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AEROBIC PHYSICAL ACTIVITY IN NATURE AS COMPENSATION FOR TYPE A BEHAVIOR

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Abstracts

The aim of this theoretical article is to point out on the bases of scientific findings the relationship between aerobic physical activity in nature as compensation for the type A behavior. Type A behavior as a risk factor for coronary heart disease (CHD) continues to be an important subject of study in today´s society. Physical activities in the nature, also called green exercise, are of significant relevance in the context of human health research, given our present lifestyle. They address mainly the aerobic regime of physical activities as a prevention of many diseases through improvements in cardiovascular system and skeletal muscles. The authors focused on the issues related to the types A and B of personality behavior developed by Mayer Friedman and Ray H. Rosenman. Aerobic exercise activities, as significant prevention of heart diseases, deal with the compensation of precisely the A type risk behavior. The authors clarify this premise on practical examples. Even with the passage of several decades this issue has not been sufficiently researched. Its application in real life is quite justifiable due to increasing environmental changes and sedentary lifestyle. This article points out how different findings need to be linked in practice as a part of the necessary interdisciplinary collaboration of experts in the areas of medicine, psychology and sports.

Key words: types A and B behavior, prevention, aerobic exercise, coronary heart disease, lifestyle, interdisciplinary approach

Клавдія Зускова, Мирослав Павел Гурни. Аеробна фізична активність у природі як компенсація типу поведінки. ***Мета цієї теоретичної статті*** полягає в тому, щоб на основі наукових висновків вказати на зв'язок між аеробними фізичними навантаженнями в природі як компенсацію поведінки типу А. Поведінка типу як фактор ризику ішемічної хвороби серця (ІХС) продовжує залишатися важливим предметом дослідження в сучасному суспільстві. Фізичні заняття на природі, які також називаються зеленими вправами, мають важливе значення в контексті досліджень здоров'я людини, ураховуючи наш сучасний спосіб життя. Вони стосуються переважно аеробного режиму фізичних занять як профілактики багатьох захворювань через покращення роботи серцево-судинної системи та скелетних м'язів. Автори акцентували увагу на питаннях, пов'язаних із типами А та В поведінки особистості, розробленими Майєром Фрідменом та Реєм Х. Розенманом. Заняття аеробними вправами як важлива профілактика захворювань серця стосуються компенсації саме поведінки типу А. Автори пояснюють цю передумову на практичних прикладах. Навіть із плином кількох десятиліть це питання недостатньо досліджене. Застосування його в реальному житті цілком виправдано через посилення змін навколишнього середовища та малорухливого способу життя. Ця стаття вказує на те, як різні результати повинні бути пов'язані на практиці як частина необхідної міждисциплінарної співпраці експертів у галузі медицини, психології та спорту.

Ключові слова: поведінка типів А та В, профілактика, аеробні вправи, ішемічна хвороба серця, спосіб життя, міждисциплінарний підхід.

Клавдия Зускова, Мирослав Павел Гурны. Аеробная физическая активность в природе как компенсация типа поведения. Цель этой теоретической статьи заключается в том, чтобы на основе научных

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выводов указать на связь между аэробными физическими нагрузками в природе в качестве компенсации поведения типа А. Поведение типа как фактор риска ишемической болезни сердца (ИБС) продолжает оставаться важным предметом исследования в современном обществе. Физические занятия на природе, которые также называются зелеными упражнениями, имеют важное значение в контексте исследований здоровья человека, учитывая наш современный образ жизни. Они касаются в основном аэробного режима физических занятий как профилактики многих заболеваний через улучшение работы сердечно-сосудистой системы и скелетных мышц. Авторы акцентировали внимание на вопросах, связанных с типами А и В поведения личности, разработанными Майером Фридменом и Рэем Х. Розенман. Занятия аэробными упражнениями, как важная профилактика заболеваний сердца, касаются компенсации именно поведения типа А. Авторы объясняют эту предпосылку на практических примерах. Даже с течением нескольких десятилетий этот вопрос недостаточно исследован. Применение его в реальной жизни вполне оправдано усиления изменений окружающей среды и малоподвижного образа жизни. Эта статья указывает на то, как различные результаты должны быть связаны на практике как часть необходимого междисциплинарного сотрудничества экспертов в области медицины, психологии и спорта.

Ключевые слова: поведение типа А и В, профилактика, аэробные упражнения, ишемическая болезнь сердца, образ жизни, междисциплинарный подход.

Introduction. After the second world war we can increasingly observe the declining levels of physical activity (PA), especially in the Western world. The green environment may help to reduce the perception of effort and increase motivation to achieve higher levels of PA [1]. Green exercise is activity undertaken in the nature. It leads to positive short and long-term health outcomes. One multi-study analysis focused on ten UK studies, which involved 1252 participants. Each green environment improved both self-esteem and mood of the participants. The presence of water generated an even more positive effect [2]. The interaction with nature brings benefits in many interdisciplinary areas. On the basis of a meta-analytical study, we can categorize them as follows: The psychological benefit affects psychological well-being and has positive effect on cognitive ability or function. The physiological benefit is positive effect on physical function or physical health. The social benefit is positive effect on individual religious pursuits or spiritual well-being. Finally, the tangible benefits are material goods that an individual can accumulate in terms of wealth or possessions [3]. It was clear from the study of Keniger et al. [3] that some types of benefits were much more studied than others; those less studied benefits are social, spiritual and tangible. The restorative benefits of nature have been confirmed by Hartig et al. [4]. The impact of green exercise on physiological and psychological markers of health were confirmed by multiple studies [3; 5–7].

Green exercises include also hiking and outdoor sports. According to the American Hiking Society [8], hiking can reduce the risk of various health conditions, such as heart disease, hypertension, diabetes, obesity, anxiety, osteoporosis and arthritis. The interdisciplinary pilot study by Sturm et al. [9] showed the effects of endurance training through mountain hiking in high-risk suicide patients. In a group of patients suffering from high-level suicide risk, those who were experienced hikers and regularly undertook monitored hikes that were organized as an add-on therapy to the usual care showed improvement in hopelessness, depression, and inclination to commit suicide. Randomized crossover design research by Niedermeier et al [10] of healthy participants who were mountain hikers exposed them to three different conditions: outdoor mountain hiking, indoor treadmill walking, and sedentary control situation. Three-hour of mountain hiking brings numerous positive effects, including valence, activation, elation, and calmness. Furthermore, compared to a sedentary control situation and an indoor PA condition, it lowers negative responses, such as fatigue and anxiety. Based on cross-sectional design study of 1,536 Austrian mountain exercisers, PA has the potential to reduce psychological distress [11]. Being in the woods or mountains is relaxing and reduces stress also as measured by physiological factors, such as lower blood pressure, heart rate (at the same time increasing HRV) and endocrine markers [12].

The aim of this article is to point out on the bases of scientific findings the relationship between aerobic physical activity in the nature and compensation for A type behavior as a risk factor for coronary heart diseases.

Results. Most of the outdoor PA, which includes exercise, predominantly belong to the aerobic PA. Howley claims, that *«Aerobic exercise (training) involves large muscle groups in dynamic activities that result in substantial increases in heart rate and energy expenditure. Regular participation results in improvements in cardiovascular system and skeletal muscles, leading to an increase in endurance performance»* [6, p. 364]. The National High Blood Pressure Education Program noted similarly that insufficiency of PA is one of the 10 cardiovascular risk factors [13]. The gravity of this issue is described in detail in «Update: A Report from The American Heart Association», which introduces a new concept of cardiovascular health [14]. It features 7 metrics («Life's Simple 7»), comprised of health behaviors – quality of diet, PA, smoking, BMI; and health

factors – blood cholesterol, BP and blood glucose. The report states that PA improves health while the lack of it is unhealthy. Moreover, PA reduces premature mortality. In addition, PA prevents the development of risk factors for cardiovascular diseases (such as high blood pressure and high cholesterol) and other related diseases, including coronary heart disease, stroke, type 2 diabetes mellitus, and sudden heart attacks [15]. PA, including aerobic activity, is tied to mental health, too [16; 17].

Walking, when undertaken at a sufficient pace, is an aerobic activity. It is one of the most widely spread aerobic activities in the nature. Engaging in regular aerobic physical activity, such as brisk walking at least 30 min per day most days of the week, is one of the preventive treatments [18; 19]. Walking at a pace of 5–8 km/h is an easy and accessible way of meeting physical activity recommendations [20]. In the meta-analysis study of health benefits of outdoor walking groups forty-two studies were identified, involving 1843 participants. Evidence has shown that walking groups achieved wide-ranging health benefits [21]. Meta-analyses have shown that walking is tied to various health benefits, including positive effects on depression treatment [22]. The study by Gusi et al. [23] has identified group walking as a potentially attractive PA intervention. It has a special appeal to those who like to be in the outdoors for both fun, as well as a health benefit. It has been also found cost-effective in motivating increased PA. Identifying subjects with risk factors, combining PA with proven therapy and advice on behavior in higher altitudes, prevents instant cardiac death and increases the benefits generated by mountaineering activities [24].

During the three decades between 1960s and 1980s the type A behavior pattern seemed to be by itself a clear indicator of future coronary heart disease (CHD). However, from the 1980s more studies have disputed than confirmed the clear correlation between the type A behavior and CHD. This has led the scientific community to become more cautious about the conclusion that the type A behavior pattern is a clear indicator of future onset of CHD [25]. The epidemiological study of the relationship between the type A behavior and CHD was first undertaken on 3500 males in an 8.5-year investigation, known as the Western Collaborative Group Study [26; 27]. The results of this longitudinal study confirmed behavior pattern as a precursor of CHD. It is independent of the standard risk factors [28].

The type A behavior personality is characterized by competitiveness, ambitiousness, assertiveness, tendency to perform several activities at the same time, sense of shortage of time, time pressure, more likely demonstration of hostility and overall hyperactivity. With Eysenck's typology, the type A corresponds to increased extraversion and neuro instability. The types A and B of behavior represent certain personality dispositions. By summarizing the behavioral manifestations of the type A behavior of persons, we compose a picture of a person with the following characteristics [Rosenman, 1978 in 29]:

- general expression of strength and energy, agility and confidence;
- firm handshake and live pace;
- strong or energetic voice;
- austere expression, cursory answers;
- chopped speech (inadequate pronouns in words);
- quick speech and speech acceleration at the end of a longer sentence;
- conversation interruptions with frequent and quick answers, rather than allowing the questioner to complete his question;
- speeding up speech by confirming «yes, yes,» or «right, right,» or by nodding a sign of consent when another person speaks;
- vigorous response in the event of a time delay (slow car or bus driving, waiting in line ...);
- hostility targeting another person or topic of conversation;
- frequent immediate and strong one-word answers to questions (e. g. yes!, never!, certainly!, sure!).

The type B behavior is characteristic of persons forming the type A counterpart. The behavior of these individuals is much more relaxed, contented, unassuming, rarely desiring a large number of things in ever-shorter time. These people are more focused on the environment than on themselves. Their movements are smoother, the voice calm, balanced and not rushing. They do not worry about small things, have a more balanced mood and spend more time out of work [30]. Their ambitions can be as great as those of the type A, but their efforts and work results rather satisfy them, add confidence and a sense of security. The type B behavior is balanced, more content, «healthier».

It has been found that patients with ischemic heart disease (e.g., heart attack or myocardial infarction, angina pectoris) have a significantly higher incidence of persons with the type A behavior [29]. *«Ischemia is defined as inadequate blood supply (circulation) to a local area due to blockage of blood vessels supplying the*

area. Ischemic means that an organ is not getting enough blood and oxygen. Ischemic heart disease, also called coronary heart disease or coronary artery disease, is a term given to heart problems caused by narrowed heart (coronary) arteries that supply blood to the heart muscle» [31].

Research has revealed a link between burn-out syndrome and neuroticism, as well as that the exhaustion dimension is related to the type A behavior, its accompanying features, such as competition, hectic lifestyle, hostility, and exaggerated control needs [32]. Both A and B personality types are associated with work-related stress, but factors for stress response vary. While in the A type it is a question of performance, in the B type it is interpersonal relationships [33].

Ongoing PA, with focus on aerobic physical activity, also prevents the development of coronary artery disease and reduces symptoms in patients with established cardiovascular disease [34]. Frequent exercise is also strongly associated with the decrease in cardiovascular mortality, as well as with the risk of developing cardiovascular disease [35]. Mortality risk reduction appears with even small bouts of daily exercise and peak at 50–60 minutes of vigorous exercise each day [36]. A possible way to modify the type A behavior is to undertake aerobic physical activities. A positive effect of a 12-week aerobic program was found not only in relation to the modification of personality in the type A behavior, but also in the reduction of cardiovascular reactivity to mental stress [37]. On the other hand, psychophysiological reactivity failed to alter after 10-week intervention program, including exercise and cognitive-behavioral stress management, in the research of Seraganian [38]. It should be noted that in terms of unselected population of patients after acute myocardial infarction referred to cardiac rehabilitation, low- and high-intensity exercise training produces relatively similar changes in cardiorespiratory variables during the initial 3 months of exercise training [37]. The impact of exercise, particularly in nature, as mediating factor on cardio-respiratory condition in the type A behavior can lead to positive effects in CHD. In view of its continuing relevance this problem should be addressed in an interdisciplinary approach in the areas of medicine, psychology, exercise physiology and sport psychology.

Discussion. One of the determinants of the type A behavior can be parents who place high demands on their children and expect a high standard of performance. Stejskal [39] points to an interesting but serious problem related to this issue in sport. He provides the following example. Physical activities (e.g. aerobic exercises, yoga, hiking, etc.), which to a great extent reduce the risk of cardiovascular disease in the type A personality, can be utilized by educators as a prevention mechanism in the interest of a student. However, according to Stejskal [39], a dilemma will occur when a student with the type A behavioral tendency has extraordinary physical aptitude to become a top athlete, for example, in handball. Talented students for this sport are selected for systematic training already as children. In addition to somatic, physiological and motor conditions, psychological preconditions are here an important factor. The types A described by Rosenman and Friedman, with their parameters of hyperactivity and increased aggressiveness – for example in contact team sports – are for each coach a required psychological parameter of young talents. The question is to what extent such behavior and orientation should be supported in a young athlete. This topic has not yet been sufficiently addressed in relation to sport.

The next area is the relationship between work related stress and the type A personality [33]. In the working age group, stress is a significant indicator for CHD. It affects indirectly health behavior and directly neuroendocrine stress pathways [40]. We will present a model example that can clarify the necessity for interdisciplinary collaboration of experts to address the issue of CHD and risk prevention behavior associated with it.

A top manager suffers health problems related to high levels of stress in the work environment. He or she visits a doctor, who recommends recreational sport activities to compensate for the workload. The doctor does not specify these activities. The person is either starting to play tennis or is already a tennis player. «Well, I'm doing sports twice a week,» she says. Now comes the cardinal question. What type of sport activity is appropriate? Tennis is intense enough and the duration of one training session is long enough. Why in this case tennis is not a suitable sport activity? It is precisely this kind of sport that may pose yet another behavioral risk factor in specific cases in which the person´s behavior is type A. We are dealing with a performance-oriented person, still under the pressure of many tasks, competitive due to lack of time (very simply described). This type of behavior is more likely to occur in cholerically tuned individuals and can be found to a greater extent among professions, such as managers [29; 41].

What happens during a tennis practice? Once a person has mastered the basics of a tennis game, he or she starts playing matches. Here, the question of who will win will be addressed. And thus the mentioned manager is again in a competitive environment and in stress. How do we then compensate for the workload? There is an importance of aerobic sports activities such as swimming, cross-country skiing, running and cycling in nature

as a prevention for risks related the type A behavior and CHD having a good cardiorespiratory system condition. Thus, certainly tennis will not be a good choice for a stress prone (inclined to choleric) manager with the type A behavior due to its competitive character. This competitiveness to achieve points leads to increased mental stress while we can predict, that aerobic activity in nature will decrease it.

Conclusion. In our examples we pointed out the type A behavior and the choice of a certain type of suitable sport activity for this type of personality, particularly in nature. We tried to point out how different findings need to be linked in practice as part of the necessary collaboration among experts in the areas of medicine, psychology and sports. Given the ambiguity of the results, research should continue into type A behavior as the precursor of CHD, although research in this area has declined over the past decades [25]. Further interdisciplinary studies are needed to identify the mechanisms that impart cardiovascular benefits in order to develop more effective exercise regimens [35] leading to behavioral changes. Disseminating this knowledge and information is vital to achieve practical impact.

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References

1. Gladwell, V. F., Brown, D. K., Wood, C., Sandercock, G. R., Barton J. L. (2013). The great outdoors: how a green exercise environment can benefi. all. *Extrem Physiol Med*, 2(3). 1–7. doi.org/10.1186/2046-7648-2-3.
2. Barton, Jo., Prett,y J. N. (2010). What is the Best Dose of Nature and Green Exercise for Improving Mental Health? *A Multi-Study Analysis. Environ Sci Technol*, 44(10). 3947–3955. doi.org/10.1021/es903183r.
3. Keniger, L. E., Kevin, J., Gaston, K. J., Irvine, K. N., Fuller, R. A. (2013). What are the Benefits of Interacting with Nature? *IJERPH*, 10(3). 9132010, 935. doi.org/10.3390/ijerph10030913.
4. Hartig, T., Kaiser, F. G., Strumse, E. (2007). Psychological restoration in nature as a source of motivation for ecological behaviour. *Environ Conserv*, 34(4), 291–299.
5. Pretty, J., Peacock, J., Sellens, M., Griffin, M. (2005). The mental and physical health outcomes of green exercise. *Int J Environ Heal R.*, 15(5), 319–337. doi.org/10.1080/09603120500155963.
6. Howley, E.T. (2001). Type of activity: resistance, aerobic and leisure versus occupational physical activity. *Med Sci Sports Exerc, Jun*, 33(6), 364–369.
7. Burton, Jo., Bragg, R., Wood, C., Pretty, J. (2016). *Green Exercise: Linking Nature, Health and Well-being.* New York: Routledge.
8. Miller, G.A., Chambers, J. (2013). *Annual Report. Relevance. Reach. Impact.* American Hiking Society.
9. Sturm, J., Plöderl, M., Fartacek, C., Kralovec, K., Neunhäuserer, D., Niederseer, D., Hitzl, W., Niebauer, J., Schiepek, G., Fartacek, R. (2012). Physical exercise through mountain hiking in high-risk suicide patients. *A randomized crossover trial. Acta Psychiatr. Scand*, 126(6), 467–475. doi.org/10.1111/j.1600-0447.2012. 01860.x.
10. Niedermeier, M., Einwanger, J., Hartl, A., Kopp, M. (2017). Affective responses in mountain hiking – A randomized crossover trial focusing on differences between indoor and outdoor activity. *Plos One*, 12(5), e0177719. doi.org/10.1371/journal.pone.0177719.
11. Niedermeier, M., Hartl, A., Kopp, M. (2017). Prevalence of Mental Health Problems and Factors Associated with Psychological Distress in Mountain Exercisers: A Cross-Sectional Study in Austria. *Front Psychologia*, 8(1237), 1–8.
12. Q Li. (2010). Effect of forest bathing trips on human immune function. *Environ Health Prev Med*, 15(1), 9–17. doi.org/10.1007/s12199-008-0068-3.
13. National Institute of Health, National Heart, Lung, and Blood Institute. The Seventh Report on the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. National High Blood Pressure Education Program. U. *S. Department of Health and Human Service. NIH Publication.* 2003, 03–я5233: 53.
14. Benjamin, E. J. et al. (2017). Heart Disease and Stroke Statistics – 2017 Update: A Report from the American Heart Association. *Circulation*, 7, 135(10), e146-e603. doi.org/10.1161/CIR.0000000000000485.
15. U.S. Department of Health and Human Services. Physical Activity Guidelines for Americans. Be Active, Healthy, and Happy!, *ODPHP Publication*, 2008, 2c, 61. No U0036.
16. Paluska, S. A., Schwenk, T. L. (2000). Physical activity and mental health: current concepts. *Sports Med*, 29(3), 167–180.
17. Biddle, S. (2016). Physical activity and mental health: evidence is growing. *World Psychiatry*, 15(2), 176–177. doi.org/10.1002 / wps.20331911759.
18. Kelley, G. A., Kelley, K. S. (2000). Progressive resistance exercise and resting blood pressure: A meta-analysis of randomized controlled trials. *Hypertension*, 35, 838–843.

19. Whelton, S. P., Chin, A., Xin, X., He, J. (2002). Effect of aerobic exercise on blood pressure: A meta-analysis of randomized, controlled trials. *Ann Intern Med*, 136, 493–503.
20. Morris, J. N., Hardman, A. E. (1997). Walking to health. *Sports Med.*, 23, 306–332. doi.org/10.2165/00007256-199723050-00004.
21. Hanson, S., Jone,s A. (2015). Is there evidence that walking groups have health benefits? A systematic review and meta-analysis. *Br J Sports Med.*, 49(11), 710–715. doi.org/10.1136/bjsports-2014-094157.
22. Robertson, R., Robertson, A., Jepson, R., Maxwell, M. (2012). Walking for depression or depressive symptoms: a systematic review and meta-analysis. *Mental Health end Physical Activity*, 5(1), 66–75. doi.org/10.1016/j.mhpa.2012.03.002.
23. Gusi, N., Reyes, M., Gonzalez-Guerrero, J., Herrera, E., Garcia, J. (2008). Cost-utility of a walking programme for moderately depressed, obese, or overweight elderly women in primary care: a randomized controlled trial. *BMC Public Health*, 8, 231. doi.org/10.1186/1471-2458-8-23.
24. Burtscher, M., Ponchia, A. (2010). The Risk of Cardiovascular Events During Leisure Time Activities at Altitude. *Prog Cardiovasc Dis*, 52 (6), 507–511. doi.org/10.1016/j.pcad.2010.02.008.
25. Espnes, G. A., Byrne, D. (2016). Type A Behavior and Cardiovascular Disease. In: Alvarenga M, Byrne D. (Eds.). *Handbook of psychocardiology. Springer Singapore*, 1–20.
26. Rosenman, R. H., Friedman, M., Straus, R., Wurm, M., Kositchek, R., Hahn, W., Werthessen, N. T. (1964). A Predictive Study of Coronary Heart Disease The Western Collaborative Group Study. *JAMA*, 189(1), 15–22. doi.org/10.1001/jama.1964.03070010021004.
27. Rosenman, R. H., Brand, R. J., Jenkins, D., Friedman, M., Straus, R., Wurm, M. (1975). Coronary heart disease in Western Collaborative Group Study. Final follow-up experience of 8 1/2 years. *JAMA*, 233(8), 872–877. DOI:10.1001/jama.1975.03260080034016.
28. Brand, R. J., Rosenman, R. H., Sholtz, R. I., Friedman, M. (1976). Multivariate prediction of coronary heart disease in Western Collaborative Group Study compared to findings of the Framingham study. *Circulation*, 53(2), 348–355.
29. Skorodenský, M. (1991). *Psychologické a rizikové faktory ischemickej choroby srdca* [Psychological and risk factors in ischemic heart disease.] Bratislava: Veda, 193 p. (Slovak).
30. Jenkins, C. B., Rosenman, R. H., Friedman, M. (1967). Development of an objective psychological test for determination of the coronary – prone behavior pattern in employed men. J Chron Dis, 20(6), 371–379. doi.org/10.1016/0021-9681(67)90010-0.
31. Institute of Medicine (US). Cardiovascular Disability. Updating the Social Security Listings. Committee on Social Security Cardiovascular Disability Criteria. Washington (DC). *The National Academies Press (US)*, 2010. doi.org/10.17226/12940.
32. Maslach, C., Schaufeli, W. B., Leiter, M. P. Job burnout. In: Fiske ST, Schacter DL, Zahn-Waxler C. (Eds.). (2001). *Annu Rev Psychol*, 52, 397–422. doi.org/10.1146/annurev.psych.52.1.397.
33. James, K. E., Sidin, J. P. (2017). Revisit the effect of type a and b personality, and its effect on job-related stress in the organization. *Proceedings of International Conference on Economics*, 334–344.
34. Thompson, P. D., Buchner, D., Piña, I. L., Balady, G. J., Williams, M. A. et el. (2003). Exercise and Physical Activity in the Prevention and Treatment of Atherosclerotic Cardiovascular Disease. A Statement From the Council on Clinical Cardiology (Subcommittee on Exercise, Rehabilitation, and Prevention) and the Council on Nutrition, Physical Activity, and Metabolism (Subcommittee on Physical Activity). *Circulation*, 107(24), 3109–3116.
35. Nystoriak, M. A., Bhatnagar, A. (2018). Cardiovascular Effects and Benefits of Exercise. *Front. Cardiovasc. Med*, 5, 135. doi.org/10.3389/fcvm.2018.00135.
36. Wen, C. P., Wai, J. P., Tsai, M. K., Yang, Y. C., Cheng, T. Y., Lee, M. C., et al. (2011). Minimum amount of physical activity for reduced mortality and extended life expectancy: a prospective cohort study. *Lancet*, 378, 1244–1253. doi.org/10.1016/S0140-6736(11)60749-6.
37. Blumenthal, J. A., Rejeski, W. J., Walsh-Riddle, M., Emery, C. F., Miller H. et.el. (1988). Comparison of high- and low-intensity exercise training early after acute myocardial infarction. *Am J Cardiol*, 1(61), 26–30.
38. Seraganian, P., Roskies, E., Hanley, J. A., Oseasohn, R., Collu, R. (1987). Failure to alter psychophysiological reactivity in type and men with physical exercise or stress management programs. *Psychol Health*, 1, 3, 195–213.
39. Stejskal, T. (1999). Telesná výchova prostriedkom alebo cieľom? [Is Physical Education the Means or the Goal?]. *Tělesná výchova a sport mládeže* [Physical Education and Sport of Youth], 65(2): 12–14. (Slovak).
40. Chandola, T., Britton, A., Brunner, E., Hemingway, H., Malik, M. et.el. (2008). Work stress and coronary heart disease: what are the mechanisms? *Eur Heart J*., 29(5), 640–648. doi.org/10.1093/eurheartj/ehm584.
41. Irvine, J., Lyle, R.C., Allon, R. (1982). A personality as psychopathology: Personality correlates and an abbreviated scoring system. *J Psychosom Res*, 26(2), 183–189. doi.org/10.1016/0022-3999(82)90035-6.

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