

Doctoral (PhD) Theses

**The positive effects of regular physical exercise  
on mental health and quality of life in young adults: empirical  
study of symptoms of depression, stress and stress management**

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Debrecen, 2012

## **The objective of the thesis, the topic delimitation**

The mental health of each component, namely, depression and stress define the mental health status and quality.

The WHO predicts that depression of the 2020s to be expected of second place in global rankings of disease. Stress is considered to be the major global disease-causing factor of the XXI century. By now, today, depression and stress are the major global health –threatening factors.

Inactivity is also a health hazard, which further weakens the mental health status.

These facts in themselves need an immediate action by the government and responsible institutions because now "we are in the twenty-four hours" concerning of the mental health.

The above problem is highlighted and specific, if we speak about young adult population.

In my dissertation I investigated a special segment from this population: college students.

What gives the speciality? Because of their ages, still providing

- 1) the *possibility* of preparing for the effective prevention against depression and stress, because the underlying anatomical brain structures and cognitive schemas are only now emerging, very fluid. (See theory of neuroplasticity). At the same time:
- 2) the *responsibility* partly for themselves, and partly to the relevant government agencies and society that this part of their life manage effectively as an opportunity for further career success and mental health.

Doing exercises, especially the benefits of regular exercise effect on mood have been known for a long time in everyday level. As the good effect of stress -relieving is also known. But, the subject of scientific investigations and explanations of the effects is still missing, both in terms of the national and international literature.

Man-made hazards prevention and health promotion programs, lifestyle programs highlighted the role of health care in the stress management, stress relief, and dissolving for the first time.

In the science of psychology, the health psychology is the area, which, like applied psychology, examines the importance of physical activity and the role of regular exercise, related to the depression and the effects of stress, stress factors and properties.

As the health psychology is a relatively young discipline, it is not surprising that existing research examining the relationship between correlations on the releases can be found occasionally, until recently.

Even telling the diagnosis of depression surrounded a lot of uncertainty, which is understandable if you consider that depression is a multicausal, multi-etiological and recurrent disease tends disease, syndrome, which can show "everyone is a little different," unique face and unique runoff.

Especially because the depression strongly depends on the different cultures and symptomatic and causal diversity, but there is no biological marker of the "statement", mainly the subjective suffering dominates.

#### *The common neurobiological background of depression and exercise*

The exercise – even in one occasion - in addition to the sweat is invisible to the eye, but the more powerful biochemical and neuro-hormonal changes are also accompanied.

These are not resulting only immediate anxiety dissolving, joy of movement, and better physical and mental well-being but can restore the harmony of the so-called brain biogenic amines (serotonin, dopamine, norepinephrine). Regular physical activity has a depression-reducing effect. The common platform implemented neurobiological brain effects of mild to moderate depression in relation to investigations has also been shown in studies in elderly patients.

#### *The relationship between stress and depression*

Untreated stress in susceptible individuals can easily turn to depression. The literature on depression is therefore related to certain negative life events as inevitable consequences. It is

especially true in connection with socially acceptable long-term experience loss, in case of mourning. However, depression can be moderated or prevented with stress prevention and mitigation procedures by - for example, regular movements, exercise and sport.

### *Stress management: types of coping*

Young adults and college students' mental health is clearly describable on the basis of depressive symptoms, stress and coping characteristics and defining. The key among these is the importance of regular exercise as a preventive and protective lifestyle factors.

Doing exercises is interpreted as a stress reducing, an adaptive coping mode, and a prevention tool which is effective -in directly and indirectly roads- with alleviating the stress and depression and the protection and preservation and even the development of mental health.

Lazarus (1966) used individual solutions to overcome the stress coping and distinguished two main types according to the emotion-oriented or problem-oriented solutions

On this basis, he later developed that questionnaire, which is still widely used in researches, and Folkman, his student also noted (coping modes questionnaire, / Coping Style Inventory / Lazarus and Folkman, 1980). Hungarian version was adapted by Kopp (1992).

Exercise and sport can be classified as emotionfocused, behavioural coping techniques.

Olah, the expert of "stress and coping", believes that a psychological immune system exists – and exercises are important part of it. He worked out a questionnaire examining psychological immune system, which allows the individual personality factors pose mapping protective factors: Psychological Immune System Inventory /PISI/, (Olah,1997).

In this thesis, I would like to show the adaptive and maladaptive coping modes and forms of isolation and description of prevalence among college students, in sports context. Choosing an exercise or a sport can be an adaptive coping.

## *The characteristics of college students' mental health and quality of life*

In the recent years, studies have shown that depression is also displayed increasingly in younger age groups. This tendency strongly affect on the subculture of college students. However, their lifestyles show some specific fluctuations, but is incomparably more stressful than the college life in previous years. The defeat to relieve stress they can easily resort to maladaptive solutions, - mental health at risk (alcohol-and pills-drug use, hetero- and auto-aggression became more frequent). In addition to this, they do less exercises, yet most of the time the necessary for the preservation of health does not meet the minimum movement. They exclude all the benefits and preventive and protective health effects of the movement and exercise from their lives My aim is also to point out, that regular physical exercise as a behaviour, a positive psychological health and self-protection factor, which may assume a significant role in the prevention of mental health hazards.

In addition to this, through the mental health, it influences positively on the individual's general health condition, either directly or through indirect effects as well.

My personal experiences as an athlete and a physician of sportsmedicine are unshakable facts that regular exercise is an important element of the mental prevention. In support of this I had started an independent research from the late '90s.

Firstly, I carried out tests among inpatients in Hospital of Nagyálló, then, - using the previous experiences – in Nyíregyháza Jósa Andrew hospital I got a permission to create a research room in the psychiatric ward and furnish it with gym equipments. In this field I was able to examine the combined effect of individual movement therapy and supportive psychotherapy among the inpatients with strong depression.

All these actions have been reported as excellent and useful preliminary studies for the planned main research.

So, the main ridge of my thesis was gradually developed and crystallized, which was created in order to obtain a PhD degree.

My thesis above was built on:

- my personal life experiences (sports physician's and athletic "own experiences" psychotherapeutic practice),
- the data obtained by studying literature, and
- my own independent researches.

My thesis rests on three pillars:

- 1) The personal experience establish,
- 2) The theoretical literature supports,
- 3) My own independent research findings confirm assumptions and facts.

### **The main objectives of the research**

1. *Assess, describe and characterize* the frequency of exercise, the symptoms of depression, stress, and stress management (coping) data among college students, athletes and non athletes.
2. *Compare* the values of college athletes who do regular exercises, and the above-mentioned college students, who don't do any sports
3. *Collect and explore* the existing, formed opinions, beliefs and attitudes towards exercise and sports, the area of depression and stress, among the groups of athletes and non-athletes college students.
4. *Outline the trend* of depression and depressive symptoms, following the addition of exercise, the prospect of a decade, between 1998 and -2009. This study was took place in four different data analysis.
5. *Examine each modulating background factors*, which influence the degree and seriousness of depression, with positive or negative manner, they do it permanently, in a long-term projection period, making trend basis, related to sports activity.

6. *Explore and analyze elite athletes*, – in international competition - the features of stress (regarding to the stress sensitivity, stress / perceived stress / stress magnitude and stress sources) in connection with their health status, opinions and attitudes compared to the values of non-athletes 'campus citizens'.

7. *Highlight* the mental health protection, prevention opportunities in the physical training - particularly in reducing depression, and stress-mitigating role of psychological immune system. Referring to the research of the empirical data as evidence, which are identical and connected to the literature data and the empirical facts as well.

### **The outline of the methods**

The research is my own research, the results of three independent studies involving more complex one. In all three studies I worked out the college students' data. The students represented three different groups, based on their relation to physical training. I examined:

1) college students without any sports (campus citizens), 2) college students who carries regular physical activity (physical education students, so "professional" athletes) and 3) elite athlete college students (the global competitive international field) with a questionnaire.

The clinical research questionnaires were a part of a well established, standardized rating scale (Zung Depression Scale), and part of my special development for the purposes of research. Questionnaire for the Relationship between Physical Exercise and Depression (Petrika, 2003) was made for I. and II. experiments. The Sport, Health and Stress questionnaire and the English version (Petrika, 2009, 2010) is a questionnaire package that includes four separate questionnaires. These thematic questionnaires were originally the "Campus Study 2010" research project.

In this thesis I use the project battery of this test, and I processed certain relevant items received for the questionnaire responses. The three main objectives of the study are an integral unit, both the samples and the methods. Against this background, I will present the tests one by one and the sub-goals as well.

## **I. First experiment: Cross-sectional study**

### ***Depression, stress and stress management testing athletes and nonathletes college students***

In empirical cross-sectional study I examined depression and stress data characteristics of coping among athletes and nonathletes college students in a self-rated questionnaire. The sample case number were  $N = 425$  persons.

Test as a measuring device of 20 known from the clinic standardized itemized Zung Self-rated Depression Scale was used to measure severity and prevalence of depression and the kinds of subjective symptoms and demonstrable autonomic depressive characterization. In addition to that, an own developed, created especially for this research, a complex function questionnaires were used.

The form has given the name of the Relationship between Physical Exercise and Depression (Petrika, 2003). The main questionnaire consists of 13 item and sometimes are broken further subparagraphs.

The items are organized around five main test issues.

These are the following:

1) Exercise 2) Depression 3) Stress 4) Stress Management 5) Opinions and attitudes and the relationship between depression and the movement and possible therapeutic aspects. (The attitude here is marked by B. Buda) The research included a socio-demographic conditions and socioeconomic status (SES) and general health, lifestyle related questionnaire.

The data was gathered from the random selected students of physical education and non physical education students of College of Nyíregyháza. Filling the questionnaires took place in lectures and seminars on a voluntary, anonymous way. A structured questionnaire was built on a Likert-type scales, self-assessment scales and visual analog scale, as well as opinions and attitudes were examined.

I received basic data with descriptive statistics. Comparative and correlation calculations were performed. The probability levels at 95% were determined. I applied SPSS for Windows version 12 for the statistical calculations.



## **II. Second experiment: Trend analysis**

*Development trends in the depression between the decades of 1998-2009.*

*Factors modulating the effect of depression, in connection with physical education among college students.*

In my research testing was used among college athletes throughout the Zung Depression Scale. Thus it was possible to make a trend research across a decade from the data obtained at four different date. I analyzed data from surveys of depression in 1998, and 2002/2003 school year, the 2003-2004 school year and during the 2008-2009 school year. Among physical education students the rate of depression during the decade remained low- the values of the test times – comparing with the values of the non-athletes students. The difference is significant. In particular, the level of depression - expressed as averages in the SDS index, - showed a continuous rise during the decade. With the help of the Relationship between Physical Exercise and Depression Questionnaire (Petrika, 2003) I investigated the context of depression, the extent of modifying factors, beside regular physical activity.

*A) There are strong influential factors during analysing Modulating factors:*

- Physical condition/stamina
- Mood
- Stress level (perceived stress)

Regression analysis of the operation. Basic linear function used for the description:

$SDS = f(stamina, mood, stress).$

Both the strength and mood reduce the depression - in terms of fitness. However, the current stress strongly increases the rate of depression. All relationships are significant.

*B) Modulating factors are less influential:*

- Gender
- Health
- Current depression

Cross table and chi-square test based on each factor significantly correlated with the depression. The female gender, poorer health status and the incidence of past or current depressive episode, significantly increase the current value of the SDS score.

*C) Showing no effect during analysing Modulating factors:*

- Smoking
- Handiness (right- handed or left-handed)

Smoking and handiness(right-handed or left-handed) showed no significant association with depression. The statistical analysis has occurred with SPSS for Windows with version 19.

**III. Third experiment:** Cross-sectional study

***Analysis of stress and characteristics of stress, and health self-assessment among international elite college athletes.***

In the study, analysing and comparing samples has occurred among non- athlete college students (campus citizens) and elite international athletes college students. The examined persons were college students of non-physical education of Nyíregyháza and the participants in the 20th male and female handball college world championships, which was held in the city. Test measuring devices were the questionnaire pack of "2010 Campus Study" research project, Sports, Stress and Health (Petrika, 2010 ) This package includes four thematic questionnaires, from which I used only some of it in the following work – stress-relevant items data and the conclusions drawn from them are presented. The data is mostly numeric data or ranges, thus supporting the objective analysis. Filling the questionnaire was voluntary and anonymous. For the foreign competitors the adapted English version of the questionnaires was sent (Sports, Stress and Health, Petrika, 2010).

The parameters analyzed and presented:

- Sensitivity to stress
- Size of load stress (perceived stress)
- Stressful life events, subjective weight
- Sources of stress type.

In addition, the

- Self-assessment of health status, and
- Opinions and attitudes on how about the sports influence on stress data were also surveyed.

The SPSS statistical evaluation program used 16-inch and 19-inch version.

*In Stress sensitivity* we found no significant difference.

When examining the results it is also important to note that the athletes are currently participating in an international contest where the stakes are high and is increasing in the subjective personal psychological pressure.

It is understandable that the athletes were significantly detected higher actual stress ,according to the data. There are similar levels of *life stress events* in the two groups. In the analysis of the *sources of stress* it appears that while the non-athletes are struggling with connection stress, the athletes cope with interpersonal stress effects more easily. For them, intrapsychic origin stresses are more serious problems. The difference between the two groups was significant.

The self-assessment of the *health condition* shows a slight shift in the importance of better health to higher values of the elite group of athletes. The difference is not significant.

The opinion of the two groups shows significant differences in the evaluation of *sports-stress relieving effect*. The affirmative answers may be the athletes' personal experience, a positive experience.

## **Thesis results**

### ***Results of the first experiment***

1. In the course of my investigation I discovered that only 31.9% of non-athletic college students undertake at least 30 minutes of moderate intensity physical activity, at least twice a week. The rest of the students exercise even less. Based on these results, it can be stated that college students lead a physically inactive lifestyle to a large extent and that their physical activity levels are substantially lower than they need to stay healthy. Such a high degree of a lack of exercise is a mental health risk itself.

2. I found that the prevalence data of those physical education students who exercised regularly showed lower levels of depression than of the other students who did not exercise regularly (3.4% vs. 7.9%). In this experiment the results of the physically active students corresponded with the results of the adult general population (which is 3.5%, according to literature), whereas amongst sedentary students who did not exercise regularly, the occurrence of mild depression was twice as high, some of them even displaying medium or high levels of depression.

3. Comparing the Zung depression scores of the physically active versus inactive students I demonstrated that the depression levels of the physically active students are significantly lower than those of the minimally active students. For that reason, physical activity is also recommended against depression.

4. I also found that the perceived stress level of physical education students is lower than their inactive counterparts, although both categories lived under the same circumstances.

5. Assessing the self evaluation exercise I established that physical education students who exercise regularly regarded themselves to be in much better physical condition than their non-exercising peers. However, the results in relation to emotional state (mood) did not show such difference between the two groups.

**6.** I demonstrated that physical education students more often choose exercise as stress relief or adaptive coping method in contrast to the characteristically maladaptive methods applied by inactive students.

**7.** My findings revealed that a bigger proportion of the physical education students than the inactive students believed that physical activity reduces stress and helps to fight depression.

**8.** My research showed that physical education students had lower levels of stress and depression, in other words they enjoyed a higher quality of life due to the assistance of their beneficial regular physical exercise, dissimilarly to physically inactive students.

### ***Results of the second experiment***

**9.** In my pioneering research I studied the level of depression of college students within the period of 1998 – 2009. I demonstrated that a physically active lifestyle considerably decreased the tendency of depression and showed that this trend maintained much lower levels among students who exercised regularly.

**10.** I demonstrated that in relation to depression, of the examined factors, physical and emotional conditions had a pronounced modulating effect on depression. The levels of stress, the presence of depression in anamnesis and poor state of health are all negative modulating effects. Females have a higher risk of depression, which is an additional negative modulating effect for them.

### ***Results of the third experiment***

**1.** I have been the first to provide evidence that elite athletes employ more effective stress managing methods even in highly stressful situations than their inactive counterparts. This significant difference is revealed in the level of stress, causes of stress and the methods used to manage stress.

2 . I have proven that there is a substantial difference between the physically active college students' attitude towards the stress relieving effect of regular physical exercise and their non-exercising inactive peers' attitude.

3. Through the results of my experiment, I illustrated that regular physical activity changes the college students' behaviour in positive ways and helps to boost their psychological immune system and work more efficiently.

4. The empirical data of my present study supported the hypothesis that regular physical activity favourably influences psychological stress and depression directly, as well as indirectly. As such, physical exercise is a necessary preventative aspect regarding physical and mental health, including quality of life.

## **Summary**

Firstly, I examined the regular physical activity, depressive symptoms and psychological stress relationships in healthy young adults, and within a specific subculture, in college students. Empirical studies were carried out with survey method. The studies have proved the well-known empirically, theoretically established assumptions, that regular physical exercise and sports protective and preventive impact against the depressive symptoms and stress loads. This beneficial effect is realizing in partly direct and partly indirect ways, which roads conversely reinforce each other. This all means a better quality of mental health and higher quality of life.

The task is waiting for further research that in the future we should determine the framework of the content and form of exercise –efficiency, the exercise as a "motion-drug" for preventive and any adjuvant, therapeutic feeding. This can happen with the cooperation and collaboration of sports experts and medicine specialists.

## **Presentations related to the thesis**

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