

QUALITY OF LIFE, LEVEL OF ANXIETY AND LEVEL OF DEPRESSION AMONG FORMER ARTISTIC GYMNASTS, FORMER GYMNASTS FROM OTHER SPORTS AND NON-ATHLETES

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Abstract

Involving people in physical activity or sport provides some health-related benefits and has a positive effect on their quality of life (QoL). However, high level athletes experience anxiety to cope with the high demands of the sport. The purpose of the study was to assess the QoL, level of anxiety (STAI) and level of depression (BDI) among former artistic gymnasts, former athletes from other gymnastics sports (acrobatic, rhythmic, gymnastics for all) and non-athletes. Secondly, it aimed to investigate if there are gender differences within the groups on the aforementioned variables. 114 healthy people (75 women and 39 men) were involved in the present study with a mean age 27.11 ± 9.92 years. The sample was divided into 3 different groups (1st group: 39 former artistic gymnasts (FAG); 2nd group: 53 former gymnasts from other gymnastic sports (GOS), and 3rd group: 22 non-athletes (CG). Participants were asked to complete three different questionnaires in order to assess their QoL, STAI, and BDI. Statistical analysis showed no significant differences on QoL and STAI, whoever a statistically significant difference was found between groups on BDI ($p < .05$). No main effect was found on gender. Further, results revealed that former gymnasts, regardless of the type of sport, have better QoL, lower level of STAI and BDI compared to non-athletes. In conclusion, former gymnasts, even after years of absence from the sport, report better QoL, and have a lower level of STAI and BDI than non-athletes.

Keywords: *quality of life, anxiety, depression, gymnasts.*

INTRODUCTION

Physical activity forces the human body to work harder than usual; it can take many different forms from simple gardening, housework, games, dancing, etc. (Zourikian, Jarock, Mulder, 2012). The term "physical activity" is often confused with "exercise". Exercise includes physical movements, but this form of physical activity is programmed and specially designed to be repeated in order to improve or maintain the physical condition

of the individual (Zourikian et al., 2012; World Health Organization, 2019). Physical exercise has beneficial effects on health, both physically and mentally (Cevada, Cerqueira, Moraes, Santos, Pompeu, and Deslandes, 2012), and a positive effect on anxiety; whereas lack of exercise can have negative effects on human health and well-being (Ströhle, 2008), increasing the risk of various diseases such as diabetes, obesity,

osteoporosis, and depression (Warburton, Nicol, Bredin 2006). Previous data indicate that exercise can be used as a treatment to improve a variety of conditions in physical and mental human health (Nabkasorn et al., 2005) since exercise has a positive relationship with the outcome of various mental illnesses, such as depression (Nabkasorn et al., 2005).

Former athletes, even after decades of absence from the sport, can help maintain their positive behavior (Bäckmand, Kaprio, Kujala, Sarna, 2001), have greater life satisfaction, better functional capacity, fewer depressive symptoms and a better quality of life (QoL) than non-athletes (Bäckmand et al., 2001). Although athletes experience a lot of anxiety in relation to their performance during their sporting careers, research shows that decades after quitting, their anxiety level is lower than in their peers who were not involved in sports in the past (Bäckmand, Kaprio, Kujala, Sarna, 2009; Cevada et al., 2012). In addition, it is well documented that athletes on artistic gymnastics (AG) have higher levels of stress during their careers (Bäckmand et al., 2001) and the countless hours of training in order to stand out in the sport may create a greater perception of stress and increased cortisol levels (Cevada et al., 2012).

The term "quality of life" (QoL) is a multidimensional concept and was first used in America after World War II to indicate that it is not only identified with the standard of living but also with a good life in the sense of leisure and entertainment (Campbell, 1981). Clinicians examine the physical aspects of the term, while psychologists focus on the emotional and cognitive dimensions of health (Yfantopoulos, 2001). Most definitions focus on several elements and are considered either subjective or objective or a combination of both. Previous studies (Meeberg, 1993; Tartar, Erb, Biller, Switala, van Thiel, 1988) perceived QoL as a multifaceted construct that includes reported life satisfaction, a person's sense

of self-satisfaction in various areas of life, the behavioral and cognitive ability of the individual, as well as emotional well-being. Involving people in physical activity or sport provides some health-related benefits and this has a positive effect on their QoL and improves person's mood (Bäckmand et al., 2001). Snyder, Martinez, Bay, Parsons, Sauers, and McLeod (2010) reported that athletes had a higher level of QoL than non-athletes, both in mental health and in physical and social aspects. According to Filbay, Pandya, Thomas, McKay, Adams, and Arden (2019), QoL of former athletes is less understood and there is a possibility that sport has a positive or even negative effect on their later life. In general, former athletes have a better QoL than the general population: their physical function is similar but their mental function is better (Bäckmand et al., 2001; Cevada et al., 2012; Filbay et al., 2019). These findings show that previous competitive athletic experience can help improve athletes' QoL even after a long withdrawal period from sport, as it is associated with improved physical and mental aspects (Bäckmand et al., 2001).

Anxiety arises when individuals realize that they cannot adequately cope with the demands placed on them (Lazarus and Folkman, 1984). People with anxiety can experience both physical and psychological symptoms that can affect their daily lives (Johnston, Roskowski, He, Kong, and Chen, 2020). Previous studies have reported that people's involvement in some physical activity may reduce their anxiety levels indicating that those with a sedentary lifestyle had higher levels of anxiety compared to people who were involved in sport or participated in some type of activity (Johnston et al., 2020; Tyson, Wilson, Crone, Brailsford, Laws, 2010). Participation in sport not only reduces the state of anxiety but also reduces anxiety associated with daily life (Bäckmand et al., 2001), i.e., people engaged in sports have lower levels of anxiety than those who have never played

a sport before (Bäckmand et al., 2001; 2009; Cevada et al., 2012). Cevada et al. (2012) found that former gymnasts had lower level of anxiety compared to non-athletes and they showed no significant differences from former athletes of other sports.

Depression is a condition that negatively affects the way we feel, creates feelings of sadness, melancholy and frustration, and as a result affects the way we think and act. Lauber, Falcato, Nordt, Rössler (2003) argued that the most common causes that lead a person to this condition are difficulties within the family, stress from work, and generally unspecified stress, as well as traumatic experiences or illness. A large number of studies suggest exercise as an aid to reduce depressive symptoms in the population, even in patients with severe depression (Deslandes et al., 2009; Dimeo, Bauer, Varahram, Proest, Halter, 2001; Nabkasorn et al., 2005; Ströhle, 2008). When people participate in some physical activity, their body image and their physical condition improve, their self-esteem and their relations with the social environment are strengthened, and as a result the level of depression is reduced (Babiss, & Gangwisch, 2009). Former athletes who have withdrawn from sport for a long period have greater life satisfaction and fewer depressive symptoms than people who have never been involved in any sport (Bäckmand et al., 2001).

Throughout their careers, AGs have higher levels of psychological anxiety compared to non-athletes (Georgopoulos et al., 2011). But during the transition period when athletes withdraw from sport, they experience a stress-free release with positive dimensions as they can find a new role in life and become more socially active (Clowes, Lindsay, Fawcett, and Knowles, 2015). However, Wylleman, Alfermann and Lavallee (2004) report that withdrawal from AG can cause various psychological and emotional adjustment difficulties, such as depression, eating

disorders, low self-esteem, etc. There are generally not enough studies that look at the QoL and level of anxiety and depression in former gymnasts after years of retirement. Thus, the purpose of this study was to assess the quality of life (QoL), the level of anxiety (STAI) and the level of depression (BDI) in former artistic gymnasts (FAG), former gymnasts from other sports (GOS), and non-athletes (CG). It also examines if there is a gender effect on these parameters. It was hypothesized that there was no statistically significant difference between the three groups on the aforementioned parameters and that there were no differences in relation to gender.

METHOD

The present study involved 114 healthy participants (75 women and 39 men) with a mean age 27.11 ± 9.92 years, ranging from 20 to 59 years. The sample was divided into 3 different groups. 39 former artistic gymnasts (FAG) (mean age 30.03 ± 9.85 years) participated in the first group, and there were 53 former gymnasts from other sports (rhythmic gymnastics, acrobatic, gymnastics for all) (mean age 27.28 ± 11.07 years) (GOS) in second group. The main criterion for participation was: (i) to have at least 7 years of competitive experience so that they reached a high level in their sport; and (ii) to be out of sports for at least 2 years so that there is a sufficient withdrawal period. The third group was the control group (CG) consisting of 22 people who had never been involved in sports before (non-athletes) (mean age of 21.55 ± 1.50 years).

The present study is an experimental process, where participants were asked to complete 3 different questionnaires so that it was possible to assess their QoL, level of anxiety (STAI) and level of depression (BDI), respectively. To complete the questionnaires and collect the data, a discussion with each participant preceded, to assess whether they met all the criteria required for the survey. All questionnaires

were sent electronically; participants were given precise instructions on how to complete them. The questionnaires were completed anonymously to ensure that they elicited as honest answers as possible.

Quality of Life Questionnaire SF-36.

This questionnaire is used to measure and assess the health status of the population. It is a reliable measuring tool that addresses the basic dimensions of quality of life (QoL) (Yfantopoulos, Sarris 2015). The questionnaire consists of 36 closed-ended questions which are summarized in 8 scales. The scales are: (i) General Health; (ii) Mental Health; (iii) Physical Functionality; (iv) Social Functionality; (v) Physical Role; (vi) Emotional Role; (vii) Physical Pain, and (viii) Vitality (energy and fatigue) (Ware & Sherbourne, 1992; Yfantopoulos & Sarris 2015). These eight scales form two general scales, concerning physical and mental health. The scoring ranges from 0-100. The higher the score, the better the QoL.

State- Trait Anxiety Inventory (STAI).

The STAI is a self-reporting questionnaire for measuring anxiety and consists of 40 phrases that people often use to describe themselves. This questionnaire was created by Spielberger et al. (1970). It is divided into two subscales: "State Anxiety", and "Trait Anxiety", and examines the status of anxiety and anxiety as a personality trait respectively (Marteau, & Bekker, 1992). The first subscale consists of 20 questions about how the participant feels the moment he / she answers the "State Anxiety" questionnaire. Participants indicate the degree to which each question characterizes them, based on a four-point scale (1. Not at all, 2. Somewhat, 3. Moderate, 4. Too much). The second subscale consists of 20 further questions related to anxiety as a personality trait. It reflects the most general condition of the person and assesses the level of anxiety as a personal trait. Participants in this sub-

scale also state the degree to which each question characterizes them, based on a four-point scale (1. Almost Never, 2. Occasionally, 3. Often, 4. Always). Each question is scored from 1 to 4. Initially, the sums of the first sub-scale "State" and the second sub-scale "Trait" are calculated. Then we add up the sum of the 2 questionnaires and if the total score is in the range between 20 and 37, it shows low anxiety; between 38 and 44 moderate anxiety, and between 45 and 80 high anxiety.

Beck Depression Inventory (BDI)

The BDI was first introduced in 1961, and it has been devised by Beck, Steer, and Carbin. (1988). It is a self-reporting questionnaire consisting of 21 questions that refer to a person's behavioral characteristics and depressive symptoms. Each question has 4 possible answers (0-3) and participants are asked to evaluate how much each applies to them. The questions relate to: (i) mood, (ii) pessimism, (iii) feeling of failure, (iv) feeling of satisfaction, (v) feeling of guilt, (vi) feeling of punishment, (vii) self-loathing, (viii) automorphic, (ix) the idea of suicide, (x) crying, (xi) irritability, (xii) social withdrawal, (xiii) indecision, (xiv) body image, (xv) decreased productivity, (xvi) sleep disturbance, (xvii) easy fatigue, (xviii) loss of appetite, (xix) weight loss, (xx) physical discomfort, (xxi) and loss of libido (Beck et al., 1988). Each answer is scored from 0-3. To determine the level of depression, the individual's answers are added up. If the sum is in the range between 0 and 9, it shows minimal depression; between 10 and 18 mild depression; between 19 and 29 moderate depression, and between 30 and 63, it indicates severe depression.

The statistical analysis was performed with the analysis of variance in order to examine the differences in the dependent variables (QoL, STAI, BDI) in FAG, GOS, and CG. Correlation analysis was also used to determine the relationship between the

three variables examined. The statistical analysis was performed with the statistical package SPSS v. 22 (SPCC Inc., Chicago, IL) and data are presented with averages and standard deviations. All statistical significances were tested at $\alpha = 0.05$.

RESULTS

The mean and standard deviation of the examined variables in the whole sample were 7.56 ± 5.90 , 40.31 ± 10.20 , and 74.66 ± 15.44 for BDI, STAI and QoL, respectively. The statistical analysis

showed a significant difference between the groups in terms of BDI ($F_{(2)} = 3.637$, $p = .030$). This is determined by the difference between the FAG and CG ($p < .05$). In contrast, there was no difference between the FAG and GOS. Regarding the STAI, no statistical differences were found between the groups ($F_{(2)} = 0.908$, $p = .406$), and there was no statistically significant difference in QoL ($F_{(2)} = 1.637$, $p = .198$). The means and standard deviations of the examined variables per group are presented in Table 1.

Table 1

Means and standard deviation of the examined variables.

	FAG (n = 39)	GOS (n = 53)	CG (n = 22)
QoL	75.08 ± 14.42 ¥	76.49 ± 15.08 ¥	69.49 ± 17.54
STAI	40.75 ± 8.91 ¥	39.09 ± 11.50 ¥	42.47 ± 8.93
BDI	6.54 ± 4.20 ¥	7.09 ± 5.67 ¥	10.50 ± 8.02

Note: ¥ significant difference compared to CG; FAG: Former Artistic Gymnasts; GOS: Former gymnasts from other sports; CG: Non-athletes; QoL: Quality of Life; BDI: STAI: State- Trait Anxiety Inventory; BDI: Beck Depression Inventory

In addition, the gender factor (FAG in relation to GOS) does not differ in any of the examined variables, which means that there are no differences in the examined variables; (i) QoL: ($F_{(2)} = 2.123$, $p = .148$, STAI: ($F_{(2)} = 3.039$, $p = .084$, BDI: ($F_{(2)} = .496$, $p = .483$). Correlation analysis showed a negative relationship between BDI and SF36 ($r = -.634$, $p = .01$), as well as between STAI and SF36 ($r = -.650$, $p = .01$). In contrast, a positive correlation was observed between BDI and STAI ($r = .597$, $p = .01$)

DISCUSSION

The purpose of the study was to assess the QoL, STAI, and BDI among former artistic gymnasts (FAG), former gymnasts from other branches (GOS), and non-athletes (CG). The results of our study

verify our initial hypothesis regarding the QoL. Although there was no statistically significant difference between the 3 groups, the FAG and GOS had higher values, indicating that, in general, former gymnasts have a better QoL than non-athletes. Our results partially agree with the findings of Filbay et al. (2019) who found a better QoF in former athletes, especially on mental function. According to these authors, there is a possibility that sport has a positive or even negative effect on the QoL of former athletes during their later life. In addition, our results are in line with the findings by Bäckmand et al. (2001) which show that former athletes have a better functional capacity and better QoL than non-athletes; and also those of Cevada et al. (2012) who found that former athletes had better results on emotional aspects and their general health compared

to non-athletes. Furthermore, our results support previous data of Snyder et al. (2010) who found that athletes had better QoL than non-athletes, both in mental health and in physical and social aspects. It seems that participation in sports has positive psychological effects that remain beyond athletes' engagement in sport and enhance their QoF (Filbay et al., 2019). Regarding the level of QoL among former athletes, our findings support data by Bullock, Collins, Peirce, Arden and Filbay (2020) who found that former cricketers reported similar physical components of health-related QoL.

Concerning STAI, our results showed that there was a tendency in FAG and GOS to have less anxiety than CG. This finding is in agreement with previous data of Bäckmand et al. (2001) who examined the personality and mood of former athletes at an older age and found that there were no statistically significant differences between former athletes and CG in terms of their level of anxiety. However, the same authors in a subsequent study (Bäckmand et al., 2009) found that former athletes had lower levels of anxiety than people who have not been involved in a sport before. Therefore, it seems that even in this variable former athletes posted better results than non-athletes. In addition, as Morgan stated, participation in sport reduces anxiety; the most significant benefit gained from exercise is a reduction in anxiety in relation to everyday life, and a tendency to prevent anxiety from becoming chronic (Morgan, 1979). This finding is verified by Tyson et al. (2010) who evaluated the effect of physical activity on anxiety levels and found that those who engage in a sport or in some type of physical activity have much less anxiety than those who lead a sedentary lifestyle. These data support Morgan's findings who concluded that exercise can not only reduce anxiety and personality anxiety, but can prevent this anxiety from becoming chronic (Morgan, 1979). The fact that we didn't find statistically

significant differences between former athletes and non-athletes may be due to the fact that during their careers, as reported by Georgopoulos et al. (2011), AGs have higher levels of psychological stress compared to non-athletes. In addition, our results could be supported by data of Wylleman et al. (2004) who report that during the transition period, when AGs retire from their sport, they may experience various psychological and emotional adjustment difficulties. The fact that our sample included high level athletes justifies the absence of significant differences between former gymnasts, confirming findings by Masten that support the claim that athletes competing at the highest competition level exhibit higher levels of STAI compared to those at lower levels (Masten, 2016). Furthermore, the absence of gender effect on anxiety agrees with Sari's findings which revealed that male and female badminton athletes did not differ in this variable (Sari, 2015). Based on the literature, it seems that anxiety is less understandable, since both views are supported - more anxiety in athletes' transitional life, or less anxiety and a sense of liberation. This is probably related to the way each practitioner deals with this sudden loss of something they did for most of their life.

Concerning BDI, our results verify our initial hypothesis that FAG will have less depression than CG and that FAG will not differ significantly from GOS. The statistically significant difference between FAG and CG verifies previous data of Cevada et al. (2012) who found that former AGs who retired from their sport a long time ago reported lower rates of BDI compared to people who never participated in sports. Also, the results of the present study are in line with the results of Bäckmand et al. (2001) who found that former athletes had more life satisfaction and showed fewer depressive symptoms than people who never engaged in sports. The fact that there was no gender effect on BDI is a finding that contradicts previous

data that showed that female college athletes had higher levels of depression than male college athletes (Armstrong & Oomen-Earl, 2009). Our research also supports the results of a previous study (Dimeo et al., 2001) which examined participants with mild to moderate depression who participated in a training program and reported that exercise could reduce the level of depression. This is confirmed by a large number of studies proposing exercise as a means of helping to reduce depression (Deslandes et al., 2009; Dimeo et al., 2001; Nabkasorn et al., 2005; Ströhle, 2008). Generally, exercise has long-term benefits not only at the physical but also on the mental and emotional level (Bäckmand et al., 2001).

, AGs must undergo countless hours of training from an early age in order to excel in their sport. According to previous findings (Krane, Greenleaf, & Snow, 1997; Lavalley & Robinson, 2007), one of the consequences is that when athletes stop their training and competitive duties some find their withdrawal overwhelming and therefore experience a crisis, while others experience a positive transition with very few problems (Baillie, 1993). In general, although there are many differences between the four types of sports (AG, RG, acrobatics, gymnastics for all), it seems that when we refer to a high level of athletes, the requirements of these sports have the same effect on the examined parameters. Consequently competitive gymnastics requires athletes to perform under time constraints and meet accuracy requirements, all of which increase the state of anxiety in athletes. As a result, some former gymnasts feel they meet their daily obligations more easily once they end their sporting career, and for this reason they present lower levels of anxiety and depression.

CONCLUSIONS

Former gymnasts have less depression, better quality of life and less

anxiety compared to people who have not been involved in a sport before. In conclusion, former gymnasts, even after years of absence from the sport, are in possession of greater life satisfaction, better functional capacity, fewer symptoms of depression and a better quality of life than non-athletes.

RESEARCH BOUNDARIES AND LIMITATIONS

The results of the present study, however, cannot be generalized. The results should be taken with some specific limitations, mainly in terms of the sample that participated in the research. Research only refers to former gymnasts who had at least 7 years of competitive experience and were inactive from their sport for at least 2 years. Further, it is worth noting that this research was conducted during the coronavirus period and, specifically, during the lock-down period which certainly affected the mental state of our participants and consequently our results.

REFERENCES

- Armstrong, S., & Oomen-Early, J. (2009). Social connectedness, self-esteem, and depression symptomatology among collegiate athletes versus nonathletes. *Journal of American College Health*, 57, 521-526.
- Babiss, L. A., Gangwisch, J. E. (2009). Sports participation as a protective factor against depression and suicidal ideation in adolescents as mediated by self-esteem and social support. *Journal of Developmental and Behavioral Pediatrics*, 30, 376-384.
- Bäckmand, H., Kaprio, J., Kujala, U. M., Sarna, S. (2001). Personality and Mood of Former Elite Male Athletes - A Descriptive Study. *International Journal of Sports Medicine*, 22, 215-221.
- Bäckmand, H. M., Kaprio, J., Kujala, U. M. and Sarna, S. (2009). Physical activity, mood and the functioning of daily

living: a longitudinal study among former elite athletes and referents in middle and old age. *Archives of gerontology and geriatrics*, 48, 1-9.

Baillie, P. H. (1993). Understanding retirement from sports: Therapeutic ideas for helping athletes in transition. *The Counseling Psychologist*, 21, 399-410.

Beck, A. T., Steer, R. A. and Carbin, M. G. (1988). Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. *Clinical psychology review*, 8, 77-100.

Bullock, G. S., Collins, G. S., Peirce, N., Arden, N. K., & Filbay, S. R. (2020). Health-related quality of life and flourishing in current and former recreational and elite cricketers. *Health and Quality of Life Outcomes*, 18(1), 1-12. doi:10.1186/s12955-020-01301-7.

Campbell, A. (1981). The sense of well-being in America: Recent patterns and trends. McGraw-Hill Companies.

Cevada, T., Cerqueira, L. S., Moraes, H. S. D., Santos, T. M. D., Pompeu, F. A. M. S. and Deslandes, A. C. (2012). Relação entre esporte, resiliência, qualidade de vida e ansiedade. *Archives of Clinical Psychiatry*, 39, 85-89.

Clowes, H., Lindsay, P., Fawcett, L. and Knowles, Z. R. (2015). Experiences of the pre and post retirement period of female elite artistic gymnasts: An exploratory study. *Sport and Exercise Psychology Review*, 11 (2), 1745-4980.

Coakley, J. J. (1983). Leaving competitive sport: Retirement or rebirth? *Quest*, 35, 1, 1-11.

Deslandes, A., Moraes, H., Ferreira, C., Veiga, H., Silveira, H., Mouta, R., Pompeu, F. A., Coutinho, E. S. F. and Laks, J. (2009). Exercise and mental health: many reasons to move. *Neuropsychobiology*, 59(4), 191-198.

Dimeo, F., Bauer, M., Varahram, I., Proest, G., Halter, U. (2001). Benefits from aerobic exercise in patients with major depression: a pilot study *British Journal of Sports Medicine*, 35, 114 - 117.

Filbay, S., Pandya, T., Thomas, B., McKay, C., Adams, J. and Arden, N. (2019). Quality of life and life satisfaction in former athletes: a systematic review and meta-analysis. *Sports Medicine*, 49(11), 1723-1738.

Georgopoulos, N. A., Rottstein, L., Tsekouras, A., Theodoropoulou, A., Koukkou, E., Mylonas, P., Polykarpou, G., Lampropoulou, E., Iconomou, G., Leglise, M. and Vagenakis, A.G. (2011). Abolished circadian rhythm of salivary cortisol in elite artistic gymnasts. *Steroids*, 76(4), 353-357.

Johnston, S. A., Roskowski, C., He, Z., Kong, L. and Chen, W. (2020). Effects of team sports on anxiety, depression, perceived stress, and sleep quality in college students. *Journal of American College Health*, 69, 791-797.

Krane, V., Snow, J. and Greenleaf, C. A. (1997). Reaching for gold and the price of glory: A motivational case study of an elite gymnast. *The sport psychologist*, 11, 53-71.

Lauber, C., Falcato, L., Nordt, C., Rössler, W. (2003). Lay beliefs about causes of depression. *Acta Psychiatrica Scandinavica*, 418, 96-99.

Lavallee, D. and Robinson, H. K., (2007). In pursuit of an identity: A qualitative exploration of retirement from women's artistic gymnastics. *Psychology of sport and exercise*, 8, 119-141.

Lazarus, R. S. and Folkman, S. (1984). *Stress, appraisal, and coping*. Springer publishing company.

Marteau, T. M. and Bekker, H. (1992). The development of a six-item short-form of the state scale of the Spielberger State - Trait Anxiety Inventory (STAI). *British journal of Clinical Psychology*, 31, 301-306.

Mc Call W. V. (1975). Quality of life. *Social Indicators Research*, 2, 229-248.

Meeberg, G. A. (1993). Quality of life: a concept analysis. *Journal of advanced nursing*, 18, 32-38.

Morgan, W. P. (1979). Anxiety reduction following acute physical activity. *Psychiatric Annals*, 9, 141-147.

Nabkasorn, C., Miyai, N., Sootmongkol, A., Junprasert, S., Yamamoto, H., Arita, M., Miyashita, K. (2005) Effects of physical exercise on depression, neuroendocrine stress hormones and physiological fitness in adolescent females with depressive symptoms. *European Journal of Public Health*, 16, 179 - 184.

Sari, I. (2015). Does goal orientation matter for trait anxiety, self-efficacy and performance? An investigation in university athletes. *Education*, 136, 169-178.

Snyder, A. R., Martinez, J. C., Bay, R. C., Parsons, J. T., Sauers, E. L. and McLeod, T. C. V. (2010). Health-related quality of life differs between adolescent athletes and adolescent nonathletes. *Journal of sport rehabilitation*, 19, 237-248.

Spielberger, C. D. (1966). *Theory and research on anxiety*. Anxiety and behaviour. New York: Academic press.

Ströhle, A. (2008) Physical activity, exercise, depression and anxiety disorders. *Journal of Neural Transmission*, 116, 777-784.

Tarter, R. E., Erb, S., Biller, P. A., Switala, J. and Van Thiel, D. H., (1988). The quality-of-life following liver transplantation: a preliminary report. *Gastroenterology Clinics of North America*, 17, 207-217.

Tyson, P., Wilson, K., Crone, D., Brailsford, R. and Laws, K., (2010). Physical activity and mental health in a student population. *Journal of mental health*, 19, 492-499.

Warburton, D. E., Nicol, C. W. and Bredin, S. S. (2006). Health benefits of physical activity: the evidence. *Cmaj* *Jamc*, 174, 801-809.

Ware, J. E. and Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-36): I. Conceptual

framework and item selection. *Medical care*, 30, 473-483.

World Health Organization. (2019). *Global action plan on physical activity 2018-2030: more active people for a healthier world*. World Health Organization.

Wylleman, P., Alfermann, D. and Lavalley, D. (2004). Career transitions in sport: European perspectives. *Psychology of sport and exercise*, 5, 7-20.

Yfantopoulos, J. (2001). Quality of life and QALYs in the measurement of health. *Archives of Hellenic medicine*, 18, 114-130.

Yfantopoulos, J., Sarris, M. (2015). Health related quality of life. Measurement methodology. *Archives of Hellenic medicine*, 18, 218-229.

Young, K. J. and Longman, A. J., 1983. Quality of life and persons with melanoma: A pilot study. *Cancer nursing*, 6, 219-226.

Zourikian, N., Jarock, C. and Mulder, K. (2012). *Physical activity, exercise and sports*. Canadian Hemophilia Society.

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