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Quality of Life and Physical Conditioning in Women

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Abstract: *The aim of this study was to determine the differences in the level of quality of life and physical conditioning between women who are engaged in some form of recreational exercise and women who do not have organized physical exercise. The study involved 60 women of 25 to 45 years old divided into a group engaged in recreational exercise at least a year (30) and a group of non-exercisers (30). A quality of life questionnaire was used to examine the attitudes about the level of quality of life, while a battery of diagnostic tests in the level of physical fitness was assessed. T-test for independent samples was used to compare the two groups. The results showed statistically significant differences in favor of exercisers when it comes to the expression of overall quality of life, as well as the dimensions of mental and physical health and environmental impact. Observing physical performance, women who actively exercise showed a higher degree of physical fitness compared to physically inactive respondents. Therefore, it can be concluded that physical activity has a positive effect on improving quality of life and physical conditioning in women who are engaged in some form of recreational activity.*

Keywords: *physical exercise, mental and physical health, exercisers, non-exercisers.*

INTRODUCTION

Changing the way in thinking about health and health care depends on recognizing the importance of social consequences that can cause diseases, as well as on one's own recognition that health care aims to increase both quantity and quality of survival, so health care is being increasingly focused on "quality of life" (Carr, Higginson & Robinson, 2002). According to the definition of the World Health Organization, quality of life refers to a person's perception of his/her own situation in life through the cultural context and value systems in which he/she lives in relation to life goals, expectations, modalities and interests (WHO).

In the 20th century, the task of health policy was to prolong life expectancy, while in the 21st century it was to improve the quality of life (Ač-Nikolić et al., 2010). In modern life, it is important how a person feels, not how experts (doctors, coaches, etc.) think he/she feels. In the professional literature, it is considered that the quality of life includes one's own assessment of psychological well-being, as well as a wide range of life domains such as physical health and functioning, independence, financial status, efficient use of community social capital (participation in various social activities, recreation, socializing with family and friends), safety of the external environment (Bowling, 2017, 13). Therefore, the quality of life is not only related to the medical aspect of life, but it is observed through social engagement, culture, education, financial status, but also the level of physical activity and mental state of the organism.

Physical activity in modern technologically advanced society has a tendency to decrease. Although there is more free time, due to the life that is facilitated by advanced technology, human movement and physical work are reduced, and sitting is increased. Such a sedentary life has a negative impact on the physical condition of the body because it causes a lower level of muscle strength and cardiovascular endurance (Kudriavtsev et al., 2018), as well as the occurrence of many diseases. Sedentary life negatively affects the occurrence of cardiovascular diseases (Booth et al., 2017) and it may be associated with an increased risk of cancer (Sanchis-Gomar et al., 2015). Physical inactivity primarily contributes to diseases such as obesity and diabetes type 2. Obesity is strongly associated with physical inactivity (Brownson, Boehmer & Luke, 2005; Ekkekakis et al., 2016), because in addition to the consequences, it can also be the cause of physical inactivity due to the influence on the occurrence of the syndrome of impaired dopamine regulation, which in turn contributes to a decrease in physical activity (Ruegsegger& Booth, 2017).The mortality rate from diabetes type 2 can be reduced if the percentage of physically active people increases (Silva et al., 2019), while the occurrence of osteoporosis is the result of bad life habits, including physical inactivity (Bartolozzi, 2015).

In addition to the negative impact on the physical condition of the organism, a sedentary lifestyle also affects mental health. Physical inactivity is significantly associated with a higher level of depression (Bishwajit et al., 2017; Jia et al., 2018). Both physical inactivity and sedentary activity are significantly correlated with symptoms of anxiety (Bélair et al., 2018; Alcántara et al., 2020). People who have elevated levels of tension, anger, rage or who are depressed and anxious use physical activity to solve these psychological problems by increasing muscle work (Schuch et al., 2017; Kandola et al., 2019; Rodriguez-Ayllon et al., 2019).

Physical activity is a key element of overall human health, as it has positive effects on physical health, psychological well-being and quality of life (Bai et al., 2022; Weinberg & Gould, 2019). Thus, the connection between physical activity and psychological well-being was confirmed in a sample of middle-aged people (Granero-Jiménez et al., 2022), as well as in young ones (Pascoe et al., 2020). Samples of older people (65 to 80 years old) also found that moderate physical exercise has positive effects on psychological well-being and quality of life (Shames et al., 2021), as well as on the quality of life and the subjective sense of vitality (Antunes et al., 2022) and on health segment of the quality of life (Chen, Malete & Ling, 2022).

The main intention in this research is to point out the need for regular physical exercise, which, in addition to progress in terms of physical fitness, also contributes to the improvement of mental and physical health. Therefore, the aim of the research is to determine the differences in the level of quality of life and physical conditioning between women who are engaged in some form of recreational exercise and women who do not have organized physical exercise.

MATERIAL AND METHOD

Sample of respondents

The study involved 60 women of 25 to 45 years old divided into a group engaged in recreational exercise (Pilates, step aerobics and tae-bo) for at least a year (n = 30) and a group of non-exercisers (n = 30). Before starting the research, the written consent of all respondents was obtained, as well as the official permission of the aerobics studio „NIA“ in which the research was conducted. The research was approved by the Ethics Committee of the Faculty of Sport, University Union – Nikola Tesla (approval number – 140/22).

Measuring instruments

In this transversal research, a statistical method was used to collect, classify and process data which were then tabulated, interpreted and analyzed. The measurement techniques used in the research are scaling for the purpose of researching attitudes about the level of quality of life and testing through a battery of diagnostic tests that assessed the level of physical abilities.

Quality of Life Questionnaire – shortened and adapted version (WHOQOL-BREF – World Health Organization Quality of Life-Brief). The instrument consists of 26 items to which the respondent responds via a five-point Likert-type self-assessment scale. Based on the items from this version of the questionnaire, data on overall quality of life as well as quality of life in four domains are obtained: physical health (activities, need for drugs and treatment, energy capacity, mobility, pain, sleep quality, health-related work ability); mental health (satisfaction with physical appearance – by herself, negative and positive feelings, self-confidence); social relations (interpersonal relations, social support and sexual activity) and living conditions (financial resources, opportunities for recreation and leisure). 1. Examples of items for the physical health domain: “The extent to which physical pain prevents you from doing what you need to do?”; 2. For mental health domain: “How often do you have negative feelings such as sadness, despair, anxiety, depression?“; 3. Social relations: “What is the level of your satisfaction with the support provided by your friends?”; 4. Living conditions domain: “What is the level of your satisfaction with the conditions you live in?”. The timeline for the questions is “in the last two weeks”. High reliability subscales of the quality of life have been established: physical health α=0,768, mental health α=0,738, social relations α=0,784 and living conditions α=0,780.

Physical fitness. Five tests (Topend Sports) were used in the testing, which have been found to be reliable and valid for the assessment of physical fitness: *Abdominal Endurance – Sit up Test* (Ojeda, Maliqueo, & Barahona-Fuentes, 2020); *Squats Test* (*Blazevich, Gill & Newton, 2002;* Yeh et al., 2018); *Isometric Back Strength Test* (Yang et al., 2020); *Push up Test* (Baumgartner et al, 2002); *2-Minute Step in Place Test* (Haas et al., 2017; Nogueira et al., 2021).

Exercise programs

All exercise programs are realized in the aerobics studio "NIA" in Niš, three times a week (Tuesdays, Thursdays and Saturdays beginning at 6 pm) lasting an hour. Trainings have a three-part structure: introductory (5–10 min), main (45 min) and final part (5–10 min).

Pilates – pilates training consists of low-intensity exercises, which include the muscles of the whole body whose main goal is to stabilize the body and strengthen its central part (core). The trainings were accompanied by music with a tempo of 60 to 80 beats per minute. The introductory part of the training consists of mobility exercises and warm-up exercises – number of repetitions is 6–10 times). In the main part of the training, exercises aimed at strengthening and shaping certain muscle regions are performed (arm muscles, gluteal region, lower extremity muscles, abdominal muscles and back muscles (number of repetitions is 10–12 times). In the final part of the training, stretching exercises of large muscle groups and especially those muscles that were engaged in the main part of the training are applied.

Step aerobic – The introductory part of the training is characterized by the preparation of those muscle groups that will be engaged in the main part of the training with the use of simpler coordination exercises and small range of motion, with a moderate pace (120–134 bpm), which is also preparing the body for more intense exercise. The main part of the training consists of the aerobic part (122–140 bpm) and the part for strength exercises. More complex choreographies with basic steps, lifting steps, outbursts and touch steps are used. The aerobic part is followed by strength exercises on the ground (115–125 bpm). This part of the training includes exercises for the muscles not sufficiently engaged during the aerobic part (for strengthening muscles of the arms and shoulder girdle, gluteal region, abdominal and back muscles. The aim is to increase muscle endurance, repetitive strength and flexibility. The final part of training is characterized by calming down the body by stretching exercises of those muscle groups that were most engaged in the main part, with the music of a slower tempo (50–90 bpm).

Tae-bo – in the introductory part (100–120 bpm), warming up is performed and the organism is prepared for the stresses to follow with simple choreographies composed of the basic steps of walking and running in place and in movement. The main part contains the aerobic part (movements, blocks and sequences of movements aimed at the development of the cardiovascular and respiratory system) and the part with shaping exercises (exercises for shaping and strengthening the body). The tempo of the music is from 100 to 120 bpm. During the realization of this part of the training, the load on the cardio-respiratory system is low. Exercises are used to strengthen the muscles of the arms and shoulder girdle, abdominal wall, back, gluteal region and legs. The final part includes stretching and relaxation exercises with the aim of calming down the body (40–60 bpm). Static stretching exercises are realized. Each exercise is performed in plank for 20 seconds.

Statistical analysis

Among the descriptive parameters in the analysis, the arithmetic mean from the measures of central tendencies and the standard deviation from the measures of dispersion were used. In order to obtain possible differences, the T-test for independent samples was used. The level of significance is $p<0.05$.

RESULTS

Table 1. *Comparison of female exercisers and non-exercisers in quality of life (separate dimensions and overall) and in physical fitness parameters*

		Mean	SD	P
Physical health	exercisers	29.80	2.91	.009*
	non-exercisers	27.47	3.71	
Mental health	exercisers	24.20	2.72	.011*
	non-exercisers	22.33	3.53	
Social relations	exercisers	11.47	1.66	.514
	non-exercisers	11.80	2.24	
Living conditions	exercisers	28.83	4.09	.004*
	non-exercisers	25.57	4.31	

Overall quality of life	exercisers	93.47	8.45	.018*
	non-exercisers	87.17	11.33	
Sit up Test	exercisers	18.75	2.77	.000*
	non-exercisers	13.96	1.79	
Squats Test	exercisers	32.28	2.21	.000*
	non-exercisers	25.93	2.55	
Isometric Back Strength Test	exercisers	98.55	4.90	.000*
	non-exercisers	79.90	6.89	
Push up Test	exercisers	26.55	5.08	.000*
	non-exercisers	17.20	3.10	
2-Minute Step in Place Test	exercisers	107.62	7.84	.000*
	non-exercisers	99.83	8.12	

The results in Table 1 show statistically significant differences between exercisers and non-exercisers when it comes to the accentuation of overall quality of life, as well as the dimensions of mental and physical health and the impact of environment. Namely, female exercisers report a higher level of quality of life than female non-exercisers. Thus, they have a higher overall quality of life, as well as a quality of life related to physical and mental health and the impact of environment compared to female non-exercisers.

Observing the results in the parameters of physical fitness it can be seen that statistically significant differences were found between the group of female exercisers and non-exercisers. Namely, the exercisers have a higher level of physical fitness in all applied tests, which is not surprising given the time period of at least a year that all respondents from the group of physically active women spent in the training process.

DISCUSSION

This research showed that there are statistically significant differences between female exercisers and non-exercisers when it comes to the accentuation of overall quality of life, as well as the dimensions of mental and physical health and environmental impact. Female exercisers have a higher overall quality of life, as well as a quality of life related to mental and physical health and environmental impact compared to female non-exercisers. Besides, observing physical performance, women who actively exercise showed a higher degree of physical fitness compared to physically inactive respondents.

The results of this study confirm the allegations of previous research on this topic. It is considered that there is a positive correlation between the level of physical activity and the quality of life (Prasad, Fredrick & Aruna, 2021), because the highest indicators of quality of life in general, as well as in the physical, mental and social aspects, are showed by the people with high level physical activity intensity (Puciato, Borysiuk & Rozpara, 2017). If a gender analysis is performed, there are no differences in the self-perception of quality of life between men and women, but in both sexes the quality of life is clearly related to physical activity. The domain of physical activity shows the strongest connection with physical inactivity (Porto et al., 2012).

Researches to date suggest that increasing levels of physical activity may contribute to improving the quality of life of older adults (Antunes et al., 2022, Shames et al., 2021). People of both sexes who are more physically active have a higher level of sensory abilities, greater autonomy and independence, with a generally higher overall quality of life, regardless of age, marital status, level of education and socio-economic status. Primarily for women, the indicators of the quality of social life are significantly higher for active and very active subjects compared to sedentary subjects (Guedes et al., 2012). It is also important to include mechanisms of social support for people in order to access various physical exercise programs and in general to create an environment for adults, especially older people, to be as physically as active as possible in order to improve their quality of life (Kang, Park & Wallace, 2018). Physical activity should become a part of everyday life as early as possible, because it is a pledge for psycho-physical health in later years of their lives. So, researches have shown that people who exercised in middle age and continued with these activities during their later life, have a significantly higher level of quality of life associated with health in their old age (Lee et al., 2022).

In women who regularly exercise recreationally, life satisfaction, respect for other people, perception of their own physical appearance, functionality and health status, as well as overall physical self-perception can be improved (Cruz-Ferreira et al., 2011). Ebrahimi, Ghandehari & Veisi (2020) examined the effect of physical exercise organized in the form of sports activities within intergenerational programs (mixed groups of older adults and students) on the quality of life of older people. After 8 weeks, the quality of life of the elderly has significantly increased compared to their results before the test, which indicates the beneficial effects of physical activity, especially when it is supported by the environment of different generations.

The quality of life and high level of mental and physical health depends on physical activity in middle-aged people, as well as in young ones, adolescents and children. It is suggested that physical activity through organized training programs is a promising strategy in terms of promoting mental health in young people (Pascoe et al., 2020). In the last decade great attention has been paid to researches conducted in childhood and monitoring low levels of physical activity, sedentary behavior and mental health problems. It is believed that physical activities in school conditions can reduce anxiety, increase the body's overall resilience, positively affect mental health and thus improve the quality of life in children and adolescents (Andermo et al., 2020). It is also of the utmost importance that middle-aged people, especially women and those with signs of depression and excessive stress, are motivated to adopt more rigorous physically active lifestyle; it has been found that even in this age period physical activity is positively associated with the quality of life (Tement & Selič-Zupančič, 2021).

CONCLUSION

With increasing understanding of the impact of various lifestyle factors, such as sedentary behavior and the level of physical activity on physical and mental health, there is a growing evidence of how physical inactivity correlates with various mental and physical health problems. Quality of life is an important indicator in health assessment, and its improvement contributes to the preservation and improvement of people's physical and mental health. Loss of physical function during the aging process can affect the quality of life. In that sense, physical activity can be an effective means of preventing and treating many psychosomatic disorders that come with aging. So programs that are launched in order to improve the quality of life should inevitably include the domain of physical activity.

The results of this research are based on the studies that have been conducted so far and support the allegations that physical activity contributes to the improvement of both physical and mental health, and thus the overall quality of life. The findings of this and similar studies can help to raise awareness of the need for physical activity, as well as create even more effective health care programs by intensifying physical activity, which leads to improved quality of life, especially for older generations.

Due to the relatively small sample of respondents, which in the case of a group of exercisers was drawn from only one aerobic studio, it can be said that the research has certain limitations. Catching a wider population of women who are regularly exercising and those who are not, would certainly allow a much more reliable analysis of the relationship between the observed phenomena in the form of physical activity, mental and physical health and thus quality of life. Also, a number of parameters that examine the level of physical fitness can be taken into account. However, the research provides information that may indicate the importance of recreational physical activity in women.

REFERENCES

Ač-Nikolić, E., Čanković, S., Draganić, N. & Radić, I. (2010). Ispitivanje validnosti i pouzdanosti WHOQOL-BREF upitnika za populaciju starih u Vojvodini (Validation and reliability testing of WHOQOL-BREF questionnaire for the elderly population in Vojvodina). *Zbornik Matice srpske za društvene nauke*, 131, 211–220. https://www.ceeol.com/search/article-detail?id=600399. [in Serbian]

Alcántara, C., Qian, M., Meli, L., Ensari, I., Ye, S., Davidson, K. W. & Diaz, K. M. (2020). Anxiety sensitivity and physical inactivity in a national sample of adults with a history of myocardial infarction. *International Journal of Behavioral Medicine*, *27*(5), 520–526. https://doi.org/10.1007/s12529-020-09881-w.

Andermo, S., Hallgren, M., Nguyen, T.T.D., Jonsson, S., Petersen, S., Friberg, M., Romqvist, A., Stubbs, B. & Elinder, L.S. (2020). School-related physical activity interventions and mental health among children: a systematic review and meta-analysis. *Sports Medicine – Open*, *6*, 25. https://doi.org/10.1186/s40798-020-00254-x.

Antunes, R., Fonseca, E., Oliveira, D., Matos, R., Amaro, N., Morouco, P., Coelho, L. & Rebelo-Goncalves, R. (2022). Quality of life, vitality and handgrip strength in elderly practitioners of physical exercise. *Cuadernos de Psicologíadel Deporte*, *22*(1), 245–255. https://doi.org/10.6018/cpd.467011.

Bai Y, Hua B., Zhang F., Zhou W. & Deng B. (2022). Effect of different intensity **exercises** intervention on cardiovascular functions and quality of life on patients with chronic heart failure: A protocol for systematic review and meta-analysis. *Medicine*, *14*(101), e28554. https://

doi.org/10.1097/md.0000000000028554.

Bartolozzi, E. (2015). The natural approach to osteoporosis. *Clinical Cases in Mineral and Bone Metabolism*, *12*(2), 111. https://doi.org/10.11138/ccmbm/2015.12.2.111.

Baumgartner, T.A., Oh, S., Chung, H. & Hales, D. (2002). Objectivity, Reliability, and Validity for a Revised Push-Up Test Protocol. *Measurement in Physical Education and Exercise Science*, *6*(4), 225–242. https://doi.org/10.1207/S15327841MPEE0604_2.

Bélair, M.A., Kohen, D.E., Kingsbury, M. & Colman, I. (2018). Relationship between leisure time physical activity, sedentary behaviour and symptoms of depression and anxiety: evidence from a population-based sample of Canadian adolescents. *BMJ Open*, *8*(10), e021119. http://dx.doi.org/10.1136/bmjopen-2017-021119.

Bishwajit, G., O'Leary, D.P., Ghosh, S., Yaya, S., Shangfeng, T. & Feng,Z. (2017). Physical inactivity and self-reported depression among middle- and older-aged population in South Asia: World health survey. *BMC Geriatrics*, *17*(1), 1–8. https://doi.org/10.1186/s12877-017-0489-1.

Blazevich, A.J., Gill, N. & Newton, R.U. (2002). Reliability and validity of two isometric squattests. Journal of Strength & Conditioning Research, 16(2), 298–304. https://journals.lww.com/nsca-jscr/Abstract/2002/05000/Reliability_and_Validity_of_Two_Isometric_Squat.20.aspx.

Booth, F.W., Roberts, C.K., Thyfault, J.P., Ruegsegger, G.N. & Toedebusch, R.G. (2017). Role of inactivity in chronic diseases: evolutionary insight and pathophysiological mechanisms. *Physiological Reviews*, *97*(4), 1351–1402. https://doi.org/10.1152/physrev.00019.2016.

Bowling, A. (2017). *Measuring Health: A Review of Subjective Health, Well-Beeing and Quality of Life Measurement Scales, 4th edition*. London: Open University Press.

Brownson, R.C., Boehmer, T.K. & Luke, D.A. (2005). Declining rates of physical activity in the United States: what are the contributors? *Annual Reviews of Public Health*, *26*, 421–443. https://doi.org/10.1146/annurev.publhealth.26.021304.144437.

Carr, A., Higginson, I. & Robinson, P. (2002). *Quality of Life*. Wiley.

Chen, S., Malete, L. & Ling, J. (2022). An examination of physical activity guidelines and health-related **quality** of **life** among U.S. older adults. *Preventive Medicine*, *156*, 106986. https://doi.org/10.1016/j.ypmed.2022.106986.

Cruz-Ferreira, A., Fernandes, J., Gomes, D., Bernardo, L. M., Kirkcaldy, B. D., Barbosa, T. M., & Silva, A. (2011). Effects of Pilates-based exercise on life satisfaction, physical self-concept and health status in adult women. *Women & Health*, *51*(3), 240–255. https://doi.org/10.1080/03630242.2011.563417.

Ebrahimi, Z., Ghandehari, M.R.E. &Veisi, K. (2020). The Effect of Physical Activity Based on Intergenerational Programs on the Quality of Life of Older Adults. *Iranian Journal of Ageing*, *14*(4), 406–421. http://salmandj.uswr.ac.ir/article-1-1499-en.html.

Ekkekakis, P., Vazou, S., Bixby, W.R. & Georgiadis, E. (2016). The mysterious case of the public health guideline that is (almost) entirely ignored: call for a research agenda on the causes of the extreme avoidance of physical activity in obesity. *Obesity Reviews*, *17*(4), 313–329. https://doi.org/10.1111/obr.12369.

Granero-Jiménez, J., López-Rodrigez, M., Dobarrio-Sanz, I. & Cortés-Roddriguez, A, (2022). Influence of Physical **Exercise** on Psychological Well-Being of Young Adults: A Quantitative Study. *International Journal of Environmental Research and Public Health*, *19*(7), 4282. https://doi.org/10.3390/ijerph19074282.

Guedes, D.P., Hatmann, A.C., Martini, F.A.N., Borges, M.B. & Bernardelli, R. (2012). Quality of Life and Physical Activity in a Sample of Brazilian Older Adults. *Journal of Aging and Health*, *24*(2), 212–226. https://doi.org/10.1177/0898264311410693.

Haas, F., Sweeney, G., Pierre, A., Plusch, T. & Whiteson J. (2017). Validation of a 2 Minute Step Test for Assessing Functional Improvement. *Journal of Therapy and Rehabilitation*, *5*(2), 71–81. https://doi.org/10.4236/ojtr.2017.52007.

Jia, H., Zack, M.M., Gottesman, I.I. & Thompson, W.W. (2018). Associations of smoking, physical inactivity, heavy drinking, and obesity with quality-adjusted life expectancy among US adults with depression. *Value in Health*, *21*(3), 364–371. https://doi.org/10.1016/j.jval.2017.08.002.

Kandola, A., Ashdown-Franks, G., Hendrikse, J., Sabiston, C.M. & Stubbs, B. (2019). Physical activity and depression: Towards understanding the antidepressant mechanisms of physical activity. *Neuroscience & Biobehavioral Reviews*, *107*, 525–539. https://doi.org/10.1016/j.neubiorev.2019.09.040.

Kang, H-W., Park, M. & Wallace, J.P. (2018). The impact of perceived social support, loneliness, and physical activity on quality of life in South Korean older adults. *Journal of Sport and Health Science*, *7*(2), 237–244. https://doi.org/10.1016/j.jshs.2016.05.003.

Kudryavtsev, M., Osipov, A., Kokova, E., Kopylov, Y., Iermakov, S., Zhavner, T., Vapaeva, A., Alexandrov, Y., Konoshenko, L. & Görner, K. (2018). The possibility of increasing cadets' physical fitness level of the educational organizations of the Ministry of Internal Affairs of Russia with the help of optimal training effects via crossfit. *Journal of Physical Education and Sport*, *18*(Suppl. 5), 2022–2028. https://doi.org/10.7752/jpes.2018.s5300.

Lee, M., Lee, H., Song, K.J., & Lee, Y.M. (2022). Benefits of Sustained Physical Activity From Middle-Age To Early Old Age On Quality Of Life In Early Old Age. *Research Square*. https://doi.org/10.21203/rs.3.rs-1219812/v1.

Nogueira, M.A., Almeida, T.D.N., Andrade, G.S., Ribeiro, A.S., Rêgo, A.S., da Silva Dias, R., Ferreira, P.D., Penha, L.R.L.N., de Oliveira Pires, F., Dibai-Filho, A.V. & Bassi-Dibai, D. (2021). Reliability and accuracy of 2-minute step test in active and sedentary lean adults. *Journal of Manipulative and Physiological Therapeutics*, *44*(2), 120–127. https://doi.org/10.1016/j.jmpt.2020.07.013.

Ojeda, A.H., Maliqueo, S.G. & Barahona-Fuentes, G. (2020). Validity and reliability of the Muscular Fitness Test to evaluate body strength-resistance. *Apunts Sports Medicine*, *55*(208), 128–136. https://doi.org/10.1016/j.apunsm.2020.08.002.

Pascoe, M., Bailey, A. P., Craike, M., Carter, T., Patten, R., Stepto, N. & Parker, A. (2020). Physical activity and exercise in youth mental health promotion: A scoping review. *BMJ Open Sport & Exercise Medicine*, *6*(1), e000677. http://dx.doi.org/10.1136/bmjsem-2019-000677.

Porto, D.B., Guedes, D.P., Fernandes, R.A. & Reichert, F.F. (2012). Perceived quality of life and physical activity in Brazilian older adults. *Motricidade*, *8*(1), 33–41. https://doi.org/10.6063/motricidade.8(1).237.

Prasad, L., Fredrick, J. & Aruna, R. (2021). The relationship between physical performance and quality of life and the level of physical activity among the elderly. *Journal of Education and Health Promotion*, *10*, 68. https://doi.org/10.4103/jehp.jehp_421_20.

Puciato, D., Borysiuk, Z. & Rozpara, M. (2017). Quality of life and physical activity in an older working-age population. *Clinical Interventions*

in Aging, *12*, 1627–1634. https://doi.org/10.2147/cia.s144045.

Rodriguez-Ayllon, M., Cadenas-Sánchez, C., Estévez-López, F., Muñoz, N. E., Mora-Gonzalez, J., Migueles, J. H., ... & Esteban-Cornejo, I. (2019). Role of physical activity and sedentary behavior in the mental health of preschoolers, children and adolescents: a systematic review and meta-analysis. *Sports Medicine*, *49*(9), 1383–1410. https://doi.org/10.1007/s40279-019-01099-5.

Ruegsegger, G.N. & Booth, F.W. (2017). Running from disease: molecular mechanisms associating dopamine and leptin signaling in the brain with physical inactivity, obesity, and type 2 diabetes. *Frontiers in Endocrinology*, *8*, 109. https://doi.org/10.3389/fendo.2017.00109.

Sanchis-Gomar, F., Lucia, A., Yvert, T., Ruiz-Casado, A., Pareja-Galeano, H., Santos-Lozano, A., Fuiza-Luces, C., Garatachea, N., Lippi, G., Bouchard, C. & Berger, N. A. (2015). Physical inactivity and low fitness deserve more attention to alter cancer risk and prognosis. *Cancer Prevention Research*, *8*(2), 105–110. https://doi.org/10.1158/1940-6207.CAPR-14-0320.

Schuch, F., Vancampfort, D., Firth, J., Rosenbaum, S., Ward, P., Reichert, T., Bagatini, N.C., Bgeginski, R. & Stubbs, B. (2017). Physical activity and sedentary behavior in people with major depressive disorder: a systematic review and meta-analysis. *Journal of Affective Disorders*, *210*, 139–150. https://doi.org/10.1016/j.jad.2016.10.050.

Shames, A., Nobari, H., Afonso, J., Abbasi, H., Mainer-Pardos, E., Perez-Gomez, J., Bayati, M., Babrami, A. & Carneiro, L. (2021). Effect of Aerobic-Based Exercise on Psychological Well-Being and Quality of Life Among Older People: A Middle East Study. *Frontiers in Public Health*, 9, 764044. https://doi.org/10.3389/fpubh.2021.764044.

Silva, D.A.S., Naghavi, M., Duncan, B.B., Schmidt, M.I., de Souza, M.D.F.M. & Malta, D.C. (2019). Physical inactivity as risk factor for mortality by diabetes mellitus in Brazil in 1990, 2006, and 2016. *Diabetology& Metabolic Syndrome*, *11*(1), 1–11. https://doi.org/10.1186/s13098-019-0419-9.

Tement, M. & Selič-Zupančič, P. (2021). Quality of life and health status in middle-aged presumed healthy Slovenian family practice attendees. *Slovenian Journal of Public Health*, *60*(3), 182–189. https://doi.org/10.2478/sjph-2021-0026.

Weinberg, R.S. & Gould, D. (2019). *Foundations of sport and exercise psychology (7th ed.). Human Kinetics.*

Yang, S., Wu, W., Zhang, C., Wang, D., Chen, C., Tang, Y., Li, K., Xu, J. & Luo, F. (2020). Reliability and validity of three isometric back extensor strength assessments with different test postures. *Journal of International Medical Research*, *48*(2), 1–12. https://doi.org/10.1177/0300060519885268.

Yeh, C-P., Huang, H-C., Chang, Y., Chen, M-D. & Hsu, M. (2018). The Reliability and Validity of a Modified Squat Test to Predict Cardiopulmonary Fitness in Healthy Older Men. *BioMed Research International*, Article ID 4863454. https://doi.org/10.1155/2018/4863454.

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