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Influence of Physical Activities on Stress Reduction among Third Age University Students

Abstract

The aim of our paper was to identify the effect of physical activities on the reduction of stress among the elderly who regularly participated in a physical activity program and point out the positive effects of these exercises.

The research sample consisted of a total of 202 elderly people from 64 to 78 years of age. 102 of them regularly exercised within the framework of the Motion studio program for the elderly organised by the University of the Third Age at Brno University of Technology. Other 100 seniors did not study and none of them exercised regularly. The level of stress was measured with the Stress Test (Selye, 1993, Křivohlavý, 2001).We looked for differences in the level of stress among seniors who exercise on a regular basis and those who do not exercise. We compared age, retirement time and all physiological stress-related difficulties. We used the Pearson correlation coefficient and the factual evaluation for statistical evaluation of the obtained data.

The obtained results, indicate that the seniors who came regularly to the Motion studio showed less stress than the rest of the tested elders.

They showed lower level in the zone of moderate stress, on average 4.5 points (men exhibited slightly higher stress level – 5 points – than women – 4 points) compared to the average of 8.1 points among seniors without sports and regular exercise (again, men showed higher levels of stress – 8.3 points – than women – 7.9 points). We found that the time spent in retirement does not statistically significantly affect the level of stress among the elderly (0.05 % significance level). The results indicated that the main stressors in old age are primarily physiological factors, which determine the level of life quality and often cause protracted diseases, particularly those related to musculoskeletal system. The time spent in retirement does not statistically significantly affect the level of stress of the elderly. Seniors without sports and regular exercise who reported higher levels of stress complained more about their cardiovascular condition, loss of appetite and neurological problems.

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The research has shown that seniors who are regularly engaged in physical activities are less stressed than seniors without sports and regular exercise.

Keywords: seniors, health, quality of life, stress, sport and physical activities.

Introduction

Nowadays, many universities worldwide offer a lifelong study programs, the so-called 3rd Age Universities (U3A hereinafter), in a response to a rising demand for education among the aging population. At the same time, graduates of these courses pay increasingly more attention to options suggesting how to improve their own health through physical activities which would be managed according to their current mental state and actual needs. Previous research [5], [7], [8], [9], [14], [15], [16], [23], [32] and the current state-of-art level of knowledge extend the offer of available sports and physical activities for seniors, which are quite considerably in demand since regular exercise contributes to the health and quality of life at any age. The latter is defined with regard to satisfaction of the respective individual with the achievement of certain targets to direct his/her life that are determined by their own hierarchy of values [17]. It is an individual value experienced subjectively by each individual in different dimensions; each individual understands and defines it differently. Human life is fully implemented, i.e. in good quality, only if it is based on *arche* (beginning), which is the cause of acting (*causae efficientes*), consequently, human mind has to choose a mean of a movement along a path (*dynamis*) which is nothing else then a cause in terms of material, matter and options. Adoration of objectivity in science leads to the fact that quality of life is achieved by objectively observable, i.e. quantifiable, predictions which usually depend on the health of the subject. Therefore, cultivating the human body with spiritual cultivation must be a part of the health care [10]. Quality of life is also associated with life satisfaction and that does not dwindle even at a later age [17]. The issues of life quality are also associated with physical activities of seniors, especially in terms of well-being, fitness and wellness. Well-being is referred to as an experience of personal happiness and is an inevitable component of health. At present, it is also directed to overall well-being of human beings in relation to their bio-psycho-socio-spiritual balance. This concept is also linked to physical fitness and represents a set of exercises which are based on muscle strength, flexibility, coordination, and breathing efficiency. Cardiovascular fitness, which is interconnected with regular exercises is particularly important, and its significance rises with aging. As seniors are among the fastest growing population group, it is necessary to pay due attention to them. Demographic statistics shows that about 870,000 people over 65 years of age join the world population of seniors every month [12]. Therefore, physical activity is an essential part of healthy aging. Movement can play a vital role in maintaining proper body functions and can simultaneously improve the

quality of life of seniors who are already disordered. Thus, physical activity and sport of seniors brings considerable savings in health care costs in this category of population. According to the World Health Organization [31], regular exercises are especially important for seniors to reduce the risk of falls, prolong their independence and improve their quality of life. The research showed [18] that regularly exercising seniors have a five times lower risk of cardiovascular disease. However, exercises must take place in the aerobic zone. With the rising age, movement and physical activities in each person become restricted. In relation to the quality of life, sports and physical activities are recommended for seniors as prevention against aging. Movement is controlled by the central nervous system and this controls all the processes in the human organism through the cerebrospinal system. Thus, it controls physical behaviour and volitional human activities. During physical activities at any age, information is transmitted between the brain and muscles, and it reaches deep into controlling processes. Various exercises enable us to understand the close relationship between the mind and the body, and thanks to this enable us to better control our thinking and memory [26]. Regular exercises also have effects on stress elimination, thus contributing positively to health. Stress accompanies each one of us throughout our life, and it endangers our health through environmental influences and current situations. It is also involved in the development and course of many diseases. Stress significantly affects the course of diseases [1]. Through its effects, stress can significantly prolong a disease and it can also contribute to the patient's death. Because stress is one of the phenomenological problems of contemporary society, it can even cause a premature burnout. "The reason for burnout are negative, or missing, positive relations to the surroundings and misunderstanding of oneself" [25]. Stress, depression and anxiety in adulthood are the second most common type of health problems related to work [22]. For seniors, stress contributes to the deterioration of quality of life and health; therefore, physical activities in older age should be a part of the seniors' daily routine.

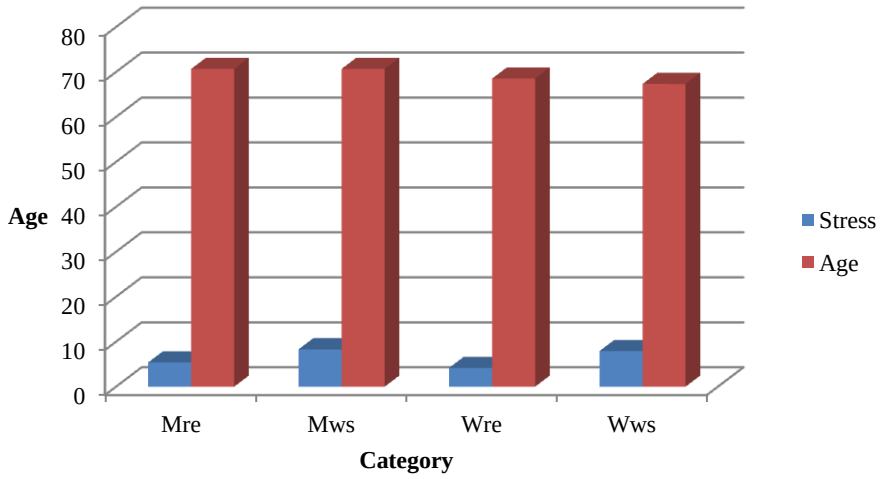
Methods

To evaluate the current level of stress in a group of regularly exercising seniors and seniors who are not engaged in sports and regular exercises, we used the Stress Test [17] and a standardized personal questionnaire. The Stress Test is a diagnostic method which is also used by WHO for their research and it includes questions related to human behaviour in distress. It consists of three parts – physiological symptoms of stress (14 questions), emotional symptoms of stress (8 questions) and behavioural symptoms of stress (10 questions). The proband fills in his/her current feelings in a questionnaire by encircling the value that he/she experienced in the last three months. The obtained results determined the

stress level, which was divided into four groups: normal stress levels (less than 12 points), increased stress (13–16 points), high stress (17–23 points) and pathological stress (more than 24 points). If a participant responds positively to questions 1–5 and 12 regarding his/her physiological symptoms, it is a symptom of a severe disease. Within an extensive stress evaluation in the Czech Republic, we also addressed students of U3A who attended the Motion studio at CESA VUT and exercised regularly under the guidance of experienced instructors. Diagnostics was accepted by a total of N = 102 seniors exercising regularly; 82 women (aged 57–83, the average age of 67.5, SD = 5.04) and 20 men (aged 60–80, the average age of 70.5, SD = 3.9). On average, these seniors were 8.25 years in retirement, i.e. they did not do any paid work. To compare and evaluate the obtained results, we also addressed 100 seniors who did not engage in sports and exercise activities regularly. This group covered 80 women (aged 61–75, the average age 67, SD = 4.52) and 20 men (aged 64–82, the average age 70, SD = 3.85). On average, these seniors were 6.02 years in retirement, i.e. they did not do any paid work. Some seniors only attended theoretical courses at U3A at Brno University of Technology, without participating in a regular sports and exercise activity, while the remaining elders did not join any courses. The obtained results were compared with the data from the personal questionnaire for seniors, and the normality of the data was evaluated statistically using the Pearson correlation coefficient. For statistical comparison of the two groups, we used a two-sided t-test for independent files, standard deviation and median. The resultant value of p = 0.08 indicates a considerable homogeneity of the groups.

Results

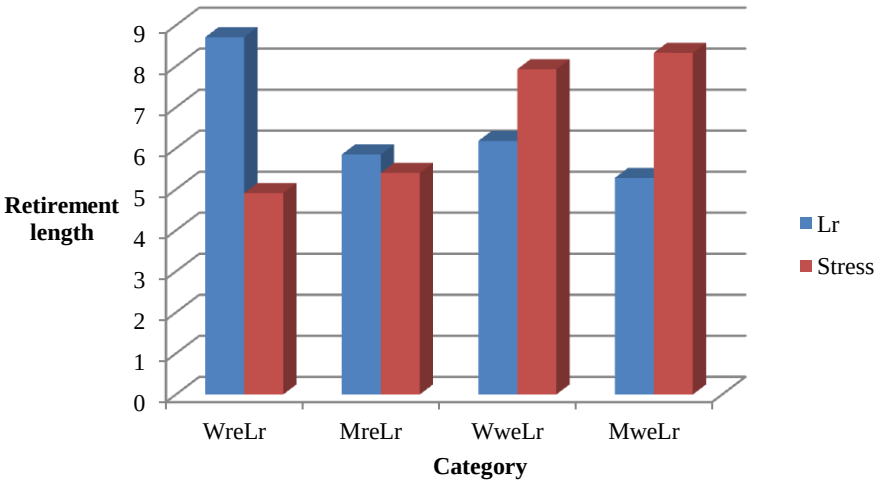
None of the tested seniors who regularly attended the Motion studio at CESA VUT belonged to the group with increased or high stress. On the contrary, the level of stress varied among exercising seniors in the region of very low stress (4.41 points). Therefore, it is obvious that they had a very good quality of life, which may be also related to the regular participation in exercise. A more detailed analysis revealed that the exercising women showed lower levels of stress than the exercising men (Fig. 1, Table 1). The time spent in retirement did not significantly influence the stress level of exercising men or women (the Pearson correlation coefficient of males was 0.28, females 0.10). Non-exercising seniors had higher levels of stress compared to those who exercised (8.01 points), though the second group also reached normal levels of stress but men were more stressed than women (Fig. 2, Tab. 1). Even in this case, the time spent in retirement did not affect the stress level (the Pearson correlation coefficient of men was 0.02, women 0.10. The results show that the addressed seniors have a relatively low stress level; therefore, we have also used the factual assessment for further processing.



Legend: Mre – men who exercise regularly , Mws – men who do not exercise on regular basis, Wre – women who exercise regularly, Wws – women without sports and regular exercising

Fig. 1. Comparison of age and stress in reference groups of seniors

Source: own research.



Legend: WreLr – women who exercise regularly, length of retirement, MreLr – men who exercise regularly, length of retirement, WweLr - women without sports and regular exercising, length of retirement, MweLr – men without sports and regular exercising, length of retirement

Fig. 2. Time spent in retirement and stress level for reference groups of seniors

Source: own research.

Table 1. Pearson correlation of dependence between the stress level and age and the time spent in retirement for seniors

Category	Age – Stress	Length of retirement – Stress
Seniors (men) exercising	– 0.28	0.08
Seniors (men) non-exercising	– 0.29	0.03
Seniors (women) exercising	– 0.14	– 0.11
Seniors (women) non-exercising	– 0.36	– 0.37

When analysing the answers to the questions that indicate a pathological stress, exercising seniors most often answered negatively – for all the answers, the median was 0 points, while non-exercising seniors answered positively in physiological disorders (question: 1. Frequent palpitations, rapid heartbeat, accelerated, intensive and irregular; 2. Pain and contractions on the chest bone). Therefore, it can be concluded that the addressed seniors do not show high levels of stress; however, the exercising ones are less stressed than non-exercising cohorts. Questions on physiological disorders are focused on experiencing difficulties associated with increased levels of stress and are more pronounced particularly among elderly people in connection with fatigue and exhaustion of their organism. Nevertheless, we can state that the majority of exercising seniors do not think about these problems and feel healthier than non-exercising seniors.

The analysis of the personality questionnaire showed that the exercising seniors indicate a higher quality of life in their answers:

> It's as good as it can be.
>
> With exercise, I can handle everything, I look forward to every day and I have something to live for.
>
> When I exercise, I look forward to familiar colleagues, I have already had a few friends there and we also gather outside the gym premises.
>
> I understand that exercising is the most important for life, only then I was well tuned and looked forward to other activities.

Within these responses, we focused some exercises therapeutically so that seniors could use the opportunity to acquire, through specific approaches, also the sufficient information about their bodies, about their experiences and their feelings. At the same time, they learned how to relax and use the exercises for their need to better manage stressful situations.

Discussion

The obtained results are mainly related to the characteristics of the functional state of the organism in old age, which is conditional on health. An elderly per-

son considers himself/herself healthy when he/she lacks an obvious disease and disturbing syndromes, when he/she is independent and pleased with his/her quality of life, undertakes adequate physical and mental activities and maintains social contacts [30].

> A functional state of organism and level of its performance in old age is determined by the level of fitness, balance and walking levels, nutrition, and performance in daily life activities, the level of cognitive abilities, mood and satisfaction. It is necessary to accept the rule that the function forms the organ. In old age, the functional fitness is understood as a key element of health. It is affected multi-factorially. Its level is affected by genetic predisposition, disease manifestations and their consequences, the way of present life, environmental factors and psychological state [29].

Our findings show that seniors, who exercise regularly, feel healthier. In two cases, the tests did not reveal any positive answer (1 male and 1 female); two seniors had no trouble at all. Researches that deal with the influence of regular exercise on the quality of life of seniors are always based on exogenous factors that affect aging, in particular the environmental and socio-economic factors that, related to a medical condition, limit the ability of seniors to perform physical activities [13]. According to Bumbálek [3], a major cause of stress among seniors is a change of their way of life, loss of social contacts (social status) and social roles that were very important part of their lives. This state is referred to as the social age. However, even these manifestations are individual; from time to time, they affect each individual. Simultaneously with this phenomenon, physical activities of seniors are gradually reduced and a sedentary lifestyle prevails. It leads to a loss of muscle mass and deterioration of mobility of seniors. Therefore, exercising and regular physical activities of seniors are of great importance in terms of social aging (meeting people in exercising programs or in other activities) and in terms of quality of life (ability of self-care and self-sufficiency). Exercising helps to improve the quality of life of seniors and at the same time it also improves complex cognitive functions [2], [28].The issues of research on the influence of physical activity on health and quality of life of seniors were dealt with in a number of foreign and domestic research studies.

The experts consider physical experience and subjective feeling of health to be relevant indicators to life quality evaluation, which also currently appears among elderly people [17], [20], [30]. In this context, family plays an important role therefore, the permanent objective for family and society is encouraging the positive status of seniors, intergeneration solidarity, supporting self-realization of seniors and, thus, their independence [30].

The effect of regular physical activity leads not only to health but also to the reduction of body weight and the good function of the muscle system. If more fat-free mass can be found in the elderly, it leads to a change in the ability to perform a muscle activity more effectively, which is a prerequisite for professional and leisure-time activities. When, however, a targeted intervention does

not take place, these abilities decrease with the increasing age [4], [19]. For the aging organism, these changes are essential because they do not only limit the behaviour of individuals, but also his/her behaviour both in everyday situations and in limit situations [11], [21]. A regularly exercising senior is then able to better master the necessary life functions, but he/she is also more independent and self-serviceable. Regular exercising also affects the good health of seniors allowing them not only quality physical work, but it also improves their condition [27]. As early as in 2001–2002, the project was implemented by FTK UP Olomouc with a group of seniors of an average age of 86.3. A positive effect of exercise program on physical and mental functions (mnestic and cognitive) was proved as well as on the social life of seniors [6]. An active lifestyle of seniors was assessed according to the expectations of active lifestyle, i.e. the current level of development of biological age (according to selected parameters of body composition – coefficient of ECM/BCM – molecular model) and according to the prerequisites for physical work. These requirements are best satisfied by cyclical motion, especially walking, running, swimming and cycling. For the purposes of research, walking was selected. We were detecting the volume and intensity of physical activity within a daily and weekly regime and the accelerometer was used for counting the average number of steps. An important element of physical activity of seniors appears to be the environment in terms of the degree of numbers of performed steps [24]. In the study by Pelcová and Blaha [24], it was found that there is a correlation between the intense and moderately intense physical activity and health perception for subjectively perceived health and physical activity among seniors. However, participation of elderly people in physical activities of moderate intensity does not indicate any dependency on subjectively perceived health. The intensity of physical activity was measured according to WHO recommendations. Mostly, the seniors report common daily tasks among the intense physical activities, e.g. walking or shopping; however, these activities are evaluated as a low intensity physical activity. In recent years, we can also see recommendations for seniors to exercise in gyms or fitness centres, but these must always be under professional supervision and control.

Summary

Physical activity as a part of a life style enhances life quality and expresses culture of a human and the society [30]. The obtained results show that the physical activity of an elderly individual can have a positive influence on stress level that he/she experiences. In old age, physical activity is very important for the maintenance of life quality, especially in medical and psychological terms. If a senior is competent in executing activities of daily living independently, his/her quality of life improves significantly. Thanks to regular exercise, the sen-

ior may be not only in better fitness shape, but he/she may also be able to handle everyday activities and work load better, therefore, creating functional reserve which is of crucial importance. Exercising is becoming a suitable supplement of daily regime, where the senior can meet his/her friends and fulfil the sense of life. Exercising women and men in senior age have lower levels of stress than non-exercising seniors. The time spent in retirement does not statistically significantly affect the level of stress in the elderly. Regularly exercising seniors have a better opportunity to meet with their peers and spend time enjoying leisure activities that ensure their better subjective well-being and also a better quality of life. On the basis of research investigations, it can be concluded that a regularly exercising senior belongs to the category of active and independent in execution of activities of daily living. Therefore, the institutions that create opportunities for seniors to meet and exercise regularly, such as the Motion studio at the Brno University of Technology, contribute not only to the health in medical terms but also have a considerable social and psychological impact on the lives of the involved seniors.

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Wpływ aktywności ruchowej na obniżanie stresu u studentów Uniwersytetu Trzeciego Wieku

Streszczenie

Celem pracy było zbadanie wpływu aktywności fizycznej na zmniejszenie stresu wśród osób starszych, które regularnie uczestniczą w zajęciach ćwiczeń ruchowych, oraz wykazanie pozytywnych efektów tych ćwiczeń. Grupa badawcza składała się z 202 osób starszych w przedziale wiekowym od 64 do 78 lat. W grupie tej 102 osoby starsze regularnie ćwiczyły w ramach programu Studiów Ruchu organizowanych przez Uniwersytet Trzeciego Wieku VUT w Brnie. Pozostała grupa 100 osób nie uczestniczyła w programie i nie ćwiczyła regularnie. Poziom stresu był mierzony za pomocą Testu Stresu (Selye, 1993 Křivohlavý, 2001); szukaliśmy różnic w poziomie stresu między osobami starszymi regularnie ćwiczącymi i osobami starszymi niećwiczącymi. Zróżnicowania te były porównywane z wiekiem, z czasem spędzonym na emeryturze oraz z poszczególnymi problemami fizjologicznymi, które są związane ze stresem. Do oceny statystycznej wyników używaliśmy współczynnika korelacji Pearsona oraz rzeczowej oceny. Wyniki wskazują, że osoby starsze, które regularnie uczestniczą w studiach ruchu, są mniej zestresowane niż seniorzy niećwiczący. Wykazują one niższy współczynnik w strefie umiarkowanej stresu, średnio 4,5 punktu. Mężczyźni mają nieco wyższy poziom stresu (5 punktów) niż kobiety (4 punkty). Wyniki niećwiczących seniorów mieszczą się w strefie środkowej stresu, średnio 8,1 punktu. Mężczyźni ponownie wykazują wyższy poziom stresu (8,3 punktu) niż kobiety (7,9 punktu). Stwierdziliśmy, że czas spędzony na emeryturze nie wpływa znacząco na poziom stresu u osób starszych (poziom istotności 0,05). Wyniki wykazały, że głównym czynnikiem stresogennym u osób w wieku starszym były przede wszystkim problemy fizjologiczne. To one określają poziom jakości życia, często powodując przewlekłą chorobę, zwłaszcza zaburzenia w aparacie ruchowym. Czas statycznie spędzony na emeryturze nie wpływa istotnie na poziom stresu u osób starszych. Nieaktywne ruchowo osoby w starszym wieku, które zgłaszały wyższy poziom stresu, w większości skarżyły się na problemy z układem krążenia, problemy z apetytem czy na problemy urologiczne. Badania wykazały, że osoby w starszym wieku, które regularnie biorą udział w aktywności ruchowej, są mniej zestresowane niż osoby starsze nieaktywne ruchowo.

Słowa kluczowe: osoby starsze, zdrowie, jakość życia, stres, aktywność ruchowa.