 1 point              |                    |
| D <sub>8</sub> | <b>Survival abilities in solitude</b><br>average points motoric test: D <sub>1</sub> to D <sub>5</sub> and D <sub>6</sub> , D <sub>7</sub> | ≥0.99                                  | 1.0-1.5          | 1.51-2.5                   | 2.51-3.5     | 3.51-4.5             | ≥4.51              |
|                | <b>(alternative: Index SDQ)</b><br>Index SDQ (points)  | ≥1.5                                   | 2.0-2.5          | 3.0-3.5                    | 4.0-5.0      | 5.5-6.0              | ≥6.5               |

**Table 3.** Survival Declaration Questioner (SDQ) – example.

| Person: Arthur .....  |   |  | Points |      |      |     | Index SDQ   |
|---|---|--|--------|------|------|-----|-------------|
| Code  | Criterion (circle, type)                                      | Details (circle, type)   | 0      | 0.25 | 0.50 | 1.0 |             |
|   |   |  | no     | *    | **   | *** |             |
| Da <sub>3</sub>   | Safe fall   | course: basic*/; specific: for amputated/ for blind; instructor***/.....   |        |      | X    |     | 0.5         |
| Da <sub>4</sub>   | Self-defence  | course: basic*/special **/ instructor***/..... combat sports practice .....judo.....                             |        |      |      | X   | 1           |
|   | Practice of combat sports/ martial arts judo.....             | months ..... years ...8.. dan *** ..2 kyu**... only practice*  |        |      |      |     |             |
| Da <sub>5</sub>   | Swimming course/ sport practice/ junior national level        | basic course*/practice: occasionally*/ regularly **/ sport achievements***: many medals and juniors records..... |        |      |      | X   | 1           |
| D <sub>6</sub>  | Lifeguards  | basic course*/Bachelor level**/ Master level *** .....   |        | X    |      |     | 0.25        |
| D <sub>7</sub>  | Paramedic/ other specialty: mountain rescuer .....            | basic course*/Bachelor level/** Master level***/.....  |        | X    |      |     | 0.25        |
| D <sub>ST</sub>   | Special training: military***/ police***/ survival**/ scouts* | months ..... years..... qualifications:.....   | X      |      |      |     | 0           |
| <b>Index SDQ (sum of points of indicators Da<sub>3</sub> to D<sub>5</sub>):</b> |   |  |        |      |      |     | <b>3.00</b> |

**Table 4.** Sheet document of precision skills before and during activity and also aerobic capacity.

| People | Number of throw (c) / number of throw (n) during 10 seconds |               |   |        |        |        |        |        |         |                   | Evaluation                                  |                      |                    |                      |        |
|--------|---|---------------|---|--------|--------|--------|--------|--------|---------|-------------------|---|----------------------|--------------------|----------------------|--------|
|        | before worm up  | after worm up | 4 x 30s Burpee Test (number of repetitions (n) in 30 seconds) |        |        |        |        |        |         | after last effort | Precision skills before and during activity |                      |                    | Aerobic capacity     |        |
|        |   |               | 30  | 60     | 30     | 60     | 30     | 60     | 30      |                   | results                                     | Index A <sub>5</sub> | sum of repetitions | Index D <sub>2</sub> |        |
|        | c/n   | c/n           | n   | c/n    | n      | c/n    | n      | c/n    | n       | c/n               | /30   | (%)                  | 1 to 5             | n                    | 1 to 5 |
| Task 1 | Task 2  | Task 3        | Task 4  | Task 5 | Task 6 | Task 7 | Task 8 | Task 9 | Task 10 | /30               | (%)   | 1 to 5               | n                  | 1 to 5               |        |
| Olivia | 3/5   | 4/5           |   | 2/5    |        | 4/5    |        | 4/5    |         | 2/5               | 19/30                                       | 63.3                 | 4                  | 42                   | 5      |
| Arthur | 2/4   | 4/5           |   | 3/5    |        | 3/5    |        | 4/5    |         | 4/5               | 20/30                                       | 66.7                 | 5                  | 52.5                 | 5      |
|        | /   | /             |   | /      |        | /      |        | /      |         | /                 | /30   |                      |                    |                      |        |

**Table 5.** Criteria used for calculating the repetitions during the Burpee Tests into points on T-scale.

| 30 seconds Burpee Test (for female and male ≥18 years) |             |      |        |             |      |        |             |      |        |             |      |        |             |      |
|--|-------------|------|--------|-------------|------|--------|-------------|------|--------|-------------|------|--------|-------------|------|
| Points   | Repetitions |      | Points | Repetitions |      | Points | Repetitions |      | Points | Repetitions |      | Points | Repetitions |      |
|  | Female      | Male |        | Female      | Male |        | Female      | Male |        | Female      | Male |        | Female      | Male |
| 1  | 5           | 7    | 15     | 7.5         | 9.5  | 40     | 10          | 12   | 65     | 12.5        | 14.5 | 88     | -           | 17   |
| 3  | 5.5         | 7.5  | 20     | 8           | 10   | 45     | 10.5        | 12.5 | 70     | 13          | 15   | 90     | 15          | 17.5 |
| 6  | 6           | 8    | 25     | 8.5         | 10.5 | 50     | 11          | 13   | 75     | 13.5        | 15.5 | 94     | -           | 18   |
| 8  | 6.5         | 8.5  | 30     | 9           | 11   | 55     | 11.5        | 13.5 | 80     | 14          | 16   | 96     | 15.5        | 18.5 |
| 10   | 7           | 9    | 35     | 9.5         | 11.5 | 60     | 12          | 14   | 85     | 14.5        | 16.5 | 100    | 16          | 19   |
| 60 seconds Burpee Test (for male ≥18 years)            |             |      |        |             |      |        |             |      |        |             |      |        |             |      |
| Points   | 1           | 11   | 13     | 14.5        | 28   | 18     | 42          | 21.5 | 57     | 25          | 72   | 28.5   | 87          | 32   |
|  | 2           | 11.5 | 15     | 15          | 30   | 18.5   | 44          | 22   | 59     | 25.5        | 74   | 29     | 90          | 32.5 |
|  | 4           | 12   | 17     | 15.5        | 32   | 19     | 46          | 22.5 | 61     | 26          | 77   | 29.5   | 92          | 33   |
|  | 5           | 12.5 | 20     | 16          | 34   | 19.5   | 48          | 23   | 64     | 26.5        | 79   | 30     | 94          | 33.5 |
|  | 6           | 13   | 22     | 16.5        | 36   | 20     | 50          | 23.5 | 66     | 27          | 81   | 30.5   | 96          | 34   |
| Repetitions  | 8           | 13.5 | 24     | 17          | 38   | 20.5   | 53          | 24   | 68     | 27.5        | 83   | 31     | 98          | 34.5 |
|  | 10          | 14   | 26     | 17.5        | 40   | 21     | 55          | 24.5 | 70     | 28          | 85   | 31.5   | 100         | 35   |

**PROFILES**

**Profile 1.** Physiotherapy female student, 23-year old, declares occasional physical activity.

| Dimension                      | Indicator                      | Evaluated index [x/o]                       |        |        |   |        |        |
|--------------------------------|--------------------------------|---|--------|--------|---|--------|--------|
|                                |                                | 0   | 1      | 2      | 3 | 4      | 5      |
| A<br>somatic health            | A <sub>1</sub>                 | BMI   |        |        |   | x      | o      |
|                                | A <sub>2</sub>                 | Resting HR                                  |        |        | o | x      |        |
|                                | A <sub>3</sub>                 | Systolic blood pressure                     |        |        |   | x      | o      |
|                                | A <sub>4</sub>                 | Diastolic blood pressure                    |        |        |   | x      | o      |
|                                | A <sub>5</sub>                 | Aerobic capacity                            |        |        | o | x      |        |
|                                | A <sub>6</sub>                 | Anaerobic capacity                          |        |        | o | x      |        |
|                                | A <sub>7</sub>                 | Muscle strength                             |        |        |   | x      | o      |
|                                | A <sub>8</sub>                 | Flexibility                                 |        |        | o | x      |        |
|                                | the arithmetic mean of points: |   |        | x 3.00 |   |        | o 3.00 |
| D<br>survival abilities        | D <sub>1</sub>                 | Body balance disturbance tolerance skills   |        | o      |   | x      |        |
|                                | D <sub>2</sub>                 | Precision skills before and during activity |        |        | o | x      |        |
|                                | D <sub>3</sub>                 | Safe falling skills                         | o      |        |   | x      |        |
|                                | D <sub>4</sub>                 | Self-defence skills                         | o      |        |   | x      |        |
|                                | D <sub>5</sub>                 | Swimming ability                            |        |        |   | x      | o      |
|                                | D <sub>6</sub>                 | Lifesaving skills in water                  |        |        |   | x      | o      |
|                                | D <sub>7</sub>                 | First aid skills                            |        |        |   | x      |        |
|                                | D <sub>8</sub>                 | Survival abilities in solitude              |        |        |   |        | ⊗      |
| the arithmetic mean of points: |                                |   | x 3.00 |        |   | o 2.00 |        |

**Profile 2.** Physiotherapy female student, 23-year old, declares daily physical activity and long-years swimming experience.

| Dimension                      | Indicator      | Evaluated index [x/o] |         |   |   |         |   |
|--------------------------------|----------------|-----------------------|---------|---|---|---------|---|
|                                |                | 0                     | 1       | 2 | 3 | 4       | 5 |
| A<br>somatic health            | A <sub>1</sub> |                       |         |   |   |         | ⊗ |
|                                | A <sub>2</sub> |                       |         |   |   | x       | o |
|                                | A <sub>3</sub> |                       |         |   |   | o       | x |
|                                | A <sub>4</sub> |                       |         |   |   | o       | x |
|                                | A <sub>5</sub> |                       |         |   |   |         | ⊗ |
|                                | A <sub>6</sub> |                       |         |   |   | o       | x |
|                                | A <sub>7</sub> |                       |         |   |   |         | ⊗ |
|                                | A <sub>8</sub> |                       |         |   |   | o       | x |
|                                |                |                       | x 4.625 |   |   | o 4.250 |   |
| D<br>survival abilities        | D <sub>1</sub> |                       |         | o |   | x       |   |
|                                | D <sub>2</sub> |                       | o       |   |   | x       |   |
|                                | D <sub>3</sub> |                       |         | o | x |         |   |
|                                | D <sub>4</sub> | o                     |         |   | x |         |   |
|                                | D <sub>5</sub> |                       |         |   |   |         | x |
|                                | D <sub>6</sub> |                       |         |   |   | o       | x |
|                                | D <sub>7</sub> |                       |         |   | o | x       |   |
|                                | D <sub>8</sub> |                       |         | o |   | x       |   |
| the arithmetic mean of points: |                |                       | x 4.000 |   |   | o 2.375 |   |

**Profile 3.** Physiotherapy female student, 23-year old, declares daily physical activity and long-years martial arts experience.

**Profile 4.** Physiotherapy female student, 23-year old, declares daily physical activity.

| Dimension                  | Indicator                      | Evaluated index [×/○] |       |   |   |       |   |
|----------------------------|--------------------------------|-----------------------|-------|---|---|-------|---|
|                            |                                | 0                     | 1     | 2 | 3 | 4     | 5 |
| A<br>somatic<br>health     | A <sub>1</sub>                 |                       |       |   |   |       | ⊗ |
|                            | A <sub>2</sub>                 |                       |       |   |   | ×     | ○ |
|                            | A <sub>3</sub>                 |                       |       |   |   |       | ⊗ |
|                            | A <sub>4</sub>                 |                       |       |   |   |       | ⊗ |
|                            | A <sub>5</sub>                 |                       |       |   |   |       | ⊗ |
|                            | A <sub>6</sub>                 |                       |       |   |   | ○     | × |
|                            | A <sub>7</sub>                 |                       |       |   |   |       | ⊗ |
|                            | A <sub>8</sub>                 |                       |       |   |   | ×     | ○ |
|                            | the arithmetic mean of points: | ×                     | 4.750 |   | ○ | 4875  |   |
| D<br>survival<br>abilities | D <sub>1</sub>                 |                       |       |   |   | ×     | ○ |
|                            | D <sub>2</sub>                 |                       |       |   | ○ | ×     |   |
|                            | D <sub>3</sub>                 |                       |       |   |   |       | ⊗ |
|                            | D <sub>4</sub>                 |                       |       |   |   |       | ⊗ |
|                            | D <sub>5</sub>                 |                       |       |   |   |       | ⊗ |
|                            | D <sub>6</sub>                 |                       |       |   |   | ○     | × |
|                            | D <sub>7</sub>                 |                       |       |   |   | ⊗     |   |
|                            | D <sub>8</sub>                 |                       |       |   |   |       | ⊗ |
|                            | the arithmetic mean of points: | ×                     | 4.625 |   | ○ | 4.000 |   |

| Dimension                  | Indicator                      | Evaluated index [×/○] |       |   |   |       |   |
|----------------------------|--------------------------------|-----------------------|-------|---|---|-------|---|
|                            |                                | 0                     | 1     | 2 | 3 | 4     | 5 |
| A<br>somatic<br>health     | A <sub>1</sub>                 |                       |       |   |   |       | × |
|                            | A <sub>2</sub>                 |                       |       |   |   | ×     |   |
|                            | A <sub>3</sub>                 |                       |       |   |   | ×     |   |
|                            | A <sub>4</sub>                 |                       |       |   |   | ×     |   |
|                            | A <sub>5</sub>                 |                       |       |   |   |       | × |
|                            | A <sub>6</sub>                 |                       |       |   |   | ○     | × |
|                            | A <sub>7</sub>                 |                       |       |   |   | ×     |   |
|                            | A <sub>8</sub>                 |                       |       |   |   | ×     |   |
|                            | the arithmetic mean of points: | ×                     | 4.375 |   | ○ | 4.250 |   |
| D<br>survival<br>abilities | D <sub>1</sub>                 |                       |       |   |   | ×     |   |
|                            | D <sub>2</sub>                 |                       |       |   | ○ | ×     |   |
|                            | D <sub>3</sub>                 |                       |       |   |   | ×     |   |
|                            | D <sub>4</sub>                 |                       |       |   | × |       |   |
|                            | D <sub>5</sub>                 |                       |       |   |   | ○     | × |
|                            | D <sub>6</sub>                 |                       |       |   |   | ×     |   |
|                            | D <sub>7</sub>                 |                       |       |   |   | ×     |   |
|                            | D <sub>8</sub>                 |                       |       |   |   | ×     |   |
|                            | the arithmetic mean of points: | ×                     | 4.000 |   | ○ | 3.750 |   |



**Profile 5.** Physiotherapy female student, 23-year old, declares occasional physical activity.

| Dimension                      | Indicator                      | Evaluated index [×/○] |       |   |   |       |   |
|--------------------------------|--------------------------------|-----------------------|-------|---|---|-------|---|
|                                |                                | 0                     | 1     | 2 | 3 | 4     | 5 |
| A<br>somatic health            | A <sub>1</sub>                 |                       |       |   | ○ |       | × |
|                                | A <sub>2</sub>                 |                       |       | ○ |   |       | × |
|                                | A <sub>3</sub>                 |                       |       | ○ |   |       | × |
|                                | A <sub>4</sub>                 |                       |       |   | ○ |       | × |
|                                | A <sub>5</sub>                 |                       | ○     |   |   | ×     |   |
|                                | A <sub>6</sub>                 |                       | ○     |   |   | ×     |   |
|                                | A <sub>7</sub>                 |                       |       | ○ |   | ×     |   |
|                                | A <sub>8</sub>                 |                       |       |   | ○ |       | × |
|                                | the arithmetic mean of points: | ×                     | 4.625 |   | ○ | 2.125 |   |
|                                | D<br>survival abilities        | D <sub>1</sub>        |       |   | ○ |       | × |
| D <sub>2</sub>                 |                                |                       | ○     |   |   | ×     |   |
| D <sub>3</sub>                 |                                |                       |       | ○ | × |       |   |
| D <sub>4</sub>                 |                                | ○                     |       |   | × |       |   |
| D <sub>5</sub>                 |                                |                       |       | ○ |   |       | × |
| D <sub>6</sub>                 |                                |                       |       |   | ○ | ×     |   |
| D <sub>7</sub>                 |                                |                       |       |   | ○ | ×     |   |
| D <sub>8</sub>                 |                                |                       |       | ○ |   | ×     |   |
| the arithmetic mean of points: |                                | ×                     | 3.875 |   | ○ | 1.500 |   |

**Profile 6.** Physiotherapy female student, 23-year old, declares occasional physical activity.

| Dimension                      | Indicator                      | Evaluated index [×/○] |       |   |   |       |   |
|--------------------------------|--------------------------------|-----------------------|-------|---|---|-------|---|
|                                |                                | 0                     | 1     | 2 | 3 | 4     | 5 |
| A<br>somatic health            | A <sub>1</sub>                 |                       |       | × |   | ○     |   |
|                                | A <sub>2</sub>                 |                       |       |   | × | ○     |   |
|                                | A <sub>3</sub>                 |                       |       |   | × |       | ○ |
|                                | A <sub>4</sub>                 |                       |       |   | × |       | ○ |
|                                | A <sub>5</sub>                 |                       |       | × |   |       | ○ |
|                                | A <sub>6</sub>                 |                       |       | × |   | ○     |   |
|                                | A <sub>7</sub>                 |                       |       | × |   | ○     |   |
|                                | A <sub>8</sub>                 |                       |       |   | × |       | ○ |
|                                | the arithmetic mean of points: | ×                     | 2.500 |   | ○ | 4.500 |   |
|                                | D<br>survival abilities        | D <sub>1</sub>        |       |   | × |       | ○ |
| D <sub>2</sub>                 |                                |                       |       | × |   | ○     |   |
| D <sub>3</sub>                 |                                |                       |       | × |   | ○     |   |
| D <sub>4</sub>                 |                                |                       | ×     |   | ○ |       |   |
| D <sub>5</sub>                 |                                |                       |       | × | ○ |       |   |
| D <sub>6</sub>                 |                                |                       | ×     |   | ○ |       |   |
| D <sub>7</sub>                 |                                |                       | ×     |   |   | ○     |   |
| D <sub>8</sub>                 |                                |                       | ×     |   |   | ○     |   |
| the arithmetic mean of points: |                                | ×                     | 1.500 |   | ○ | 3.625 |   |