

# Newsletter

## November 2023



## TECHNICAL FILE

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01

## EDITORIAL

This is the 36th newsletter of LQRC-CIEQV. This issue is dedicated to the scientific area of “physical activity and healthy lifestyles”, whose coordinator is Professora Susana Franco.

Physical activity and healthy life styles are closely interconnected. Engaging in regular physical activity is essential for maintaining good health and quality of life.

In this edition, you will find an interview with Ana Cristina Corrêa Figueira from the Higher School of Education/ Polytechnic University of Setúbal. Additionally, there are two papers of Higher School of Sport in Rio Maior / Polytechnic University of Santarém teachers. The first paper aims to analyze the effects of a combined training program on health and functional capacity in female individuals diagnosed with Fibromyalgia. The second paper aims to identify clusters of Sports in Portugal that are in a similar situation in terms of implementation levels, both in the School Sports subsystem and in the Federated Sports subsystem.

Regarding the projects under development, there are two mentioned. The first is the Healthy Lifestyle Network Europe which focuses on improving the quality of life and health of European citizens. The second project is Move4Future, which aims to promote the importance of physical activity, proper nutrition and healthy lifestyles, in development of children and youth. These projects are dedicated to promoting healthy life style and enhancing the well-being.

Thank you for acknowledging the researchers who contributed to this edition of the newsletter. Their dedication and work are greatly appreciated. We hope that the information provided in this newsletter proves to be informative and valuable to all readers.

Happy reading!



Regina Ferreira <sup>1,2</sup>

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<sup>2</sup> Life Quality Research Centre

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## INTERVIEW

### — Entrevista a Ana Cristina Corrêa Figueira



Ana Cristina Corrêa Figueira <sup>1,2</sup>

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**Ciência ID:** 151F-1BFD-F4E1

#### Brief curricular presentation

Ana Cristina Ferreira dos Santos Corrêa Figueira. Ph.D. in Physical Activity and Health by Faculty of Sport, from University of Porto, with the thesis "Long-Term Exercise Training Modulates Breast Cancer Outcomes and Attenuates Cancer-Induced Muscle Wasting in Animals", (2018). Master's degree in High Performance Training from the Faculty of Human Kinetics, University of Lisbon (2001). Integrated member of the CIEQV and Adjunct Professor at the School of Education of the Polytechnic University of Setúbal since February 1997. Vice Dean of the School since 2018.

#### What are your goals as a CIEQV member?

Contribute to academic and scientific knowledge.

Actively participate in and contribute to the research goals and projects outlined by the research unit, collaborating with other team members to achieve collective research goals.

Disseminate research findings through publications in peer-reviewed journals, conference presentations, and other relevant platforms.

Strive for research outcomes that have a positive impact on society, whether through policy recommendations, technological advances, or improvements in the quality of life in general.

These goals collectively contribute to the success and effectiveness of the research unit and foster a dynamic and collaborative environment in which members work together to advance knowledge, address challenges, and make meaningful contributions to their respective fields.

**What are your most important research projects? Develop one of the indicated projects.**

The last project I was involved in as part of my doctoral research was to find out how exercise training can help reduce the muscle loss associated with breast cancer. The importance of understanding and addressing the effects of exercise training on cancer-related muscle wasting lies in its potential to improve the physical, psychological, and overall well-being of cancer patients. Incorporating exercise as part of comprehensive cancer care may lead to improved treatment outcomes, increased tolerance to therapies, and improved quality of life during and after cancer treatment.

**Knowing that knowledge must be transferred to society, how can the area of scientific research and professional intervention in which you are involved contribute to uniting theory with practice?**

Through active engagement with the broader community and effective dissemination of information, scientific research can bridge the gap between theory and practice.

By involving students in your research and integrating research findings into their educational experience, we can contribute to their academic and professional development, emphasizing the importance of evidence-based practices in exercise and health.

Equip students with the skills to critically evaluate research literature, enabling them to make informed decisions in their future careers. This approach not only enhances the quality of education, but also instills a sense of curiosity and critical thinking that extends beyond the classroom and helps to ensure that the benefits of research are translated into tangible improvements in public health and well-being.

**Considering that the LQRC-CIEQV promotes research on the quality of life, what are the practical implications of the research it develops?**

As a research center focused on quality of life, the LQRC-CIEQV plays a critical role in exploring various aspects that contribute to the overall well-being of individuals. The practical implications of the research it develops are diverse and can have a significant impact on individuals, communities, and societal systems, providing them with the knowledge to make informed decisions that positively impact their quality of life. In addition, as a research center focused on quality of life, the LQRC-CIEQV can have far-reaching practical implications, influencing policies, practices, and interventions across multiple domains to improve the well-being of individuals and communities. Research findings should serve as the basis for positive societal change and the creation of environments that promote a high quality of life for all.

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## ARTICLE 1

### – Effects of a combined training program on pain, stiffness, fatigue, and well-being in women with fibromyalgia



Mónica Sousa<sup>1</sup>, João Moutão<sup>1,2</sup>, Rafael Oliveira<sup>1,2,3</sup>, Susana Alves<sup>1,2</sup>

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## Abstract

Fibromyalgia is a rheumatic disease characterized by chronic widespread muscle pain and its treatment is carried out through pharmacological interventions. Physical exercise and the adoption of a healthy lifestyle influence the reduction of the symptoms of the disease. The main objective of this study was to analyze the effects of a combined training program on health and functional capacity in female individuals diagnosed with Fibromyalgia. It was a quasi-experimental study with a duration of 8 months with a sample of six participants between 43 and 58 years old, who did not practice any type of physical exercise program. The following instruments were used in baseline and post intervention: Fibromyalgia Impact Questionnaire (FIQ), Short Form Health Survey Questionnaire (SF-36v2) and functional physical fitness tests (30-second chair stand, arm curl, sit and reach, 8-ft up-and-go, back scratch and 2-minute step test. Wilcoxon non-parametric test (intra-group comparison) was used, with a significance level of  $p < 0.05$  to compare baseline and post intervention effects. Significant improvements were observed: in

2-minute step test ( $p=0.21$ ); physical function; physical performance; physical pain and general health, the mental component, vitality; social function of the SF-36v2 (all,  $p<0.05$ ). Moreover, FIQ showed a significant reduction in all scales at the end of the program compared to the baseline ( $p<0.05$ ). Combined training program can reduce the impact of fibromyalgia while improving health and aerobic performance.

**Keywords:** Combined Exercise Program; Fibromyalgia; Functional Capacity; Health.

## Introduction

Fibromyalgia is a very common chronic rheumatic disease in developed countries, affecting between 2% and 4% of the general population and is more common in females.

The diagnosis of Fibromyalgia should be confirmed by rheumatologists by palpating the painful points of patients, obtaining 12 or more points defined by the American College of Rheumatology criteria guidelines and the presence of symptoms such as fatigue, tiredness on waking, generalized pain and cognitive changes for a period of more than three months (Häuser & Wolf, 2012). In addition to these symptoms, Fibromyalgia is also characterized by painful muscle complaints associated with pain, muscle stiffness, sleep disturbances, anxiety and depression, decreased functional capacity and cognitive problems (Atan & Karavelioğlu, 2020; O'Dwyer et al., 2019; Chica et al., 2019; Norouzi et al., 2019). Other symptoms also present in this pathology include fatigue and changes in psychological health status (Sañudo et al., 2010).

The medical prescription for these patients includes pharmacological treatments for sleep disorders and chronic intensive pain. Considering that this population alone is already more sedentary due to its constant immobilization associated with chronic pain, it is essential to analyze other methods that can interfere with a better quality of life in the daily lives of these patients (Atan & Karavelioglu, 2020). One of the main methods used is physical exercise, as it promotes the reduction of symptoms in this population (Bonanabesse et al., 2019; Norouzi et al., 2019).

Physical exercise promotes several physical and psychological benefits and, as such, the effects of combined physical exercise programs on this population were analyzed. In this analysis, it was realized that combined exercises promote greater effectiveness in the control and evolution of the symptoms of the disease, that is, attenuating the main symptoms previously mentioned (Bonnabesse et al., 2019).



Considering that this population alone is already more sedentary due to its constant immobilization associated with chronic pain, one of the main methods used to improve quality of life is physical exercise (Sousa et al., 2023). Physical exercise promotes several physical and psychological benefits and a recent systematic review showed that combined training was the most effective for this population to reduce the symptoms of the disease with a duration between 60 and 90 min, three times a week with a light to moderate intensity (Sousa et al., 2023). Therefore, the aim of this study was to analyze the effects of a combined training program on health and functional capacity in female individuals diagnosed with Fibromyalgia.

## **Methods**

### *Participants*

The study included six female participants aged between 43 and 58 years old. The following inclusion criteria were assigned: i) fibromyalgia diagnosed; ii) female between 30 and 60 years old; iii) having no other associated pathologies (e.g., diabetes, cardiovascular diseases, respiratory diseases); iv) no regular participation in supervised physical exercise sessions. A written informed consent of all participants and the approval from the Ethics Committee of the Polytechnic Institute of Santarem, Santarem, Portugal were obtained.

### *Measures*

First, anthropometric measurements of weight and height were collected using a stadiometer scale (Seca 207, Hamburg, Germany). The body mass index (BMI) of each participant was then calculated using the following formula:  $\text{weight} / \text{height}^2$ .

Fibromyalgia Impact Questionnaire - Portuguese version (FIQ-P) by Rosado et al., (2006). This questionnaire contains 20 questions grouped into 10 items. The first item contains 11 sub-items and focuses on the patient's ability to perform daily tasks (cooking, cleaning, walking, mobility, among others). The answers are distributed on a Likert-type scale from 0 ("always able to do") to 3 ("unable to do"). The 11 sub-items are summed and divided by the number of scores obtained to obtain the functional capacity score. The next two items ask the patient to mark the number of days in the previous week when they felt well and when they missed work. The last seven items - work ability, pain, fatigue, morning tiredness, stiffness, anxiety, and depression - are measured using a visual analog scale (VAS) from 0 to 10, with 10 indicating maximum disability. FIQ values range from 0 to 100, with 100 indicating the maximum impact of fibromyalgia.

Short Form Health Survey Questionnaire (SF-36v2) - Portuguese version 2 by Ferreira et al. (2012). This instrument groups the 36 items into 8 dimensions, divided into 2 components. The physical component is composed of the following dimensions: Physical Function, Physical Performance, Physical Pain and General Health and the mental component: Mental Health, Emotional Performance, Social Function and Vitality (Ferreira & Marques, 1998). The the physical function dimension corresponds to 10 items, represents the individual's ability to perform their daily physical activities, such as bathing, dressing, walking, climbing stairs or carrying groceries, analyzing the impact of the limitations felt in these activities on the quality of life. The physical performance dimension is associated with 4 items to assess in terms of type and quantity, the limitations in health due to physical problems, encompassing the need to reduce the amount of work and the difficulty in performing daily or professional activities. The physical pain dimension aims to assess the intensity and discomfort caused by pain, as well as how it interferes with daily activities (household or work-related tasks). The general health dimension measures the perception of health, including current health, resistance to disease and healthy appearance. Finally, the mental component is also subdivided into four dimensions corresponding to 5 items to assess the interference of feelings such as anxiety, depression, tranquility and happiness in the individual's daily life, the loss of control in behavioral or emotional terms and psychological well-being. The emotional performance dimension is identical to the physical performance dimension, where it assesses in terms of type and amount of work and the difficulty in performing daily or professional activities. The social function dimension corresponding to 2 items, refers to the quantity and quality of usual social activities and captures the impact of physical and emotional problems on usual social activities. Finally, the vitality dimension, associated with 4 items, concerns the levels of energy and fatigue, allowing the analysis of differences in well-being (Ferreira & Marques, 1998).

To assess the physical fitness of the subjects, as well as their evolution throughout the intervention, the Functional Physical Fitness Test Protocol of the Rikli & Jones (1999) was used as they are relatively easy and safe to perform and require minimal resources of materials and space. The tests used from the Senior Fitness Test were as follows:

i) 30-second chair stand test. This test aims to assess the strength and endurance of the lower limbs (number of executions in 30" without the use of the upper limbs). In this test, participants should start the test sitting on the chair with their back straight and feet apart, one of the feet should be slightly advanced to help maintain balance.

ii) Arm curl. The purpose of this test is to assess upper limb strength and endurance (number of executions in 30"). In this test, participants should be seated on a chair with their back straight and their

feet fully on the ground, placing the dumbbell in their dominant hand in a lower position, next to the chair, perpendicular to the ground.

iii) Chair sit and reach. The aim of this test is to assess the flexibility of the lower limbs through the distance reached in the direction of the toes. The individual should start the test sitting forward with one leg flexed (approximately 90°) and with the foot fully on the floor. The best result should be recorded.

iv) 8-foot up-and-go test. This test aims to assess physical mobility - speed, agility and dynamic balance. The test starts with the participant sitting on the chair with their feet fully on the floor and at the "start" signal the participant stands up and must walk as fast as possible around the cone and return to the chair. The test should be performed twice, and the best result is used to measure performance.

v) Back scratch. The purpose of this test is to assess the flexibility of the upper limbs (distance the hands reach behind the back). The participant should perform this test standing, placing the dominant hand on top and extend the hand as low as possible towards the middle of the back with the palm down and the fingers extended, the elbow should be pointed upwards. Negative results represent the shortest distance between the middle fingers and positive results represent the measurement of the overlap of the middle fingers. Both measurements are recorded and the best one is used to measure performance.

vi) 2-minute step in place. The midpoint of the distance between the patella and the iliac crest of the participants shall be recorded using a tape measure. The value obtained should be considered as the minimum height at which the knees should be raised during the test. On command, the participant will start the movement with the right lower limb, simulating walking, for 2 minutes. The count will occur every time the right knee reaches or exceeds the minimum height established.

### *Procedures*

The main objectives of the intervention program were outlined based on the assumptions presented by Carrillo et al. (2014) and with the recommendations of the prescription of physical exercise for subjects with Fibromyalgia of the ACSM (2018), being that the main components are: aerobic exercise, strength training and stretching exercises.

The program was carried out twice a week, lasting 60 minutes or more, depending on the limitations of each participant. The intervention always started with aerobic exercise lasting between 20 to 30 minutes, then strength training consisting of six exercises for the major muscle groups, performed in 1 series with 15 to 20 repetitions and, finally, stretching exercises for tender points, lasting between 10 to 30 seconds, according to the recommendations of the ACSM (2018).

## Analysis

Data processing and statistical analysis were performed using SPSS software version 21.0 (IBM Corp, Armonk, NY: USA). Descriptive statistics were used to characterize the sample and distribute the values of the variables under study. Considering the small sample, the Wilcoxon non-parametric test for paired samples (intra-group comparison) was used for the comparative analysis between each evaluation moment (Initial-Final), with a significance level of  $p \leq 0.05$ .

## Results

Table 1 presents the results of the SF-36v2.

**Table 1** - Descriptive statistics and comparative analysis of the Components and Dimensions at the beginning and at the end of the exercise program (SF-36v2).

Dimensions	Initial				Final				Z	p
	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.		
Physical Function (au)	39.167	25.965	5.000	85.000	87.500	16.650	55.000	100.000	-2.207	0.027*
Physical Performance (au)	37.500	26.220	6.250	75.000	73.958	12.130	56.250	93.750	-2.207	0.027*
Physical Pain (au)	27.833	18.777	0.000	51.000	69.333	11.076	52.000	84.000	-2.201	0.028*
General Health (au)	43.667	19.562	20.000	77.000	66.667	18.779	37.000	82.000	-2.207	0.027*
Vitality (au)	45.833	12.290	31.250	62.500	85.417	12.290	68.750	100.000	-2.207	0.027*
Social Function (au)	45.833	18.819	12.500	62.500	89.583	9.410	75.000	100.000	-2.207	0.027*
Emotional Performance (au)	61.111	31.914	8.330	91.670	84.722	13.351	66.670	100.000	-1.802	0.072
Mental Health (au)	70.000	8.367	60.000	80.000	85.000	22.583	40.000	100.000	-1.476	0.014
Physical Component (au)	37.042	20.510	10.310	72.000	74.360	11.990	53.310	84.440	-2.201	0.028
Mental Component (au)	55.694	9.959	38.960	66.350	86.181	9.009	72.500	95.830	-2.201	0.028

SD: Standard Deviation; Min: Minimum Value; Max; Maximum Value; *p*: significance of Wilcoxon non-parametric test ( $p \leq 0.05$ )

The scales measured in the Short Form Health Survey Questionnaire (SF-36v2) showed a significant difference in the physical component, in the following domains: physical function; physical performance; physical pain and general health. In the mental component, a significant difference was observed in two domains: vitality; social function, except for the following domains: emotional performance and mental health. Regarding the components, it can be observed that they are statistically significant in both cases, that is, physical and mental component.

Table 2 presents the results of the FIQ-P.

**Table 2** - Descriptive statistics and comparative analysis of the results obtained through the Fibromyalgia Impact Questionnaire at the beginning and end of the exercise program.

Scale	Initial				Final				Z	p
	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.		
Physical Disability (au)	2.140	0.680	0.820	2.640	0.420	0.200	0.270	0.820	-	0.042*
									2.032	
Feeling good (au)	7.150	2.710	4.290	10.010	1.670	0.580	1.430	2.860	-	0.027*
									2.214	
Absences from work (au)	4.290	3.500	0.000	8.580	1.430	0.900	0.000	2.860	-	0.063*
									1.857	
Work performance (au)	7.830	2.320	5.000	10.000	2.830	0.750	2.000	4.000	-	0.027*
									2.207	
Pain (au)	7.330	2.340	4.000	10.000	2.830	0.980	2.000	4.000	-	0.028*
									2.201	
Fatigue (au)	8.330	1.750	5.000	10.000	2.670	0.820	2.000	4.000	-	0.027*
									2.207	
Rest (au)	7.500	2.430	4.000	10.000	2.830	0.750	2.000	4.000	-	0.027*
									2.207	
Stiffness (au)	7.330	2.660	3.000	9.000	3.000	1.100	2.000	4.000	-	0.026*
									2.220	
Anxiety (au)	7.170	3.310	3.000	10.000	2.670	1.210	1.000	4.000	-	0.046*
									1.992	
Depression (au)	7.000	2.830	3.000	10.000	2.500	1.050	1.000	4.000	-	0.046*
									1.997	
TOTAL FIQ (au)	2.140	0.680	0.820	2.640	0.420	0.200	0.270	0.820	-	0.028*
									2.201	

SD: Standard Deviation; Min: Minimum Value; Max; Maximum Value; *p*: significance of Wilcoxon non-parametric test ( $p \leq 0.05$ )

Regarding the scales measured through the Fibromyalgia Impact Questionnaire Portuguese version (FIQ-P) it is possible to verify a statistically significant reduction in all scales at the end of the program compared to the initial evaluation.

Table 3 presents the results of the physical fitness tests.

**Table 3** - Descriptive statistics and comparative analysis of physical fitness tests at the beginning and end of the exercise program.

Tests	Initial				Final				Z	p
	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.		
30-sec chair stand (reps)	10.330	2.875	6.000	13.000	12.830	1.600	12.000	16.000	-1.753	0.080
Arm curl test (reps)	11.500	4.637	7.000	18.000	16.830	3.550	14.000	23.000	-1.761	0.078
Chair sit and reach (cm)	7.830	9.663	0.000	23.000	6.920	6.080	1.000	17.000	-0.405	0.686
Back Scratch (cm)	-3.500	9.670	-15.000	10.000	0.170	7.680	-11.000	10.000	-1.219	0.223
8-foot up-and-go (sec)	4.790	0.825	3.850	6.130	4.710	0.600	3.850	5.650	-0.405	0.686
2-min step in place (reps)	121.500	8.142	110.000	130.000	152.500	14.963	139.000	180.000	-2.201	0.021*
Weight (kg)	84.167	23.990	58.800	123.100	84.250	18.640	59.300	107.900	-0.674	0.500
BMI (kg/m <sup>2</sup> )	32.242	7.279	24.460	42.600	32.570	6.450	24.600	38.520	-0.944	0.345

SD: Standard Deviation; Min: Minimum Value; Max; Maximum Value; reps: repetitions; sec: seconds; BMI: body mass index; *p*: significance of Wilcoxon non-parametric test ( $p \leq 0.05$ )

Comparing the values obtained in the physical fitness tests, it is possible to verify an improvement at the end of the program compared to the initial evaluation in all tests performed. In the case of the aerobic fitness test value, the improvement obtained was statistically significant ( $p=0.21$ ).

## Discussion

The present study consisted in the analysis of the effect of a combined physical exercise program on health and functional capacity in individuals diagnosed with Fibromyalgia in which there was an increase in the mean in all dimensions of the physical and mental component, associated with the health status questionnaire (SF-36v2) at the time of pre-test and post-test. The greatest increase for the post-test occurs in the physical component, associated with the following domains: physical function,

physical performance, physical pain and general health. These data are in line with some studies (Atan & Karavelioglu, 2020; Wang et al., 2018; Celenay et al., 2017; Romero-Zurita et al., 2012), which assume that chronic patients who start a combined exercise program on a regular basis (pre-test), significantly increase the physical and mental components for the post-test.

In this context, it should also be noted that an intervention group that performed aerobic exercise (tai chi) combined with strength training had more significant changes in physical dimensions; physical performance; physical pain and finally, general health. The same beneficial effects were observed in the vitality and mental health dimensions, composed of the mental domain compared to the intervention group that only performed aerobic exercise, namely tai chi (Romero-Zurita et al., 2012). Nevertheless, in another study, where the effectiveness of tai chi interventions in controlling the symptoms of the disease was evaluated, the authors concluded that from 12 weeks onwards, more beneficial results were noted for the physical and mental component (Wang et al., 2018). It is also important to mention that in another research, associated with two groups, one of which practiced aerobic exercise and the other performed aerobic exercise, muscle strengthening and stretching, there was a greater significant difference in the dimensions of physical function and social function for the group that performed only aerobic exercise. However, the group that performed combined exercise had a greater significant difference in both components. That is, in the physical component there was a greater significance in physical function and physical pain and in the mental component, there was a greater significance in the vitality and mental health dimension (Sañudo et al., 2010).

Moreover, it is also important to understand and analyze the effect of chronic pain control and its limitations in this population. Therefore, the results of the FIQ-P can be observed, where there is a significant difference from pre-test to post-test. These results are in line with previous research, where a decrease in the impact of fibromyalgia was observed in the following scales: pain level, fatigue, physical disability and sense of well-being (Celenay et al., 2017). However, it should also be noted that they are also associated with a decrease in the mean in the following scales: stiffness, anxiety and depression (Romero-Zurita et al., 2012) strictly associated with the significant values of the study presented.

For the evaluation of physical fitness tests, it should be highlighted that to carry out the assessment of functional capacity as well as the evolution of the participants throughout the intervention, the Functional Physical Fitness Tests of the Rikli & Jones (1999) was used because they are relatively easy and safe to perform and require minimal resources of materials and space.

In functional capacity, very significant improvements were observed from the pre-test to the post-test moment at the level of the lower limbs but also of the upper limbs, these results corroborate with other

studies (Sañudo et al., 2012; Valkeinen et al., 2008). The strength of concentric extension of the lower limbs differed significantly between the two moments of evaluation, pre-test (2%) and post-test (6%). In addition, it should be noted that the combined exercise program group increased the lower limb extension strength value by more than 6% from 14 weeks of program execution (Valkeinen et al., 2008). Nevertheless, the increases in forearm flexion strength were statistically significant in the training group after the 14-week assessment, whereas there were no strength gains in the control group (Valkeinen et al., 2008). However, it should also be emphasized that even in a 6-week program, participants who performed a combined exercise program had a slight improvement in muscle strength gains compared to the control group, which lost muscle strength in the lower limbs (Sañudo et al., 2012). In addition to muscle strength gains in the lower and upper limbs, participants had significant improvements in aerobic performance and functional capacity but no significant differences in body composition, namely body mass index and weight.

Regarding body composition, these results seem to be associated with the fact that exercise programs for these patients are recommended to use a low to moderate intensity (Sousa et al., 2023) which may not be enough to promote significant changes. Although in the studies included of the previous systematic review (Sousa et al., 2023), the distance covered in 6 minutes was used to assess aerobic performance which was not the present case, the results showed that the aerobic capacity increased significantly from pre-test to post-test (Carbonell-Baeza et al., 2010; King et al., 2002). In the study by Valim (2006), it is possible to verify the preponderance of the aerobic component and the beneficial results for this type of population due to the release of endorphins. According to Valim's study (2006), another important observation in this population is that the benefits of stretching occurred until 19 weeks and then stabilize, while in the case of the aerobic component continues to increase until 20 weeks.

The current study had some limitations such as the small sample size, the lack of control of daily living activities, lack of control group and lack of nutrient intake assessment which could strengthen the findings of the study. Future studies should consider the previous points and include different physical tests, and physiological variables for a better knowledge of this specific population.

## Conclusion

With the results of the present study, very important and relevant conclusions can be drawn for the analysis of the effect of a combined exercise program on the health and functional capacity of individuals diagnosed with Fibromyalgia. Firstly, it is understood that regular practice and the adoption of a healthy lifestyle reduces the painful points associated with the disease, reduces fatigue, reduces stress and anxiety as well as improves aerobic performance and functional capacity. Regarding the



intensity of exercise programs for this population, a low to moderate intensity is recommended and individualization is crucial to ensure the adherence of participants and, consequently, to promote a change to a healthier and more active lifestyle. Regarding the assessment of health status through the SF-36v2, it is concluded that from 12 weeks onwards there are greater gains in the components as well as dimensions composed by the same since associated with an exercise program.

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## ARTICLE 2

### — Federated Sport and School Sport. Searching for complementarities.



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#### Introduction

The role of Sport in building a better society is recognized by the different states of the European Union as it is associated with benefits for physical and psychological health, in addition to promoting socialization through the interaction it requires between participants within a regulated framework of standards. (European Commission/EACEA/Eurydice, 2013).

For younger people, practicing sports is crucial for acquiring fundamental motor skills for building motor literacy (Balyi et al., 2013; Dudley et al., 2017), for building their personality as it allows them to develop important psychological aspects such as resilience to adversity (Kaier et al., 2015), self-control (Duckworth & Gross, 2014) or self-confidence (Holt, N. & Neely, K., 2011). The development of social skills may also be attained because, during sporting interaction, values and codes of conduct are promoted and commitment towards colleagues, referees and opponents are required (Siedentop, D., 1994, 2002).

Providing young people with access to systematic, structured sporting practice, with sufficient volume and intensity so that they can enjoy all those benefits, has been a concern of sports policies. It is intended that a first contact with sports becomes a consolidated, systematic practice, with a growing bond that evolves in quantity and quality towards better performance or, at least, into a habit that remains throughout life (Balyi et al., 2013).

The models through which youth sport is implemented vary across different European countries, ranging from more liberal regimes with greater autonomy such as the Netherlands or Germany to more regulated regimes with less autonomy such as France and Spain (Hernández & Pardo, 2020). The very way in which the associative system relates to school sport may still differ significantly.

Exclusively school-based approaches, such as those followed by Nordic countries, allow us to guarantee considerable resources in the dynamics of the work carried out in schools, but weaken sporting results, due to the lack of an emphasis they present regarding the possibility of practitioners to follow a line related to performance (Blázquez, D. & Ramírez, F., 2010).

Exclusively sporting models, such as those used in Anglo-Saxon countries, are organized around federated sporting organization models. The school is just another context where the same model is applied (Blázquez, D. & Ramírez, F., 2010).

The Portuguese case represents a mixed model, as it implements a set of curricular complement activities in which the articulation between the educational system and the sports system is foreseen (Avelar Rosa, B., 2009).

In Portugal, children's sports develop essentially in two ways: Associative, commonly known as Federated Sports, (Adelino, J. et al., 2005) and School Sports (SS), the exclusive administrative responsibility of the State in what pedagogical responsibility lies with educational establishments and their teachers.

Federated Sport has a greater expression, involving 391072 athletes in 70 different Sports up to the Junior level (I.P.D.J., 2020).

School Sports is managed through a National program which, in the 2019-2020 school year, had 172018 young people registered, grouped into 6818 Groups – Teams that participated in their own competitions in 37 sports.

School Sports enjoys complete autonomy from Federated Sports, however, coordination between these systems is foreseen from a complementarity perspective, (Order no. 13608, 2012)

Thus, School Sports developed a set of initiatives and programs based on partnerships and protocols with different sport federations, namely:

- In addition to level 1 (intra-school) and 2 (inter-school) activities, level 3 activities were created, which constitute sporting practice (training and competitions) for teams and practitioners with high sporting potential, with eventual participation in the federated system;

- Complementary projects were created, which implement school activities in partnership with some sports federations;
- Sports Training Centers for School Sports were created, which are sports development hubs, driven by groups of schools and non-grouped schools, in partnership with federations, municipalities and local organizations that aim to improve performance;
- Cooperation agreements were established with a view to equipping the Schools, which was reinforced with material provided by some Sports Federations;
- The Training Program for School Sports Teachers and Students (Referees) is implemented in cooperation with most Sports Federations.

However, it has been considered that this articulation has fallen short of what is desirable (Avelar Rosa, B., 2009; Ferro, N., 2014; Godinho, A., 2018; Gonçalves, 2013; Resolution of the Assembly of the Republic no. 94, 2013) and is neither optimized nor emerges from a National strategy for sports development (Pires, G., 1995).

It is therefore important to check the situation regarding the degree of implementation of each Sport in each of these systems. This work will allow, in the future, to establish differentiated development strategies, adapted to the reality of each Sport, which will allow the complementarity between systems.

## Goals

The aim of this work is to identify clusters of Sports that, in Portugal, are in a similar situation in terms of implementation levels either in the School Sports subsystem and in the Federated Sports subsystem.

This analysis will subsequently give support for the definition of strategies that maximize synergies between the two subsystems thus strengthening the national sports system.

## Materials and Methods

For this analysis, only the 30 sports included in the School Sports program that enjoy the status of public sports utility and that had practitioners affiliated with the respective federation were considered. The most recent data published by the General Directorate of Education/Division of School Sports and the Portuguese Institute of Sports and Youth (I.P.D.J.) was considered, that is: with regard to School Sports, the number of team groups that in the 2019-2020 season which participated in the external activity (School Sports Team Groups - SSTG), that is, in the inter-school competition (levels 2 and 3). The Boccia and Goalball team groups were considered with the generic designation of “Adapted

Sports". Regarding the Federated system, in the same Sports, the total number of practitioners in the 2018-19 season who enrolled in the training levels, that is, up to the Junior level (Federated Sports Practitioners – FSP) (I.P.D.J., 2020) was considered.). As data on federated participants in Futsal and Mountain Biking were not available, they were collected from the respective federations and related to the same levels and the year 2018-2019.

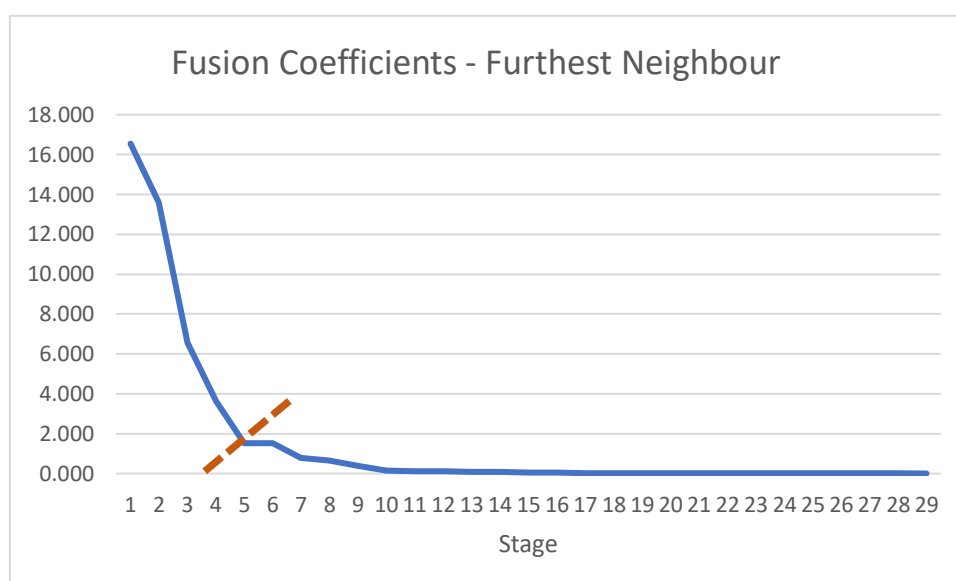
A cluster analysis was performed using a hierarchical agglomerative model. Since the variables under study are in different units, their standardization was carried out using the formula:

$$z = \frac{(x - \bar{x})}{s}$$

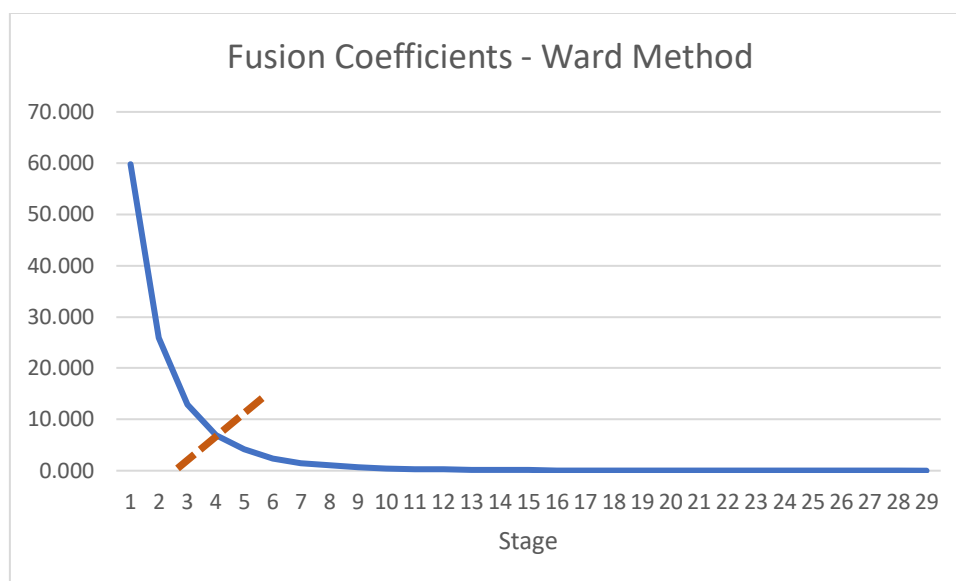
A map of agglomerations was created using the square of the Euclidean distance as a measure of similarity. The Farthest Neighbour method and Ward's method were used as agglomeration methods. For each of these methods, the criterion for cluster retention was the stability of the fusion coefficients. The stability of the solutions found in each of the methods was a criterion for the solution adopted (Hair, J. & William, B., 2000).

## Results

The analysis of the fusion coefficients carried out with the Farthest Neighbour (Figures 1) method points to 5 clusters of federations being considered while, using Ward's method (Figure 2) only 4 clusters would be considered.



**Figure1** – Fusion Coefficients – Furthest Neighbour Method



**Figure 2 – Fusion Coefficients – Ward Method**

When checking the stability of the two solutions found, it is clear that, except for a single Sport – Futsal –, the solutions are completely coincident.

The solution found with the Ward method considers 4 clusters and was considered the most appropriate solution, as this solution allows distinguishing the clusters of Sports according to the installed capacity in each of the systems, providing the necessary information for the development of strategies for each Sport (Hair, J. & William, B., 2000).

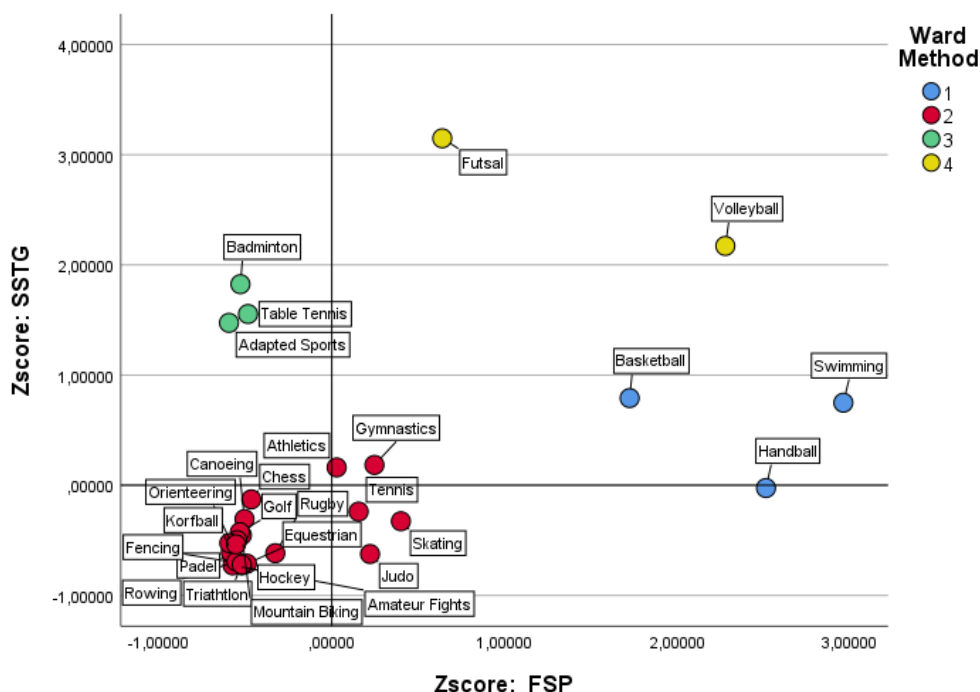
The 4 clusters of Sports that were formed in the adopted solution (figure 3) are:

Cluster 1 – Handball, Swimming, Basketball. – These Sports present a level of implementation in Federated Sports that is considerably higher than that found in School Sports. Although, in School Sports these Sports do not stand out and are slightly above the average for the different Sports in terms of the number of Team Groups, in the Federated system they have a total of practitioners considerably above the average.

Cluster 2 – Athletics, Canoeing, Mountain Biking, Korfball, Equestrian, Fencing, Gymnastics, Golf, Hockey, Judo, Amateur Fights, Orienteering, Padel, Skating, Rowing, Rugby, Surfing, Tennis, Archery, Triathlon, Sailing, Chess. – This Cluster, in which most Sports are included, is characterized by low number of practitioners, both in the Federated system and in School Sports.

Cluster 3 – Table Tennis, Badminton, Adapted Sports – This Cluster includes Sports with low installed capacity in the Federated system, but with a total of teams clearly above the average in School Sports.

Cluster 4 – Futsal, Volleyball. These Sports have an installed capacity above average both in the Federated system and in School Sports.



**Figure 3 – Z Scores for Federated Sport Practitioners (FSP) and School Sport Team Groups (SSTG)**

The search for complementarities between the Federated and School Sport Systems must be based on the established capacity of each Sport in each of them. For the Sports in cluster 1, which include those that have the greatest implementation in the federated system, it is important to grow in the school system using the former to develop the latter. The installed capacity in terms of human resources, materials and equipment, organizational structure available in the federate can be used to support and encourage the creation of team groups in School Sports.

Regarding the Sports of cluster 2, cooperation strategies must be studied on a case-by-case basis, as although all these Sports show a smaller installed capacity in both systems compared to cluster 1, the situation of each one can still differ greatly from each other because practitioners of these sports are scarce. This differentiation concerns asymmetries that may exist regarding the sport development in different territories, or even important differences in the frequency of practitioners by age group/gender. The existence of joint competitions could be an example of a strategy to adopt, in situations where this is possible.

The Sports of cluster 3 have a strong implementation in School Sports, having expression at national level. However, in Federated Sports these Sports have less implementation. For this cluster, School Sports could lever the development of Federated Sports, either through the creation of level 3 groups at School, or through articulation with local clubs when of its existence.

The Sports of cluster 4 are those that have national expression in both systems, meaning that it will be possible to find global forms of cooperation that optimize human and material resources.

The strategies to be adopted for each of the clusters found should be subsequently adapted based on other studies that complement the present one and that consider other relevant aspects, such as the geographical distribution of athletes/students, their gender or their age group.

## **Conclusions**

With regard to youth sport, two systems coexist in Portugal: the School and the Federated. This first study made it possible to identify clusters of Sports based on their ability to bring together practitioners in each of these systems.

The Clusters found are a first step towards creating globally identical strategies for each cluster but differentiated from cluster to cluster. Its definition, however, is outside the scope of this study. The data found here may contribute to this definition and to guide and support political decisions that may be taken on the matter.

This study must, however, be complemented, as it is necessary to delve deeper into the geographical distribution of practitioners by gender and age group in each of the Sports. Different cooperation strategies can arise in Sports that have heterogeneous implementations in different territories or across age groups.

This search for complementarities may cover several areas, from the training and profitability of human resources, to equipping, through the organization of competitions or the creation of training centers. Cooperation between systems is not limited to the relationship between School and Federated Systems. Other partners could prove to be decisive, such as local authorities.

Considering that the sports system is made up of several sub-systems, the planning process must consider them all, creating and deepening interaction and mutual assistance mechanisms leading to the profitability of available resources for each of the parties (Pires, G., 1995).



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04

## NEWS – PROJECTS UNDER DEVELOPMENT

### — Project 1:

### Healthy Lifestyle Network Europe



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**Ciência ID:** <sup>3</sup>3716-794D-E9E8; <sup>4</sup>2610-B602-ED5B; <sup>5</sup>3210-F874-D695

### Introduction

The European project Healthy Lifestyle Network Europe (HLNE) aim to improve the healthy lifestyle of people with health problems throughout Europe, improving the quality of life and health of the European citizens, in the battle against overweight and obesity, diabetes, cardiovascular diseases, and other illness, related to unhealthy lifestyle, such as physical inactivity, unhealthy eating and stress.

### Objectives

HLNE has the following specific objectives:

- Healthy Lifestyle promotor: Development of an innovative Healthy Lifestyle Promotor training and e-learning for professionals and volunteers, using the New Health video series from the New Health project 2022 (<https://new-health.eu/en>); Train 125 Healthy Lifestyle Promoters per

partner to level EQF2, using the New Health program, developed by New Health Foundation and partners (1000 in total); Develop materials for promotion and recruitment; Each of these 1000 Healthy Lifestyle Promoters provides the New Health Healthy Lifestyle program to at least 50 participants in their own country, so at least 50000 people will take note of this information and thus be stimulated to a healthier lifestyle; New Health App with activity tracking from IOS and Android health Apps.

- Healthy Lifestyle Coach: Development of the Healthy Lifestyle Coaches course; National educational pilots in partner countries (training of at least 10 Healthy Lifestyle Coaches, 80 in total); National coaching pilot in partner countries – every Healthy Lifestyle Coach coaches at least 5 consumers with health inequalities (400 in total).
- Development of a European Healthy Lifestyle Education Institute.

### **Financing**

ERASMUS-SPORT 2023-SCP - Cooperation Partnerships (Project number: 101133533); 400.000€.

### **Duration**

3 years (November/2023-October/2026).

### **Partners**

Stichting Nieuwe Gezondheid (Netherlands; Coordinator); Lithuanian Association of Health and Fitness CLU (Lithuania); Belgische Fitness Organisatie (Belgium); Univerzita Komenskeho V Bratislave (Slovakia); AEDESA - Asociacion Europea Deporte Ejercicio Y SA (Spain); EFAA BV (Netherlands); Center for Health, Exercise and Sport Sciences (Serbia); European Network of Sport Education (Austria); Instituto Politecnico De Santarém – Escola Superior de Desporto de Rio Maior (Portugal).

### **ESDRM team**

Susana Franco (responsável); Vera Simões e Carla Borrego (colaboradoras).



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## — Project 2: MOVE4FUTURE



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**Team Researchers:** Anabela Vitorino<sup>1,4,7</sup>, Fátima Ramalho<sup>1,3,8</sup>, Liliana Ramos<sup>1,2,9</sup>, Marco Branco<sup>1,3,11</sup>, Miguel Silva<sup>1,2,12</sup>, Nancy Brígida<sup>1,10</sup> and Vera Simões<sup>1,2,13</sup>

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**Ciência ID:** <sup>5</sup>B414-59C4-E709; <sup>6</sup>9C16-7F53-1375; <sup>7</sup>7A1F-3376-604F; <sup>8</sup>2714-5941-0ADD; <sup>9</sup>4D17-C91B-A66E; <sup>10</sup>CB1E-7BEC-D5BE; <sup>11</sup>4B1F-73E2-29C9; <sup>12</sup>D819-EE419-409E; <sup>13</sup>2610-B602-ED5B



### **Project Description:**

The “MOVE4FUTURE” Project is guided to children and youth in which the main goal is to promote the importance of physical activity, proper nutrition and healthy lifestyles, in their development.

This project takes place at ESDRM facilities and is a partnership with the SOS Family Support Center of Rio Maior of the SOS Children's Villages Association (CAFAP), being an initiative that aims to contribute to the healthy and balanced growth of the new generations.

A 12-week exercise training program will be implemented (with aerobic and muscular resistance exercises and also rotating recreational sports activities) with 1 exercise session per week, 1 hour each session. Twenty children and youth of both genders, aged between 8 and 17 years are participating in the program.

Considering the importance of an active participation of the parents in children and youth healthy development, the parents will also be invited to participate in sessions to share and acquire new knowledge, led by experienced teachers. These sessions will be enriching and will cover relevant topics related with: the importance of regular physical activity, proper nutrition, healthy lifestyles and anxiety management.

A longitudinal study will be carried out. The study will include 2 assessment moments: at the beginning of the program (in the week before starting the intervention) and at the end of the intervention (in the week after its end). The assessments include measures related to: physical fitness components; body composition; anxiety levels and physical activity levels.

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Oral presentation at the 1º Simpósio de Saúde e Performance no Futebol e Futsal, organized by "Ciência da Bola" in Brasil by Rafael Oliveira (28-10-2023) with the title: A Relação entre bem-estar e carga de treino e jogo em jogadores de futebol profissionais - "The relationship between wellness and training and match load in professional male soccer players".

Participation in the "World Diabetes Day" session, which took place on November 14, 2023, at Livraria Arquivo, in Leiria, organized by the Sociedade Portuguesa de Diabetologia.

Participation in the awareness session on the theme "Diabetes, physical exercise and healthy eating within the scope of World Diabetes Day and the "Educate to Protect the Future" project at the Agrupamento de Escolas das Colmeias, on November 14, 2023.

Participation in the Leiria Medical Days MEDLEI 2023, in the Geriatrics panel with communication on the theme "Physical exercise and aging", which took place on the 9th and 10th of November 2023, in Auditorium 1 of ESTG, Polytechnic of Leiria.

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07

## R&D ACTIVITIES

- **Invitation for publication in Healthcare journal:**

The researcher Prof. Dr. Roberta Frontini is the guest editor of a special issue with the topic: *Research and Survey on Mental Health of Children and Adolescents*. Deadline for manuscript submissions: 30 November 2023. For more information [CLICK HERE](#)

- **Invitation for publication in Healthcare journal:**

The researcher Prof. Dr. Rafael Oliveira is the guest editor of a special issue with the topic: *Supporting Athlete Development: The Role of Supporting Structures*. Deadline for manuscript submissions: 31 December 2023. For more information [CLICK HERE](#)

- **Invitation for publication in Healthcare journal:**

The researcher Prof. Dra. Ana Pereira is the guest editor of a special issue with the topic: *Physical Activity: A Powerful Weapon to Public Health Strategy*. Deadline for manuscript submissions: 31 December 2024. For more information [CLICK HERE](#)

- **Invitation for publication in Frontiers in Psychology:**

The researcher Prof. Dr. Carla Chicau Borrego is one of editors of Frontiers in Psychology, , section Sport Psychology and linked to the Research Topic: *Psychological Factors in Physical Education and Sport - Volume III.*. Manuscript Deadline 14 January 2024. For more information [CLICK HERE](#)

- **Invitation for publication in "Frontiers in Sports and Active Living":**

The researchers Prof. Dr. Rafael Oliveira, Prof. Dr. João Paulo Brito, Prof. Dr. Ryland Morgans and Prof. Dr. Francisco Tomás González-Fernández are the guest editors of the following research topic: *Load and Wellness Monitoring in Sports: The Relationship Between Different Metrics*". Deadlines: Abstract Submission Deadline 10 November 2023; Manuscript Submission Deadline 14 March 2024. For more information [CLICK HERE](#)

- **Invitation for publication in Frontiers in Psychology:**

The researcher Prof. Dra. Ana Pereira is the guest editor of a special issue with the topic: *Physical*



Activity: A Powerful Weapon to Public Health Strategy. Deadline for manuscript submissions: 3 April 2024. For more information [\*\*CLICK HERE\*\*](#)

- **Invitation for publication in Healthcare journal:**

The researcher Prof. Dra. Ana Pereira is the guest editor of a special issue with the topic: Active Brain and Body with Lifetime Physical Exercise for a Healthier Aging. Deadline for manuscript submissions: 31 May 2024. For more information [\*\*CLICK HERE\*\*](#)

- **I&D projects in the scientific areas of CIEQV:**

For more information [\*\*CLICK HERE\*\*](#).

08

## CALLS AND FUNDING

- Calls for support to *Turismo*, START-PME. Status: open. For more information [\*\*CLICK HERE\*\*](#)
- Calls for support to *Programa de Desenvolvimento Rural*, START-PME. Status: in preparation. For more information [\*\*CLICK HERE\*\*](#)
- Calls for support to *Plano de Recuperação e Resiliência*, START-PME. Status: open. For more information [\*\*CLICK HERE\*\*](#)
- Calls for support to *Programa ATIVAR.PT*, START-PME. Status: open. For more information [\*\*CLICK HERE\*\*](#)
- Calls for support to *Apoio à Produção Nacional*, START-PME. Status: open. Deadline: to be defined. For more information [\*\*CLICK HERE\*\*](#)
- Calls for support to *Programa de Incentivo para os Açores*, START-PME. Status: in preparation. For more information [\*\*CLICK HERE\*\*](#)
- Calls for support to *Apoios à contratação – IEFP*, START-PME. Status: open. For more information [\*\*CLICK HERE\*\*](#)
- Cluster 2 - Culture, Creativity and Inclusive Society. Deadline: 7 February 2024. For more information [\*\*CLICK HERE\*\*](#)
- FCT Calls. For more information [\*\*CLICK HERE\*\*](#)
- Isidore call for transnational access (tna) for projects focusing on sars-cov-2 research. For more information [\*\*CLICK HERE\*\*](#)

09

## SCHEDULE

- **WCQR2024 - 8th World Conference on Qualitative Research**, 23-25 January 2024, São Miguel, Açores & Johannesburg, South Africa & online. For more information [CLICK HERE](#)
- **CONGREGA 2024 - 1st Ibero-American Congress on Engineering Asset Management**, 3-5 July 2024, Lisbon, Portugal. For more information [CLICK HERE](#)
- **WCQR2024 | 8th World Conference on Qualitative Research**, 23-25 January, São Miguel, Açores & Johannesburg, South Africa & Online. For more information [CLICK HERE](#)
- ***IX Seminário Ibero-Americano CTS XIII Seminário CTS***, 8-10 July 2024, University of Aveiro. For more information [CLICK HERE](#)