IN COMMON SPORTS - INTERGENERATIONAL COMPETITION AS MOTIVATION FOR SPORT AND HEALTHY LIFESTYLE OF SENIOR CITIZENS

SECOND INTERMEDIATE REPORT

(Ref.: 590543-EPP-1-2017-1-PT-SPO-SCP)

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IN COMMON SPORTS - INTERGENERATIONAL COMPETITION AS MOTIVATION FOR SPORT AND HEALTHY LIFESTYLE OF SENIOR CITIZENS

(Ref.: 590543-EPP-1-2017-1-PT-SPO-SCP)

Start Date: Jan 1, 2018

End Date: Dec 31, 2020

Partners: Municipio de Vila Nova de Cerveira (PT), University of Vigo (SP) Municipality of San Xenxo (ES), Zolpont Egyesulet es Szerkesztoseg (HU), Polytechnic Institute of Viana do Castelo (PT), Obshtina Aksakovo (BG), Comune di Cesena (IT)

WP4 STUDY "Physical fitness and cognitive performance of the aged population – planned competition as additional motivation for active lifestyle"

WP Leader – Polytechnic Institute of Viana do Castelo (IPVC)

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Second Intermediate Report

1. Introduction

the second year of the project was running under the previous defined guidelines.

Training plans were developed and recorded in appropriated paper sheet for further analysis. All project' partners were encouraged to engage more participants.

Additional researchers were integrated on research team. Specifically, one more researcher from IPVC and two from University of Vigo.

The aims of WK4 are:

To assess the impact of a sport competition in the participants, and analyze the association between physical activity level, physical fitness and cognitive performance of the elderly in, at least, 5 countries;

To investigate the impact of additional events such as "In Common Sports" on physical fitness status and healthy life style, on aged population;

To understand the motivation for systematic physical activity on aged population;

To examine the exercise-related changes on cardio-metabolic markers for health;

To create intergenerational links for social inclusion;

To drive and to contribute to the development of more effective health promotion policies and strategies.

2. Methods

2.1. Participants

The recruitment is an open process, all the time. Therefore, new participants are welcome, anytime. At the end of the first year, the sample was defined as presented on Table 1.

Table 1: Participants distribution by country and sex, year 1.

Country	Men		Women		Total	
	N	years	N	years	N	years
Bulgary	12	70±4	64	71±6	76	70±5
Hungary	16	71±6	42	66±5	58	67±6
Italy	27	72±8	94	70±7	121	70±7
Portugal	33	71±6	52	72±7	85	71±6
Spain	a)		a)		a)	
Total	88	71±6	252	70±7	341	70±7

a) In recruitment process

At the end of year 2, the complete sample is presented on Table 2

Table 2: Participants distribution by country and sex, year 2.

Country	Men	Women	Total
Bulgary	12	64	76
Hungary	21	59	80
Italy	16	63	79
Portugal	34	61	95
Spain	18	62	80
Total	101	309	418

After two years of running project, the number of participants increased by 69. However, the behavior was different by country. In fact, two countries increased the number of participants (Hungary and Portugal), one maintained the number of participants (Bulgary), one country showed a evident decrease (Italy) and one country is actively participating for the first time (Spain).

In a follow-up perspective, table 3 presents the participants enrolled on base line and are still involved on project at the end of year 2.

Table 1: Participants distribution by country in follow-up, year 1 plus year 2.

Country	Total
Bulgary	75
Hungary	41
Italy	79
Portugal	80
Spain	a)
Total	275

a) not applicable

Regarding to the participants follow-up, from the intial 341 participants, 275 are still commited with project, representing 67% of total sample. Considering the papo+ulation age-group, the attendance and the rate of drop-out are excellent.

2.2. Testing

Throughout the year several meetings, alive and videoconference, were schedule aiming to improve data collect quality.

Tests were performed (March/April – full tests; October/November 2019 – physical fitness tests) on appropriate place available by local organization and carried out by the technicians who attendant the two short courses.

Raw data were sent to research team by Country partners for further analysis. To ensure the quality of database and to detected possible errors, research team performed exploratory statistics and data normality. Detected errors were isolated and decisions were taken – double data confirmation on own spreadsheet; re-assessment; delete mistaken data.

Final database was used for scientific work – conference abstract and paper submission.

3.Results

3.1. Data Analysis & Intermediate Results

The cognitive status, life quality and motivation for physical activity practice are presented as Table 3.

Table 3: Participants' cognitive status, life quality and motivation for physical activity practice, moment 3.

		N	Mean	Std. Error
	MMSE total	418	27.56	2.76
	EQ-5D-5L index	405	0.83	0.00
Motivation to practice physical activity	Social issue	397	2.60	0.42
	Fitness	397	2.49	0.46
	Emotion	397	2.13	0.63
	Competition	397	2.46	0.45
	Skills Develop	411	2.54	0.55
	Affiliation	411	2.45	0.57
	Fun	411	2.46	0.42

MMSET test is the most commonly used cognitive screening test and it is influenced by age and education. Nevertheless, the scores presented suggest good level at cognitive level, in all group.

Similar evidence is reported on life quality, assessed as EQ-5D-5L. The index presents a score of 0.83.

In realtion to motivation to practice physical activity, there is not a motive clearly above the others. Even the motive "emotion, the lower score presented, shows a good score (2.13). Nevertheless, "Social issue", "Skills develop" and "Fitness" are the most mentioned.

Table 4: Participants' cognitive status, life quality and motivation for physical activity practice, by country, moment 3.

	Spain			Bulgaria			Hungary			Italy			Portugal		
	N	Mean	Std. Er	N	Mean	Std. Er	N	Mean	Std. Er	N	Mean	Std. Er	N	Mean	Std. Er
MNSE total	67	27.00	3.21	76	25.78	3.27	68	28.69	1.74	121	28.07	2.39	86	27.97	2.17
EQ5D5L index	68	0.83	0.01	76	0.70	0.02	55	0.95	0.01	121	0.85	0.01	85	0.89	0.01
Social issue	66	2.48	0.51	76	2.58	0.44	53	2.63	0.52	119	2.55	0.51	83	2.79	0.31
Fitness	66	2.46	0.37	76	2.49	0.49	53	2.56	0.55	119	2.34	0.46	83	2.69	0.36
Emotion	66	2.10	0.67	76	2.29	0.53	53	2.17	0.62	119	1.83	0.58	83	2.41	0.61
Competition	66	2.42	0.36	76	2.52	0.43	53	2.48	0.53	119	2.33	0.49	83	2.61	0.38
Skills Develop	66	2.61	0.41	76	2.38	0.61	53	2.57	0.58	119	2.45	0.57	83	2.73	0.45
Affiliation	66	2.42	0.65	76	2.35	0.62	53	2.49	0.56	119	2.40	0.54	83	2.60	0.46
Fun	66	2.42	0.38	76	2.46	0.41	53	2.48	0.50	119	2.33	0.41	84	2.67	0.36

MMSET and EQ-5D-5L tests show high scores, by country. Hungary and Italy seems to have the best scores in both.

In relation to motivation to practice physical activity, there is not a motive clearly above the others. Nevertheless, little differences may be find among the countries. "Social issue" is the higher motive for Italian, Hungarian, Portuguese and Bulgarian participants, "Skills develop" is the most mentioned motive for Spain.

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In relation to sex, the data are reported on table 5.

Table 5: Participants' cognitive status, life quality and motivation for physical activity practice, by sex, moment 3.

	Female			Male		
	N	Mean	Std. Er	N	Mean	Std. Er
MNSE total	340	27.48	2.77	76	27.87	2.72
EQ5D5L index	329	0.81	0.01	76	0.89	0.01
Social issue	325	2.59	0.47	72	2.65	0.46
Fitness	325	2.47	0.46	72	2.59	0.45
Emotion	325	2.10	0.62	72	2.28	0.67
Competition	325	2.46	0.44	72	2.48	0.49
Skills Develop	325	2.53	0.52	72	2.57	0.65
Affiliation	325	2.45	0.55	72	2.44	0.64
Fun	325	2.45	0.41	72	2.51	0.46

Similar to previous analisys, the scores by sex of congitive level, quality of life and the motivation to practice physical activity, are at good level.

The Anthropometrics measures are presented as Table 6.

Table 6: Participants' Anthropometrics measures, moment 3.

	N	Mean	Std. Error
BMI (Kg/m^2)	350	28.61	4.84
Fat percent (%)	350	33.13	7.21
Waist to Hip Ratio	351	91.98	11.44

BMI, %fat and Waist to Hip ratio are determinats of health. The group,as a whole, presents scores border line with the cut-off line defined by World Health Organization.

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Table 7: Participants' Anthropometrics measures by country, moment 3.

	Spain			Bulgaria			Hungary			Italy			Portugal		
	N	Mean	Std. Er	N	Mean	Std. Er	N	Mean	Std. Er	N	Mean	Std. Er	N	Mean	Std. Er
BMI (Kg/m^2)	80	28.95	3.60	76	29.78	4.79	94	27.20	4.00	122	26.89	3.92	86	27.09	3.77
Fat percent (%)	80	32.26	6.37	76	35.91	6.07	94	36.90	8.72	122	27.36	8.16	86	29.20	7.19
Waist to Hip Ratio	80	0.88	0.09	76	1.22	2.68	94	0.87	0.08	122	0.89	0.07	86	1.12	0.10

Considering the country analisys, both Portugal and Bulgaria seem to overpass the cut-off line in relation to waist to Hip ratio. Therefore, caution on cardiorespiratory domain is needed.

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Table 8: Participants' Anthropometrics measures, by sex, moment 3.

	Female			Male		
	N	Mean	Std. Er	N	Mean	Std. Er
BMI (Kg/m^2)	279	28.74	5.03	48	27.92	3.31
Fat percent (%)	261	34.22	6.77	45	26.47	6.76
Waist to Hip Ratio	280	91.41	11.98	48	95.95	8.35

Similar to table 6, both female and male are in line with normative values for health.

Changes on Physical Fitness Status of Participants involved in the project are presented as Table 9.

Table 9: Physical Fitness Status of Participants involved in the project, moment 3 and 4.

	Moment 3			Moment 4		
	N	Mean	Std. Error	N	Mean	Std. Error
HandGrip Left (Kg)	142	33.81	0.94	209	31.63	0.64
HandGrip Dir (kg)	143	31.69	0.90	208	30.22	0.66
Sit to Stand (nº)	192	18.99	0.42	206	17.84	0.34
Walking 6m (m)	189	575.80	8.73	206	591.57	6.36
Sit & Reach (cm)	192	0.48	0.67	207	3.30	0.62
TUG (sec)	191	6.42	0.14	208	9.54	3.58

Despite being not comparable as moment 4 included new participants from Spain and missing data from Bulagry, evident increases were detected on that lapse of time. However, in physical fitness tests, the values reported in both moments shows evident increases in cardiorespiratory capacity and agility. Also, data findings seem to point for a training discusson about exercise to implement as no improvements were verified on both upper and lower limbs muscles strength and power

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Table 10: Participants' Physical Fitness Status by country, moment 3 and 4.

	Spain			Bulgaria			Hungary			Italy			Portugal		
	Moment 3														
	N	Mean	Std. Er	N	Mean	Std. Er	N	Mean	Std. Er	N	Mean	Std. Er	N	Mean	Std. Er
HandGrip Left (Kg)	80	28.11	6.18	76	25.59	4.90	94	33.53	9.05	122	31.90	9.46	86	42.03	12.21
HandGrip Dir (kg)	80	30.85	6.92	76	28.47	5.84	94	32.24	13.38	122	34.46	9.73	86	41.86	13.48
Sit to Stand (nº)	80	14.28	5.38	76	16.47	3.05	94	15.14	2.20	122	24.07	5.59	86	24.39	4.39
Walking 6m (m)	80	521.35	104.12	76	542.82	89.4	94	631.00	81.41	122	678.17	67.32	86	566.18	100.16
Sit & Reach (cm)	80	-2.63	8.99	76	1.18	6.83	94	10.76	10.12	122	2.66	11.37	86	-1.86	11.25
TUG (sec)	80	-16.32	13.59	76	8.02	1.48	94	5.37	0.88	122	5.20	0.59	86	4.40	0.65
	Moment 4														
	N	Mean	Std. Er	N	Mean	Std. Er	N	Mean	Std. Er	N	Mean	Std. Er	N	Mean	Std. Er
HandGrip Left (Kg)	80	29.41	7.39	-	-	-	94	31.41	10.34	122	30.02	9.52	86	34.34	11.72
HandGrip Dir (kg)	80	30.65	6.96	-	-	-	94	33.32	11.76	122	31.59	9.48	86	38.29	10.18
Sit to Stand (nº)	80	16.48	3.45	-	-	-	94	16.95	3.07	122	17.61	3.41	86	24.96	6.33
Walking 6m (m)	80	534.35	53.45	-	-	-	94	674.94	98.06	122	639.27	60.57	86	656.00	80.71
Sit & Reach (cm)	80	4.63	9.08	-	-	-	94	8.74	8.69	122	2.66	11.37	86	0.21	8.17
TUG (sec)	80	6.54	1.36	-	-	-	94	5.33	0.98	122	5.89	0.75	86	4.43	0.88

The trend verified by country is in line with the global behavior reported on table 9.

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Table 11: Participants' Physical Fitness Status, by sex, moment 3 and 4.

	Female			Male		
	Moment 3					
	N	Mean	Std. Er	N	Mean	Std. Er
HandGrip Left (Kg)	281	31.37	9.43	48	48.81	12.31
HandGrip Dir (kg)	281	29.10	8.72	48	48.56	11.92
Sit to Stand (nº)	273	17.25	5.88	48	19.19	5.67
Walking 6m (m)	263	529.54	132.27	46	599.20	130.09
Sit & Reach (cm)	273	1.03	9.28	48	-1.60	12.99
TUG (sec)	270	8.78	28.88	47	5.25	1.70
	Moment 4					
	N	Mean	Std. Er	N	Mean	Std. Er
HandGrip Left (Kg)	112	30.05	8.08	33	42.35	8.61
HandGrip Dir (kg)	112	28.27	7.57	33	40.77	8.88
Sit to Stand (nº)	111	17.52	4.95	32	21.09	5.26
Walking 6m (m)	113	590.73	74.87	33	676.82	99.15
Sit & Reach (cm)	113	4.53	9.73	32	1.81	9.25
TUG (sec)	113	12.61	70.19	33	4.68	0.82

Males and females show similar trend. In fact, the increases in physical fitness does not change with the sex.

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Table 12: Mean differences of participants' Anthropometrics measures and fitness status, from moment 3 to moment 4.

Paired Samples Test						
		Paired Differences				
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference	
					Lower	Upper
Pair 1	HandGrip3Left – HandGrip4Esq	3.94	8.13	0.84	2.27	5.62
Pair 2	HandGrip3Dir – HandGrip4Dir	3.11	8.51	0.90	1.31	4.90
Pair 3	BMI3 – BMI4	9.42	14.90	1.21	7.03	11.82
Pair 4	Fatpercent3 – FatPercent3	2.63	6.15	0.56	1.53	3.74
Pair 5	WaistHipRatio3 – WaistHipRatio4	0.02	0.08	0.01	0.00	0.04
Pair 6	SitStand3 – SitStand4	2.14	6.73	0.70	0.75	3.53
Pair 7	Walking6m3 - Walking6m4	-22.06	85.82	0.10	-40.13	-3.98
Pair 8	TUG3 – TUG4	-839	77.65	8.10	-24.47	7.68
Pair 9	Weight3 – Weight4	-0.39	9.73	0.87	-2.11	1.34

Table 13: Significance of the changes of participants' Anthropometrics measures and Fitness Status, from moment 3 to moment 4.

Paired Samples Test				
		t	df	Sig. (2-tailed)
Pair 1	HandGrip3Left – HandGrip4Esq	4.68	92	0.000
Pair 2	HandGrip3Dir – HandGrip4Dir	3.45	88	0.001
Pair 3	BMI3 – BMI4	7.77	150	0.000
Pair 4	Fatpercent3 – FatPercent4	4.71	120	0.000
Pair 5	WaistHipRatio3 – WaistHipRatio4	2.32	70	0.023
Pair 6	SitStand3 – SitStand4	3.053	91	0.003
Pair 7	Walking6m3 - Walking6m4	-2.43	88	0.017
Pair 8	TUG3 – TUG4	-1.04	91	0.303
Pair 9	Weight3 – Weight4	-0.44	123	0.660

Considering table 12 and table 13, the changes over the time were statiscally significantive. The findings show the positive impact of the training program on aged population.

3.2. Data discussion

Regarding the motives that encourage these participants to made part of this project, it is possible to observe (Table 3, 4 and 5) that, in both sexes, the social issues showed to be the component that has the highest impact. Immediately after it was observed that these participants place great importance on the improvement of motor skills, suggesting that maintaining motor independence is a determining aspect in this population. In oppotiosion, the emotion issues were the last motive to practice physical exercise, in both sexes. Nevertheless, the results presented seemed balanced between the different components of motivation.

Slightly differences were observed in heartbeat characteristics, with the all group showing a decrease in diastolic phase. This could be a result of a greater intensity on physical exercise, since this population did not increase the volume of the total physical exercise. In line with this result, are the body fat values, which decreased over time in both sexes. This program seems to change the daily activities of their participants, as it enabled to increase their left-hand strength, probably their non-dominant hand. Moreover, their arm strength, leg strength, shoulder flexibility and agility (though the Up and Go test) also showed greater performances in both sexes. Those results together, confirm that this program had an influence on improving health in this population.

In Hungary, the diastolic phase also decreased, but only from the third to the fourth moment of evaluation ($p<0.01$). This could suggest that those adaptations may need more time to occur. In fact, the waist reduction ($p<0.05$) and leg flexibility ($p<0.05$) improved their results in the second to the third moment, and only from the third to the fourth moment leg strength ($p<0.01$) and the cardio-respiratory ($p<0.05$) capacities improved. Nevertheless, along the four moments, the results of body fat percentage ($p<0.01$), right hand strength ($p<0.01$) and the six-minute walk test performance ($p<0.05$) increased.

Conversely, in Italy was registered a decrease in strength of the left hand ($p<0.05$) and in leg flexibility ($p<0.01$) between the first to the second moment of evaluations. Those were unexpected results but could be related to training strategies implemented by coaches, as the cardio-respiratory capacity, expressed by the six-minute walk test, increased ($p<0.01$). Nevertheless, at least leg flexibility increased between the second to the third period of evaluation ($p<0.01$). Between the third and the fourth moment, the leg strength improved the mean performance and the body fat percentage decreased, as in the other countries. Another result unexpected was the decrease of right-hand strength ($p<0.01$) between these last two moments of evaluation.

Portugal was the included country that registered more changes. Along all the moments of evaluation, body fat percentage ($p<0.01$) decreased their values, suggesting an increase in participants' health. Also, between the second and third moment, body weight also decreased, maintaining its result during the fourth moment. Although with

improvements at the end, some parameters as systolic phase ($p<0.05$), the ratio between waist and hip, right and left hand strength ($p<0.01$), cardio-respiratory capacity ($p<0.01$), agility ($p<0.01$) and shoulder flexibility registered some oscillations between moments. In opposition, some fluctuations were observed in leg flexibility, waist and hip circumferences with slightly worst results at the fourth moment. Maybe at this point, those participants have already adapted physically and would need a greater stimulus to continue to have training effects, at least in these parameters.

Spain only have the last two moments of evaluation, thus had less time to register changes. However, leg flexibility showed an improvement ($p<0.01$) between those moments of evaluation. However, in contrast to what was expected, body fat percentage, waist and hip circumference increased along these two moments. Perhaps this new activity has increased the participants' appetite, since the amount of exercise has not changed.

In summary, and considering the countries that were monitored for a longer time, several health benefits were observed, with the percentage of body fat and heartbeat characteristics improving in all countries, being these two parameters closely related to health specially in those ages. Regarding the physical fitness tests, all countries showed improvements in several capacities, suggesting that those trainings and competitions increase performance and it would depend on both, the coach's strategies and the participants needs.

3.3. Scientific work submission

Based on first moment of data collection, research team developed a scientific work submitted and accepted to present on the 20th American College Sport Medicine (ACSM) congress, May 28 – 1 June of 2020. In addition, the acceptance of the present work in this scientific context, give us the external validation of the objectives and methods of the present project.

The baseline data allow us to design the following **abstract**:

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Activity: Scientific Abstract
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Intervention- related On Aging Health State Over European Countries. May The Context Frame The Difference?

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Abstract:
The life quality, namely among aged population, has been widely studied. Observational data on behavioral context, especially regarding physical activity epidemiology, has shown ef ciency in improving physical fitness with an impact on the dimensions of well- being. However, little research has been made regarding the impact of intervention on cardiorespiratory, strength, agility and quality of life, across dif erent European contexts. **Purpose**: we aimed to investigate the impact of exercise intervention on life quality, among elderly from 4 dif erent European countries Portugal (PT), Italy (IT), Bulgaria (BL) and Hungary (HU). **Methods**: 364 (87 PT, 121 IT, 76 BL and 80 HU) older adults (68,9± 6,3 yrs, 73,6± 12,7 Kg, 1,61± 0,08 m), male (26%) and female (74%), were recruited from local populations. Intervention program was based on 2 sessions/ week (90 minutes each), supported on aerobic activities (40min), muscle strength (20min), body balance (10min), technical skill (10min) and stretching specific exercises (10 min). Pre (baseline assessment) and post one year intervention assessments were done on anthropometric measures, senior Fitness Test and EQ- 5D- 5L questionnaire, applied by trained technicians. ANOVA was performed to describe country's group dif erences and the adaptations observed among dif erent determinants, in pre and post intervention. When a significant interaction ef ect was detected post- hoc comparisons were performed with Bonferroni adjustment to identify the locations of the dif erence. Significance was set at $p < 0.05$. **Results**: The ef ect of the time (one year intervention) were found to be significant, indicating changes on health determinants (hip- to- waist ratio, $F = 13.895$, $p < 0.001$; chair to stand, $F = 20.314$, $p < 0.001$; and handgrip muscle force, $F = 21.023$, $p < 0.001$), in all groups. However, Post- hoc analysis with Bonferroni adjustment indicated that the changes over the time were similar between country's groups as the significance were maintained. **Conclusions**: Context, country environment, seems have not influence on intervention output. Rather than country or geographical location, the intervention

As consequence of the abstract submission, we received the scientific acceptance of the work: Presentation Notification, from ACSM.

February 4, 2020

Poster Presentation Notification

Please read all details carefully.

We are pleased to inform you that your abstract entitled "**Intervention-related On Aging Health State Over European Countries. May The Context Frame The Difference?**" has been accepted for presentation in a **Free Communication/Poster** session at the 2020 Annual Meeting, World Congress on Exercise is Medicine®, and World Congress on the Basic Science of Exercise in Regenerative Medicine of the American College of Sports Medicine being held at the Moscone Center West and San Francisco Marriott Marquis in San Francisco, California, May 26-30, 2020. Your abstract will be published in *Medicine and Science in Sports and Exercise*, Volume 52:5 Supplement.

2020 Poster Session and Presentation Time Changes - please pay close attention to your poster session and presentation times as these are different from past years.

Your presentation date and time are as follows:

Author Block: J.M. Cancela Carral[1], Pedro Bezerra[2], LP Rodrigues[2], M Camões[2]. [1]*University of Vigo, Vigo, Spain.* [2]*Polytechnical Institute of Viana do Castelo, Viana do Castelo, Portugal.*
Session Title: Physical Activity Interventions II
Session Number: C-44
Session Viewing Date/Time: Thursday May 28, 2020 9:30 AM - 12:00 PM
Presentation Time: 10:30am - 12:00pm

You will receive an additional email notification in April that will include your assigned poster board number and additional reminders.

Session Details
Attendees consider the poster sessions an important and valuable part of the educational program of the Annual Meeting, World Congress on Exercise is Medicine®, and World Congress on the Basic Science of Exercise in Regenerative Medicine. Therefore, the Program Committee has determined the following viewing times of the posters:

If you are presenting your poster in a morning session Wednesday-Friday, you will

Melgaço, 31 March 2020

Research team

(PhD, Pedro Bezerra)	(PhD, Cancela-Carral)
(PhD, Ana SIlva)	(PhD, João Camões)