Elaboration of the method for complex improvement of health status and the respective efficiency analysis performed with the participation of college and university students

Doctoral thesis

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I. Introduction

Health becomes really precious when we have already lost it. People's born, internal need for movement activities is gradually decreasing as years go by and finally, in the sensible periods of personality improvement, is shifted in the shade affected by socialization, conformity or correspondence (see forcing 7-8 years old kids to stay behind desks for hours) to social expectations. Motivations of regular sporting in the adult age include the internal need for movement only as "one of the factors" compared to "the factor" effect which can be noticed in respect of small children.

Physical activity has crucial effects on health, on the one hand, because of the incidence of inactive lifestyle. On the other hand, due to the large number of circumstances affecting health, which are influenced by the lack of physical activity (psychological reactions, development of several sicknesses often leading to death, disability, changing of all kinds of functional capacities, development of mental health and quality of living life). Key effects on health are already noticeable after moderate daily activity. Such activities require neither any special professional expertise nor special devices or sport facilities.

Regular physical activity will guarantee a life richer in vitality and health, thus better way to feel, which will result in the improvement of our opinion on our own health condition.

Several, especially international studies report on the importance of regular recreation sport activities in preventing health or – in case of already existing lingering illnesses – health recreation effects as a method for supporting medical treatment.

The health development research that I have performed involving the students of the University of Szeged, which is qualified as a three-month intervention program, was conducted, including the surveys, in a study term, that is under conditions at work. For this reason, the applied tests and methods can enrich the methodological arsenal and tests of health development at work, and the results and connections prove the efficiency of health improvement at work.

The procedure called as health development at work aims not only to discover then eliminate the health risks that employees must probably face - and thus preventing health from deteriorating that is the development of sickness – but also tries to make employees to actively participate in improving their own health conditions. The procedure aims to provide as much opportunities as possible for that, taking the constantly changing requirements and the professional background as a basis.

A key basis for successful intervention programs should be the unified interpretation of health. Efficient health development strategies must be based on the contexts risking health and they should be jointly included in action plans for elaborating the particular programs. Setting up the sequence order of effects of each variable allowed realizing that we ourselves are unable to affect the key influential factors (age, gender), but through apperception of risk factors and providing information on positive or negative effects of other variables, depending on our power of will (sport activity, smoking, BMI), on the health, we can already make the specific target group quite motivated in developing their health.

On the basis of a complex interpretation of health and by performing a detailed study of factors affecting health, it is clear that regular sport activity performed with the purpose of recreation – which is motivated not by performance but by focusing on health – can guarantee a quality life that is a sustainable life quality which can be improved.

II. Goals, assumptions and tasks

The importance of an active lifestyle appears in the evaluation of several studies. It would be reasonable to compile such results according to the goals of a particular health development strategy and utilize it as a basic document for efficient intervention programs. The efficiency analysis of this doctoral thesis has been prepared on the grounds of this idea with life quality and active lifestyle in the focus.

Enhancing *physical activity* and developing a sport lifestyle are the *most profitable way* of improving the quality of life and raising the number of years lived healthy. College and university students, constituting the target group of the analysis, make a homogeneous group with already relatively developed system of habits, independence and social status. For them an important basis for preparing a well-aimed health development program can be their connection with their own health. On the other hand, we can assume that they are sensible and open enough for health development actions, which could potentially decisively affect their commitment to healthy lifestyle.

2. 1. Goals

- To compile a test package, identifying the health status, which is suitable for reflecting a realistic view on the bio-psycho-social condition of the individual;
- To identify the lifestyle and health attitude of the analyzed target group;
- As a result of my analysis I would like to find out the health development efficiency of the health plan, based on the test package, that I developed and thus to prove the raison d'étre of the paper-based health development;
- I would like to prove the efficiency of the complex health development program package, which is based on the results of the test package ;
- If the analyzed methods proved to be efficient in respect of health development, I wish to test the program packages in wider social circles, and then in the possession of the known results, elaborate it according to age groups and make it available and attainable for health development experts and the related education system.

2. 2. Assumptions

- Subjective judgements on health give an objective view on health condition.
- Some personality signs determine loadability and persistence.
- Active lifestyle also affects positively the definition of subjective health condition.
- Development of health condition is affected by the direct and inter-complementary effects applied for the research.
- "Paper-based" health development actions – like health plan – also have motivating effects on health development of the analyzed persons.
- Results of the analysis allow setting up a model with multiple variables, which reflects the interrelation of factors affecting health condition.

2. 3. Tasks

- To develop health condition requires a fast and efficient identification of health condition.
- I have to know which sport activities are included in the health development/intervention program that I wish to use, and how they are likely to affect the development of lifestyle features.
- In the possession of the results and by utilizing them, the students should have made the health development program package, structured by me, performed.
- Within the scope of the three-month health development program, I have to be able to measure and prove the efficiency of physical and mental trainings through comparing the complex health condition assessment performed prior to and after the trainings, for which I randomly distribute the selected students into 3 groups. Two of those groups will be provided with health development programs of different level, while the 3rd group will be the control group.
- I should convert the processed and evaluated results in a form that can be utilized and developed further for experts and students engaged with health development.

III. Methodologies

3. 1. Physical measurings and presentation of the related protocol

I have performed the test of 125 (29 men and 96 women) voluntary university students at the Physiology Department of Health College Faculty of University of Szeged, assisted by colleagues participating in the research. Involving 96 persons out of the 125 students we have repeated the tests after 12 weeks. In addition to general medical tests, we have measured the breathing function, maximal load capacity, static balance, body fat percentage, handshake power and saturation of each participant.

When testing the breathing function, we registered the forced vital capacity (FVC), the timed vital capacity in the first second (FEV_1), and their percentage compared to the reference value (FVC % és FEV_1%). The test was performed through disposable paper mouthpiece and we used nose clippers.

Breathing function and load tolerance were measured with a CARDIOVIT CS-200 Ergo-Spiro (Schiller) device. Maximum load tolerance was tested on bicycle under progressively increasing load. After the data registration at rest, after two minutes of warm-up, the tested persons drove the bicycle with 50 watt resistance, then the load was increased each 2 minutes with 25 watt. The rev of the pedal had to be maintained during the test at 60/minute. The test was performed either until the individual tolerance limit (Te_{max}) was reached or until the submaximum pulse adequate for the age has been reached [(220-age)* 0,9]. Using 12 by-pass electrocardiogram device, we have continuously registered the electrocardiogram and the heart frequency, and measured blood pressure in each second minute. The outlet phase of 2 minutes, following the maximum performance, was performed with the 30% of maximum load.

Ventillation was measured thrugh a spiroceptor connected to a face mask. Gas analysis was conducted by means of oxygene sensor (FOS65) and ultrasonic CO_2 sensor. The device measured the taking of oxygen from breath to breath (VO_2), the release of carbon dioxide (VCO_2) and minute ventillation (VE).

The anaerob threshold (AT) was defined with the modified V-slope method (Wassermann) at the point where the increase rate of VCO_2 is exceeding the increase rate of VO_2, and the rise of the VCO_2/VO_2 curve> 1. Acceleration of the increase of VCO_2 reflects that for the accumulation of lactic acid the bicarbonate puffer started to react. The time of reaching the anaerob threshold has been registered (ATt). We registered the

absolute (Te, watt) and relative values of performance compared to the body mass (Te/kg, watt/kg) at the time of the AT and the maximum load. Absolute and relative values of VO_2 have been also registered at rest.

3. 2. Description of the applied questionnaire package

The questionnaire package has been used to describe the conditions of the analyzed person's ecological and bio-psycho-social points of view, where I tried to emphasize the critical aspects affecting the health status.

The questionnaire package consists of the following 5 questionnaires:

I. Questionnaire on lifestyle and health attitude

II. Mood status, abbreviated Beck scale questionnaire

III. Questionnaire on vital fatigue

IV. Questionnaire on subjective health condition

V. Questionnaire on personality (Cloninger-type questionnaire)

3. 3. Description of the protocol of the 3-month health development programs

3. 3. 1. Description of the protocol of customized physical training for 3 months

- Selecting the students for participating in the physical training:

I have randomly selected 46 persons, out of the analyzed group of 125 persons, for the group marked with category one. Students in group 1, in addition to condition test and the health plan, had to participate also in the 3-month physical training.

- **Selecting the personal trainers:**

Call for attendance for trainers in the research program was announced for students studying at the sport-recreation faculty of the University of Szeged.
Precondition of attendance was to have 4 successfully finished semesters, which represented an appropriate basis for the required knowledge of training theory, anatomy and physiology.
In addition to theoretical knowledge, students selected as personal trainers were in the possession of both competitor's and trainer's experiences.
Personal trainers have been selected from among students experienced in different sports. As a result, seven students have been left after the selection who were competing in the following sports:
Swimming, handball, aerobic, football, triatlon, jump rope, athletics and basketball.
Trainings were conducted in groups of 6 persons as average. Trainings were supervised by one specified master from the research team, often supporting the trainings by actively participating in them.

- **Preparation of personal trainers (recreators):**

Though the key aspect for selection was the possible highest level of knowledge on training theory and sports, they had to be provided with a special preparation prior to the commencement of work so that they would be able to meet the goals, identified for the research, precisely and independently.

In the first phase of preparation I presented a detailed description of the overall university research, the purpose of the intervention phase and the methods required for that. I introduced the analyzed persons – hereinafter clients – to the recreators.

In the second phase of preparation I organized a seminar on the relationship and its motivating function between the recreator and the client, with the assistant professor of the Institute of Sport Science who assisted my work during the implementation of the physical program.

The *third phase* included the uniform training schedule, a detailed description of the applicable methods, the presentation of available facilities and devices, and the precise application of tests and surveys.

They got familiar with the health plan, which was one of the basis for the customized training plan.

As part of the applicable methods, I designated the location of the training and made a schedule for trainers on the basis of professional experience.

I have designated 5 locations with different capabilities and a line of exercises to make up the potentially lost trainings:

- Sport hall
- Condition room
- Open athletics field
- Swimming pool
- Dyke/ramp on the banks of the Tisza
- Line of exercises to make at home

- **The schedule of trainings:**

1. On the first occasion, on the basis of the client's customized health plan, the recreator and the client discuss and identify the type of trainings, the possible previous experience in terms of the different sport activities. This had been followed by a fitness test, which was necessary for ensuring permanent control over the efficiency of the three-month work.

2. In the possession of information, the recreator prepared the training plans for each client who belonged to him/her. The training plan was made for one month, which was closed by a test and then changed each four week on the basis of the test results.

3. The obligatory number of trainings per week was 3 for all through the three months. One trainer held 3 trainings per week, but one of those three trainings were often performed at another trainer. Trainings generally lasted 60 minutes. Training locations were discussed by recreators with the clients when the training plans were drawn up. Trainings were usually completed with swimming trainings. The major problem at swimming trainings was the medium-level or poor knowledge of sorts of swimming, thus the key goal of trainings was to improve movement coordination and learning movements. For this reason, the improvement of fitness was shifted in the shade, which also weakened one of the key goals of the research.

Another frequently occurring case was the absence due to occupations, often referring to studying as a reason. In order to ensure that trainings are continuously performed, a line of exercises to be performed at home was designed to make up the lost training. Luckily, students have always noticed prior to the training when they were unable to attend due to other occupation. This way it was possible to maintain continuity without interrupting the process of the training. We succeeded in making the students understand that one training missed could not be replaced by another one the next week.

Recreators have applied circular training method for the majority of trainings. 80% of the exercises aimed to improve conditional capabilities and 20% served the goal of developing coordination capabilities.

Structure of the training

Macro cycle (mc) of physicial training:

Macro cycle (mc) covered a 3 month period of time.

Upon the commencement of mc the goals to be achieved by the end of the mc are identified, on the basis of the students' health and fitness ratios.

General purposes of the mc were the following:

- To make the students' fitness status continuously improving during the cycle;
- To make the students attain the applied training methods;
- To bring the applied exercises to perfection;
- To develop the need for movement;
- To make sure that injuries or feeling bad not occur during the trainings;
- To maintain students' motivation during the mc.

Micro cycle of the physical training:

Mc consists of 3 micro cycles (mic). Mics took one month as average. Each mic started with measuring the fitness level, preparing a training plan and lifestyle consulting. At the end of mics, the changes in fitness results were discussed by the trainers individually with each student. The end of the third mic, which also meant the end of the mc, was closed with a discussion with an overall analysis of the three months work.

Within mic 3 trainings per week were held as average: in inside hall, in open space and in swimming pool.

Trainings lasted 60 minutes as average. For each training a triple proportioning was typical: warming up, major and closing parts.

3. 3. 2. Description of the protocol for psychological team trainings:

Psychological intervention was performed on the grounds of definitions as per the modules. As a first step the individualized evaluation of the questionnaire package was performed and the paper-based, customized health plan was compiled (Appendix 2. – health plan). The second step was determined by getting into the focus group, on the grounds of random selection, which amounted to nearly half of the 46 persons provided with customized training program, that is 20 persons. We have formed 2 groups of the 20 persons and this way the "stress management psycho training", which lasted 2 x 3 days was started with 10 - 10 persons. The training was conducted by a psychologist experienced in team therapy and cognitive therapy (Appendix 3. – Syllabus of stress management psycho- training and Appendix 4. – Schedule of the training).

3. 4. Applied statistical procedures

- **Methods applied by descriptive statistics:**

In the descriptive part I calculated frequencies, averages and spread.

- **T-test: (conjugate sample and independent sample T-tests)**

Suitable for comparing the expected values of permanent variables. I have always used the conjugate t-test to analyze the differences between interrelated samples of record 1. and record 2.

I have analyzed the three groups individually, to find out if there have been any differences between the average differences of the three groups or which groups have shown the same tendency.

- **Pearson-type correlation:**

I have applied it for analyzing physical parameters and psychological scales suitable for measuring the strength of connection between continual variables.

- **Variance analysis (Oneway ANOVA and Univariate ANOVA)**

With the method of variance analysis we study the effects of one or more variable/s of optional scale for one variable of continuous scale. If we have one dependent and one independent variable we call it single (or oneway), if we have several independent variables, we call it multiple classification. The analysis with several dependent variables is called multiple variable or multivariate anova, which method however I have not used. The oneway (one dependent variable) analysis in the Spss package is called: Oneway, and (with one dependent variable -) several independent variables analysis is called Univariate ANOVA. In the thesis we refer to the multiple variables expression to identify whether we have more than one independent variables in the model, but we always study the effect/effects of one dependent variable.

- **Linear regression**

I have used it to measure the function-type connection between continual variables.

IV. Results

Analyzed "subjective and objective" parameters of health condition

Objective parameters	Subjective parameters
age	self-assessment of health condition
gender	Identifying the subjective weight
residence	Vital fatigue
height	BDI
weight	frequency of movement
Body fat percentage	Type of sport activity
BMI	Personality signs
Pulse at rest	
Load pulse	
Load pred	
Load max	
Load pred/max	
O_2	
VO_2	
Results of fitness tests	

Table 1

The three-month intervention program, including the tests, was performed during study term, thus it can be regarded working environment. This way the results and methods received can also result in enhancing the methodological arsenal of health improvement at work.

My methodological and pedagogical tasks applied during the health development program were the following:

- Selecting the personal trainers (from among students studying on physical training-recreation faculty);
- Providing preparation for the selected personal trainers;
- Managing the three-month customized physical training;
- Managing the stress management psycho training;
- Continuous mental hygiene consulting.

Selecting and preparation of personal trainers was appropriate. My expectations towards personal trainers were maximally met on the basis of statistical results and the good mood experienced on the trainings and having seen the motivated students.

Complexity of health development is proven by statistical results and the multi-variable models to be discussed later. The basis of efficiency is affected by human factors, professional expertise, attitude and individual will.

Movement as primary prevention opportunity:
It is a sad fact that 36.5% of the students do not make substantial sport activity, it is completely missing from their lifestyles. As a result of the program the proportion of substantial sport acitivity performed weekly increased with 14.8 % compared to the students not doing any sport at all and compared to the first inquiry. Naturally, this can be attributed also to the tight training plan for those who were involved in the program, but luckily *the number of occasions spent with weekly sport has been also increasing in the group of students possessing only health plan, which proves the efficiency of the health plan.*
The improvement of physical fitness positively affects the functioning of the cardio-respiratoric system, which is a crucial primary prevention device against heart and circulation diseases, which is the second more frequent cause of death in developed countries.
For this reason, I have also tried to classify sport activities according to their effects on the improvement of fitness. I set up the categories on the basis of available answers given in the questionnaires, with keeping in mind that I should have had a more detailed knowledge of training elements for a more precise identification of fitness.
It can be stated that sport activities which support the improvement of fitness have been chosen by 28% more students on the occasion of the second test, while sport activities less improving fitness were performed by 7.2% less students.
Jointly interpreting the previous two analysis results, we can come to the conclusion that *one of the most important result of complex care for health is that the students chose sport activities which are more valuable and efficient for their health and make it more regularly.*

Presence of deviant behaviours within students participating in higher education:
Frequency of drinking alcohol decreased during the three months, but the volume of alcohol drunk on one occasion has not reflected any important change. Improvement can be seen in respect of drinking extreme volume of alcohol harmful for health.
The quantity of daily coffee drinking has fallen during the program, but not significantly.
In respect of taking drugs we can see only minor, insignificant improvement regarding the frequency of taking them. More than 40 % of the students have already used drugs, that is tried minimum once, which – knowing the country's average – compared to students studying in higher education is not surprising, but making us seriously thinking it over and it is frightening.
Majority of the students have already tried wild hemp, hashis and alcohol. Heroin was tried only by one person, while cocaine by no-one.
Smoking habits reflected a better view than the country average. More than 82 % of the students have not smoked. The number of smokers during the program has slightly fell, but has not produced significant improvement.
In the possession of data of analysis of deviant behaviours, it can be seen that during the 3 months the change is very infinitesimal, in spite of the growth in sport ativities, which remarkably affects the lifestyle. Prevention of development of deviant habits can be more efficient than to manage the often psychic and organic dependence.

Sport activity as a plus element appeared in the students' lifestyle, thus it was also easier to accept and built it in than to leave the already existing deviant behaviours, which have become already habits. This can also mean that what was started as replacement activity in the beginning – for example due to the lack of presence of sport activity – later, when it has already become a habit, it is already quite difficult the replace it with alternative activities. This thought also emphasizes the strengthening of preventive approach in health development.

Weight

Weight plays roles in surveys from several aspects. Weight as a factor affecting health is in the focus of human life. That is why I also regarded important to study - in addition to identifying objective weight, which produced significant improvent in groups I/b. és I6a between the two tests - the BMI as one of the widespread way for measuring weight categories and to identify subjective weights which studied the trend of self-image and the power of subjective.

Interesting correlation can be seen in the differentiated projecting of the results on weight of the 3 month program.

As a result of interventions, the most important change has been produced by the identification of subjective weight. This has been followed by the trend of objective weight and finally there was BMI at tendency level. Consequently, changing lifestyle has prompt positive mental hygienic effects. According to subjective approach, emotional balance is followed by changes of training adoption processes, weight and BMI only later. The received correlations may have two messages: the adoption of movement lifestyle can produce prompt effects, joy and somatic results on the long term, which all serve for health development in complex form.

Psychic factors:

I have also studied the trend of mood status per groups, but I have found that significant changes must have been caused by the seasonal difference (winter-summer) between the two surveys or other circumstances unknown for me.

The purpose of questionnaire on vital fatigue was to study the dimension of health attitude within the collective terminology of "behaviour and emotions".

I have also studied the results broken down to groups. As a result, I have found that in respect of the active group 1 the health development program caused significant improvement and also in group 2, which was only in possession of health plan, the tendency was also improving, compared to the control group.

Summarizing the effects of the 3 month program, the fast, significant and tendency change of psychic factors can be observed also for the change in subjective opinion on weight previously studied. The message conceived there can be also enforced related to the examined psychic factors, thus strengthening the complex effects of movement lifestyle on health dimension.

Further analysis of the function and change of the subjective has been followed by the evaluation of subjective identification of the health condition.

Subjective health condition of the groups has significantly improved as a result of the program. The reason is that in my analysis, performed broken down to groups, the pilot group reflected string and significant improvement when the two tests were compared, against the control group where the conjugate t-test has not produced significant difference.

Regular sport and the qualified professional backgroung resulted in the students' growing mood for sport lifestyle, as a result of which self-image and mood factors have also changed into positive direction. Students' more positive opinion on their own health condition has evolved in correlation with these factors during the 3 months and reached a significant difference compared to the first analysis.

Discussions on the results of physical ratios:

In the possession of subjective opinions and results of psychic factors, another key goal of the research was to perform an efficiency analysis of improving health condition, by means of physical measuring tools.

Out of the ratios of load test I took performance as basis (Load). The Load max/pred variable is used to identify the individual's fitness status. Fitness status in group I showed significant difference, which means that the level of maximum performance - which I took as 100% - of students participating in the program has been approached by 13.4% as average. Students in Group II possessing only health plan have also achieved a tendency level improvement, which also proves that health plan has individual health development effects.

So far the results of questionnaires and load tests have been evaluated and discussed separately. Taking into consideration the research goals and my hypothesis these results resulted in partial realization of the goals and fractional confirmation of hypothesises. The lifestyle and health attitude of the analyzed target group have been also identified.

To fully confirm or refuse the goals and my hypothesis, I still need an explanation of interrelations between subjective evaluations and objective results and a description of the raison d'étre of the model made of variables presenting and proving the complexity of health condition.

I have compared the weekly volume of sport activity as objective variable to vital fatigue, which psychological factor already reacted well to the program, and the opinion on health condition as subjective factor.

Vital fatigue is affected by the frequency of weekly sport activity with low, but significant correlation. Stronger correlation with the weekly sport activity frequency has been reflected by the subjective opinion on health condition. I have studied this correlation from several aspects as the results received show and prove a tool of efficiency analysis of interventions which can be measured with subjective result.

The process of identifying health condition missed the significant difference in respect of good and very good categories, which may later result in potential contraction of the categories.

Analyzing the effects of movement frequency groups on health condition, we can observe that quantity categories reflect significant difference, except for the categories of not making any sport activity and that of making sport activity once or twice a week. The contraction of those categories is not reasonable as between these two categories the attitude to sport activity and the potential motivation opportunities can be extremely different. These results only show that students in the two categories have not shown significant difference in respect of their opinion on their subjective health condition.

Having examined the results, we find that definition of subjective health condition can be an important indicator of identifying sport lifestyle. Additionally, it can become a well applicable and economic measuring tool of efficiency tests connected to health status.

In respect of variables examined above, I have analyzed the quantity and subjective quality and their interrelation. The next stage is to perform further analysis of the strong correlations received.

I have reversed subjective quality that is the subjective judgement of the health condition with the performance (Load) variable:
Out of load data I keep dealing with the performance (Load) variable in order to analyze additional connection between the interrelations already discussed.
The Load reflected strong significancy with the number of trainings per week, which keeps strengthening also the function of subjective indicator, particularly in respect of tests, where technical equipment does not allow performing load electrocardiogram tests.
The health improvement effects of the compiled 3 month program have been also proven in a more complex form and also met the goals of research.

Explanation of the contexts in relation to weight:
Weight is a subject that people generally care for, which often means almost the same as to care for health. However, this is naturally not a good approach, because if someone has normal weight it does not accordingly mean that he/she is healthy. Still, it is a fact that deviation from normal weight is regarded a risk factor affecting health, so it is also covered by my research.
I have used actual weight, BMI and body fat percentage as objective measuring numbers.
BMI and body fat percentage reflected strong correlation, the connection was nearly linear between the two variables. This context could have shown difference if the 3 month intervention had the goal of burning fat that is "agressive" diet, but it would not have been in compliance with the long-term ambition of health development.
The primary goal of the applied training method was not to burn fat, but to move the cardio-respiratoric system and the muscle- and joint system, under gradual load. The key goal was to endear sport and personal training and pique or maybe increase the need for sport and to familiarize the possible widest spectrum of sport activities with minimum requirement of devices.
During the 3 months of the program the change in weekly movement volume has not yet produced the change in body fat percentage, but the change in psychic and physical ratios slowly, but supposively will result in the changes of body fat percentage, followed by the change in weight. Intensive physical training often results in growing weight, which is caused by the falling body fat percentage and the increasing mass of muscles.
These often cause the deterioration of subjective opinions, but the process is more typical for the initial phase.
Improvement of students' fitness status (Load) was not in context with the change in the body fat percentage. This confirms the previously mentioned theory that is the change in weight is not necessarily connected to the health condition, though as a factor it is affecting it.
Function and power of the subjective in connection with weight has been very interesting. Identification of BMI and the subjective weight were in conformity, so the self-assessment covered the truth. This result can again simplify the tests and confirm the reliability of the questionnaire survey, but *is it surely like that in each case with the weight?*
Identification of subjective weight, as we could see it, can be used as a very strong measuring tool, thus I compared it with the subjective health status, which has been so typical for objective results so far.

In general we can say that identifying the subjective weight shows also significant interrelation with the subjective judgement of the health status, for both surveys. This also means that those who have positive opinion on their health status, also had appropriate weight. As a contrary, in ranges different from the adequate weight categories I have found a insignificant, but still interesting difference. In the "slightly fat – slightly lean" category those who are close to their appropriate weight generally judge their health condition a little bit worse than those in the "very fat – very lean" category.
We can assume that persons with weight closer to normal, the idea to get rid off the surplus weight comes in mind as a realistic opportunity and thus the pressure of healthy body image is better in the focus of their thinking. This pressure and the resulting pang of conscience might cause that such people judge their own health conditions a little bit worse – though not significantly – than those whose weight is much farer from the normal weight.
Regarding persons whose weight is remarkably deviating from normal, we can assume that the acceptance of their condition, and giving up to belong to people with normal weight can cause that their opinion on their own health is slightly better.
Of course, accepting and becoming resigned to the evolved status are important in several fields of life in respect of health condition, but in this case it appears as lack of motivation, which might largely deteriorate the existance and efficiency of health development processes required all through the life.
The received results can be very important for the pedagogical and methodological development of the recreation trainings, which – depending on the clients' weight – can be made more efficient not only through the adequate selection of the training elements, but also through utilizing the motivation tools differentiated by weight.
The last element to be discussed regarding the weight is the connection between BMI and blood pressure.
Both in the first and in the second test there were significant connection between BMI and systolic blood pressure, and diastolic was significant in the second test. The previously explained weight as risk factor has been proven by the analysis of this context, which also warns how important it is to care for weight.

Contexts of personality signs with the indicators of active lifestyle:

Already when drawing up the research plan I was thinking on which factors would influence the success of the program? When preparing the questionnaire package I also built in the already known TCI questionnaire, trusting that in addition to external effects, I can become familiar with the contexts of a part of effects resulting from the inside - from the personality. Out of personality signs studied by TCI, I have analyzed the factors of persistence and conscientiousness.

Persistence as personality sign reflected significant relation with performance (Load) and the oxygen absorbing ability (VO_2) out of the results of load tests. It is not just a crucial context, but Load is also one of the central indicators of my analysis, which has already successfully proved and confirmed the efficiency of the program. Predictor effect of persistence as personality sign can be studied further in applied pedagogical processes and selection.

I have compared conscience as personality sign to fitness categories. Conscientiousness, which is a character dimension, is one of the elements of cooperation characteristic sign. Students who slightly developed their fitness status possessed significantly different consciousness factor than members of the other 2 fitness groups.

For improving fitness it is not enough only to select the right form of sport, the necessary training plan and a prepared trainer. Consciousness as characteristic sign should be an important supplement to the activity. Identification of the consciousness dimension of

students will predict a particular person's intensity of executing the specific training program.
Having analyzed the personality signs we can say that we successfully identified two characteristic signs, which affect how a person will execute the particular health improvement program. It means that there are characteristic signs, which can enhance the efficiency of the program. It could be the subject of another independent test to find out whether characteristic signs affect the free choise of sport activities or sport activities affect more the characteristic signs?

Explanation of the multiple variable models:
I have supported the assumption of the research on model with an individually operating model, that is I have successfully set up, from the test results, a multiple variable model, which reflects the interrelation of factors affecting health status.
Regarding the model, my ambition was that the selection of dependent variable would be justified on the one hand by the contexts of results discussed so far, and on the other hand, that it can be utilized for the efficiency analysis of complex development of health status.
This is why I have chosen self-assessment of health condition as subjective variable, which separately with Load as an objective physical variable determining performance and through that the fitness status, already showed strong significancy.
Complexity of health status has been well reflected by the mutual interference of the explanatory variables of the model, and the dependent variable, the effect of which I have analyzed independently, filtering the effects of the remaining explanatory variables. For this reason the method is more than as it would have been based only on the comparison of variances.
BDI, BMI and the quantity of weekly movements explain a significant part from the variancy of health condition. Explanatory power of the variables (AdjR^2): 18.3% following the first test, then following the 3 months of intervention part the explanatory power of the same variables (AdjR^2): increased to 27.7%. Separately analyzing the explanatory power of variables we can find that frequency of weekly sport activities, irrespective of the body mass index and other variables, explains the majority part from the dependent variable, which percentage incresed further as a result of the program: in test 1. it was 8.4% and in test 2 it was 15.6%, respectively.

V. Conclusions

The syllabus and methodology prepared for the selection and preparation of personal trainers proved to be good, as it turned out from processing the training journals that nobody was absent without leave and justified absences were either replaced with the home exercises or recovered through joining another training already in the same week.
To meausure the trainers' performance was not the purpose of the test, thus we have not identified specific indicators. Moreover, it would have made it more difficult to compare them that in many cases the groups were mixing in respect of sport activities, locations and the time of trainings. The high absence – but recovered rate, reflected by the processing of training attandance registries, should bear theoratical sign also for experts engaged in personal training and recreation. In addition to elementary training theory regulations, remarkable emphasis should be laid on flexibility, recoverability and the compiling of individual exercises that can be performed at home during the training planning process. On the basis of solid experiences of personal trainers we can say that great emphasis must be given to learning the perfect execution of exercises to be made at home.

We have found that - during the implementation of the training - the trainers' group of 7 persons, supplemented with 2 specialized professors, proved the applicability of individual trainings in small groups, built on a matrix-type structure, which improved the efficiency of personal training. One of the key goals of our research has been realised, because personal or small group trainings with more complex matrix-type organisational structure and the tested selection, preparation and applied methods can operate in a more efficient form. This program package, in line with the purpose of the research, can be also applied in wider social circles and made available, in appropriate form, for health development experts and the education of professionals.
The contradiction between the knowledge of participation rate at physical training and the falling number of participants of control tests, can be mostly attributed to the time of tests which partly took place during the examination term.
Due to the limited budget of the research we have been unable to finance supplementary tests.
Probably if during the 3 months we would have been unable to ensure flexibility and different chances to make up the lost trainings, the number of participants would have probably fallen already during the program. This also confirms the necessity of a matrix-type organisation to ensure an efficient and long-term cooperation.
Naturally, it can be also observed that those who did not get into the active groups, due to the random selection prior to the commencement of the programs, unfortunately attended the control tests in bad percentage due to their control group function.
When conducting similar control group tests, passive participants of the test should also be made interested in performing the necessary tasks. Unfortunately, this was missing from the program.

Results of the tests proved that health condition can be improved and developed already in 3 months. The research tried to interprete and manage the health condition in a complex form compared to the available resources. Tests covering substantial bio-psycho-social dimensions and the prepared customized programs and health plans reflected complexitiy and strong correlation and interdependence, jointly with the results of the received context analysis. Having proven the efficiency of the program, the function of human subjective related to the judgement of health condition is valorized accordingly. On the other hand, one cannot doubt the function of health plan programs taking into consideration subjective judgement and recreators conducting them.
Interdisciplinary point of view and professionalism are inevitable for the practical implementation of health development.
Health is not a toy, though often unfounded trends and economic interests or unprepared amateurs can make it like that.
The health plan elaborated during the program also has health development effect independently, and the prepared 3 months program package substantially influences it. On the other hand, from the test results and the model-level composition, a more substantial, cheaper, but reliable diminished test protocol can be identified. The strength of subjective judgements and power rate of explanatory variables allows preparing the health plan also in cases when an adequate instrument panel and tool fleet are not available. Supervising the overall 3 months program however there was one thing I surely experienced: *one cannot talk about health improvement without qualified and prepared experts! Having the adequate preparedness we can adapt to the diversity and changes of external-internal environment, but differentiated circumstances will never adapt to unpreparedness.*

List of own publications

1. Publicatons related to the subject of the thesis

Fritz P.Recreation for everybody
Szeged: Bába ; 2006.

Fritz P, Schaub G, Hegedűs I. Contexts of lifestyle, free time and recreation
Magy Sporttud Szle 2007; 8(2): 52-56.

Fritz P, Jakab E, Dorka P, Mészáros J. European practice of munkahelyi health improvement
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Fritz P, Jakab E, Gémes K, Mészáros E, Hegedűs I, Ressinka J, Mészáros J, Kopp M Development of qualitiy dimensions in the light of the correlation between recreational physical exercise and stress at the work place
Phys Educ Sport 2006; 3(1): 5-29.

2. Other publications

Hegedűs I, Fritz P. Presentation of health status and life circumstances of the unemployed and employed gipsy population, on the basis of research performed in some villages in the County of Borsod-Abaúj-Zemplén. Bp Népeü 2004; 35(3): 205-211.