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Escopo

A revista Motricidade (ISSN 1646-107X, eISSN 2182-2972) é uma publicação científica trimestral, propriedade das Edições Desafio Singular. A política editorial da revista visa contribuir para o desenvolvimento e disseminação do conhecimento científico de caráter teórico e empírico nas áreas científicas do desporto, psicologia e desenvolvimento humano, e saúde, adotando sempre que possível uma natureza interdisciplinar.

Scope

Journal Motricidade is a scientific electronic journal, publishing quarterly and property of Desafio Singular Editions. Its editorial politics aim is contributing to the development and dissemination of scientific knowledge of theoretical and empirical character in the context of sports, psychology and human development, and health assuming whenever is possible an interdisciplinary commitment.

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International Congress - CIDESD 2019

Dear colleagues,

Welcome to Portugal, Maia and the University Institute of Maia - ISMAI.
On behalf of the Research Center in Sports Sciences, Health Sciences and Human Development – CIDESD, we would like to hereby extend a warm welcome to join us at our International Congress - CIDESD 2019.

CIDESD 2019 aims to provide a valuable opportunity for delegates to share, learn from and contribute to the most recent advances in Sports, Exercise and Health Sciences in a refreshing professional and social scenery.

We have put together a programme that includes plenary sessions delivered by leading experts in the field, free communication sessions organised across our key research areas, industry exhibition, research projects showcase, and plenty of networking opportunities! Additionally, we will offer a set of thoughtfully designed pre-congress workshops.

Maia is an open city: open to culture, to the world and to science. What better place in which to join forces in unifying sport science.

Excited and looking forward to meeting you here.

The Organizing Committee of CIDESD 2019.

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O1. Effects of a physical exercise program in DNA damage and cognitive function in Alzheimer Disease patients

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INTRODUCTION

There has been a dramatic rise in the worldwide proportion of the population comprised of older adults. There is a need for increased understanding of how cognition changes across adulthood and how to prevent neurodegenerative changes. Alzheimer Disease (AD) is one of the most prevalent neurodegenerative disturb (Deslandes et al., 2009). AD is known to be accompanied by age-dependent deficits in cognition, and by essential synapses and memory loss. Changes in mitochondrial dysfunction, redox reactions, induce an increase of reactive oxygen species that damage macromolecules, including DNA. This damage affects different cells and reduce general functionality. The aim of this study was to search the effects of an exercise program in lymphocyte DNA damage and cognitive function in patients with AD.

METHODS

Ten individuals (83.8±5.3 years) diagnosed with Alzheimer disease for at least 3 years were assigned to mild to moderately intense exercise. Exercise consisted of 60 min per session, two times a week, for a total of 16 weeks (32 sessions). The tests were applied before and after the experimental period (pre- and post-training). Venous blood sample were taken in fasting conditions to lymphocytes isolation to measure DNA SBs (Collins et al., 2008). Cognitive function was assessed through the Mini Mental State Exam (MMSE) (Folstein et al., 1975), validated to Portuguese population (Guerreiro, 2010). To be sure about the exercise training effect, a cardiovascular capacity was used (six minute walking test).

RESULT

The results showed significant differences in cardiovascular capacity (t=-4.179, p=0.003) (Table 1). Though cognitive function evidenced a slight decrease, the differences between pre-and post exercise training program were not significant. Lymphocytes DNA SBs decreased after the exercise training program, however differences were not significant.

Table 1

Average values and standard deviation in six minute walking test, MMSE and DNA SBs, pre- and post-exercise training.

Variables	Pre-training	Post-training
Six min walk test (m)	291.67 ± 157.86	453.33 ± 130.38
MMSE	12.23 ±4.82	11.08 ± 5.56
DNA SBs (tail intensity %)	6.12 ± 2.24	3.64 ± 1.99

CONCLUSIONS

This study suggests that regular exercise can improve cardiovascular fitness, and delay cognitive function loss in AD patients. Moreover, oxidative damages to DNA of lymphocytes from AD patients tend to decrease with exercise.

References.

Collins, A. R., Oscoz, A. A., Brunborg, G. et al (2008). The comet assay: topical issues. *Mutagenesis*, 23(3):143–151

Deslandes, A., Moraes, H., Ferreira, C., Veiga, H., Silveira, H., Mouta, R., Pompeu, F., Coutinho, E., & Laks, J. (2009). Exercise and Mental Health: Many Reasons to Move. *Neuropsychobiology*, 59, 191-198. doi: 10.1159/000223730

Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). Mini-mental state. A practical method for grading the cognitive state of patients for the clinician. *Journal of psychiatric research*, 12 (3), 189–98.

Guerreiro, M., Silva, A.P., Botelho, A., Leitão, O., Castro-Caldas, A., & Garcia, C. (1994). Adaptação à população portuguesa da tradução do Mini Mental State Examination (MMSE). *Coimbra: Reunião da Primavera da Sociedade Portuguesa de Neurologia*, 1,9.

O2. Physiological profile of small-sided recreational team handball games for middle-aged and older sedentary men

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INTRODUCTION

There are overwhelming evidences that regular physical activity (PA) have wide-ranging health benefits (Blair, 2009). Yet, a third of the adults worldwide do not reach the recommended guidelines for PA (Hallal et al., 2012). Therefore, new exercise programs assuring the population interests, while meeting the PA guidelines, are necessary. Research on the health benefits of a recreational team handball has shown positive effects on cardiovascular and musculoskeletal fitness of adult men (Hornstrup et al., 2018; Póvoas et al., 2018), however, there is still a lack of studies with older populations. The purpose of this study was to examine the cardiovascular and blood lactate acute profile during small-sided (5v5) recreational team handball matches, in over 50-year-old sedentary men.

METHODS

Heart rate (HR), rating of perceived exertion (RPE) and blood lactate analysis were obtained from 16 participants (61–74 years) during six 5v5 (80m^2/player) matches divided into three 15-min parts interspersed by 2-min breaks.

RESULTS:

Match HRmean was 130±9 b.min^{-1} (84±7% HRmax) and HRpeak was 146±11 b.min^{-1} (95±7% HRmax) with no significant differences ($p \geq 0.05$) between the three 15-min parts (83±6%, 84±10% and 84±8%HRmean, 93±6%, 92±8% and 92±8%HRmax, 1st, 2nd and 3rd quarters respectively). Exercise intensity was >80% HRmax for 44% (20±11 min) of total match time with no differences in time spent in the different intensities between the parts. Match average and peak blood lactate values were 3.7±1.2 and 5.0±1.8 mM, respectively. Blood lactate concentration values showed a significant increase from baseline (2.2±0.8 mM) to the 1st (4.1 ±1.3 mM), and 3rd (3.2±1.4 mM) parts ($p \leq 0.001$) and decreased from the 1st to the 3rd parts of the matches ($p=0.005$).

CONCLUSION

Recreational team handball organised as 5v5 over three 15 min parts with 2-min break provides consistent cardiovascular strain in sedentary middle-aged and older men, thereby showing potential for cardiovascular improvement when used in an exercise intervention. Studies including other game formats should be performed.

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References.

Blair, S. N. (2009). Physical inactivity: the biggest public health problem of the 21st century. *Br J Sports Med, 43*(1), 1-2.

Hallal, P. C., Andersen, L. B., Bull, F. C., Guthold, R., Haskell, W., Ekelund, U., & Lancet Physical Activity Series Working, G. (2012). Global physical activity levels: surveillance progress, pitfalls, and prospects. *Lancet, 380*(9838), 247-257. doi: 10.1016/S0140-6736(12)60646-1

Hornstrup, T., Lowenstein, F. T., Larsen, M. A., Helge, E. W., Povoas, S., Helge, J. W., & Krustrup, P. (2018). Cardiovascular, muscular, and skeletal adaptations to recreational team handball training: a randomized controlled trial with young adult untrained men. *Eur J Appl Physiol*. doi: 10.1007/s00421-018-4034-5

Póvoas, S. C. A., Castagna, C., Resende, C., Coelho, E. F., Silva, P., Santos, R., & Krustrup, P. (2018). Effects of a Short-Term Recreational Team Handball-Based Programme on Physical Fitness and Cardiovascular and Metabolic Health of 33-55-Year-Old Men: A Pilot Study. *Biomed Res Int, 2018*, 4109796. doi: 10.1155/2018/4109796

O3. The impact of multimodal exercise program on the immune system of frail older women with cognitive impairment

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INTRODUCTION

Physically frail individuals experience a quicker immunosenescence effect when compared to healthy older individuals (Collerton et al., 2012). In the last years, exercise has been identified as a coadjutant therapy able to promote a better inflammatory environment in this population (Aguirre & Villareal, 2015; Chupel et al., 2017). The goals of this study were to analyse the effects of a multimodal exercise program (MME) on functional fitness and immune profile in institutionalised pre-frail and frail older women with cognitive impairment. METHODS: Thirty nine institutionalised volunteers (81±7.84 years) were assigned and allocated into two different groups: MME (n =20) and a control non-exercise group (CG*ne*, n = 19). Participants of MME performed a progressive multimodal protocol using static-dynamic balance, gait speed and body height muscle-resistance exercises. The controls did not change their usual lifestyle. The MME programs consisted in 28-weeks of supervised classes carried out 3 times a week and each exercise session lasted 45 minutes. The five components of Fried's Physical Frailty were used to identify pre-frail and frail participants (Fried et al., 2001). Data for anti and pro-inflammatory, markers of mucosal immune system and physical fitness tests were analysed pre and post-intervention. RESULTS: Significant effect of time and time by group for IgA and time by group for IL-10 levels after 28-week of intervention were found ($p > 0.05$). Within-group analysis showed a significant moderate decrease in the IL-10 to TNF-α ratio for the CME group and increase in controls ($p > 0.05$). A substantial improvement in physical fitness in both exercise groups was also found. CONCLUSION: Both chair-based exercise programs were effective in stimulating positive changes in physical fitness and simultaneous satisfactory responses in immune profile. The controls showed a negative trend towards a decreased physical fitness and slight decreased levels of anti-inflammatory profiles. The evidence regarding the use of systematic and moderate long-term physical exercise as co-adjuvant therapy in promoting better balance on the pro- and anti-inflammatory environment was the most promising result of this study.

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References.

Aguirre, L. E., & Villareal, D. T. (2015). Physical Exercise as Therapy for Frailty. *Nestle Nutrition Institute Workshop Series*, *83*, 83–92.

Chupel, M. U., Direito, F., Furtado, G. E., Minuzzi, L. G., Pedrosa, F. M., Colado, J. C., … Teixeira, A. M. (2017). Strength training decreases inflammation and increases cognition and physical fitness in older women with cognitive impairment. *Frontiers in Physiology*, *8*(JUN). https://doi.org/10.3389/fphys.2017.00377

Collerton, J., Martin-Ruiz, C., Davies, K., Hilkens, C. M., Isaacs, J., Kolenda, C., … Kirkwood, T. B. L. (2012). Frailty and the role of inflammation, immunosenescence and cellular ageing in the very old: Cross-sectional findings from the Newcastle 85+ Study. *Mechanisms of Ageing and Development*, *133*(6), 456–466. https://doi.org/10.1016/j.mad.2012.05.005

Fried, L. P., Tangen, C. M., Walston, J., Newman, a B., Hirsch, C., Gottdiener, J., … McBurnie, M. a. (2001). Frailty in older adults: evidence for a phenotype. *The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences*, *56*(3), M146-56. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11253156

O4. Aquatic vs. Land-based fitness programs in older women conditioning

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INTRODUCTION

It is clear that an active lifestyle has various benefits. The active lifestyle should focus on the physical, mental and social well-being, and the physical exercise is a very good promoter for all those areas. This statement has proven to be valid through all lifespan, and it shows that the elderly have great benefits when they are enrolled in physical activity programs. These programs can be diverse (e.g. resistance training, aquatic fitness, group fitness classes), but most importantly, should be motivating. The aim of this study was to examine the possible effects on conditioning induced by 8-weeks of aquatic fitness or land-based group classes, in female older adults.

METHODS

Two experimental groups were created. Fourteen women (64.3±7.3 years old) enrolled in bi-weekly aquatic fitness sessions, and other twelve women (62.7±9.7 years old) enrolled in bi-weekly group fitness classes. The protocol was comprised of 45' sessions for 8 weeks. Before and after the 8 weeks the subjects performed the Senior Fitness Test, hand-grip strength and body measures. All participants were volunteers, they were informed and gave consent. All procedures were in accordance to the Helsinki Declaration.

RESULTS

Both the aquatic as the land-based groups had significant improvements on their conditioning. For the aquatic fitness group, significant and meaningful improvements were observed in lower body strength ($p<0.001$; $d=1.22$), lower body flexibility ($p<0.001$; $d=3.54$), aerobic endurance ($p<0.001$; $d=1.35$), dynamic balance ($p<0.001$; $d=1.53$) and hand grip strength ($p<0.001$; $d=2.02$). Significant, but moderate improvements were observed in body mass ($p=0.021$; $d=0.72$) and hip circumference ($p=0.048$; $d=0.59$). For the land-based group, significant and meaningful improvements were observed in lower body strength ($p<0.001$; $d=2.33$), lower body flexibility ($p<0.001$; $d=2.74$), dynamic balance ($p<0.001$; $d=2.11$) and hand grip strength ($p<0.001$; $d=2.37$). Significant, but moderate improvements were observed in body mass ($p=0.031$; $d=0.64$), hip circumference ($p=0.027$; $d=0.89$) and aerobic endurance ($p=0.041$; $d=0.51$).

CONCLUSIONS

Both aquatic fitness and land-based training induced extensive benefits in older women conditioning. These outcomes suggest that 8-weeks of regular training enable an increase in the life quality of elderly people.

Acknowledgments

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O5. The effects of high-velocity resistance training and detraining on functional and cognitive performance of institutionalised older adults

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INTRODUCTION

High-velocity resistance training (HVRT) is an effective method to enhance physical performance in older adults (Cadore et al., 2014; Marques, Izquierdo, & Pereira, 2013). However, less is known regarding its benefits on cognitive function, namely on the reaction time. Thus, this study aimed to analyse the effects of HVRT on neuromuscular performance of institutionalised older adults, followed by an 8-week detraining period.

METHODS

Thirty-one subjects (aged > 80 years), were randomly allocated to an experimental group (n = 17) or a control group (n = 14). The experimental group performed HVRT twice a week for 8 consecutive weeks, including the chair squat (2x3-6repetitions), chair leg extension (2x3-6repetitions) and seated medicine ball throw (SMBT) (2x3-5repetitions), while the control group performed their daily routine. The five repetition sit-to-stand (5STS) with and without a weight vest of 5 kg, the SMBT and the handgrip test (HGT) were administered before and after the intervention, as well as after 8-weeks of detraining. In the 5STS, the reaction time, the stand-up time of the 1st repetition (SUT), the total time, the velocity and the power-output were analysed.

RESULTS

At baseline, no significant differences between groups were found. After 8-weeks of training, significant improvements (p<0.05) were found in almost all measured variables in the experimental group, except for the 5STS reaction time with a weight vest of 5 kg (p>0.05) and for the relative HGT (p>0.05). From post-test to detraining, significant decreases (p<0.05) in the relative and absolute HGT were found in the experimental group. However, the great majority of the training-induced improvements in the experimental group remained significantly above the baseline values, such as the SUT without additional weight (p<0.05), the total time, velocity and power-output with and without a weight vest of 5kg (p<0.05), and the SMBT with 1 and 3kg (p<0.05). When comparing both groups in relation to detraining and baseline values, significant differences between groups (p<0.05) in the total time, velocity and power-output with and without a weight-vest of 5kg, as well as the SMBT with 1 and 3kg, were found. In the control group, no significant differences in any test period were observed.

CONCLUSIONS

The results demonstrated that the implementation of a resistance training with maximal execution velocities improved the neuromuscular and cognitive performance of institutionalised older adults. Moreover, it is noteworthy that most of the training-induced gains remained above the baseline values after 8-weeks of detraining.

Acknowledgments

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References.

Cadore, E. L., Casas-Herrero, A., Zambom-Ferraresi, F., Idoate, F., Millor, N., Gomez, M., . . . Izquierdo, M. (2014). Multicomponent exercises including muscle power training enhance muscle mass, power output, and functional outcomes in institutionalized frail nonagenarians. *Age (Dordr), 36*(2), 773-785. doi:10.1007/s11357-013-9586-z

Marques, M. C., Izquierdo, M., & Pereira, A. (2013). High-Speed Resistance Training in Elderly People: A New Approach Toward Counteracting Age-Related Functional Capacity Loss. *Strength & Conditioning Journal, 35*(2), 23-29. doi:10.1519/SSC.0b013e31828ba884

O6. Detraining effects on mobility and lower limb muscle strength in aged people.

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INTRODUCTION

Mobility and muscle strength are important on the daily lifestyle of the elderly. Little is known about the effects of detraining in the elderly, particularly on those who regularly exercise.

METHODS

836 men and woman (mean age 71.3±4.8 yrs; Weight 72.3±11.3kg; Height 156.5±8.3cm; BMI 29.5±8.3) were allocated to two groups, according to their level of training - G1 (<3 times/week) and G2 (≥3 times/week). Assessments were performed after a 9-month intervention, as baseline (May/June), and after a 3-month detraining period (September/October). The anthropometric measures were assessed, Timed Up and Go Test (TUG) with Wiva® sensors, 30-second Sit to Stand test and EQ-5D-5L questionnaire.

RESULTS

At the baseline G1 got higher scores then G2 on weight (G1: 72.9±11.4 kg, G2:67.6±9.9 kg; $p<0.001$), and BMI (G1: 29.7±4.2, G2:28.1±3.9; $p<0.001$); G2 got better scores on gait to go stage (G1: 1.94±0.56, G2:1.83±0.53; $p<0.05$), gait return stage (G1: 1.77±0.47s, G2:1.63±0.43s; $p<0.002$), TUG total time (G1: 7.7±1.7s, G2:7.2±1.6s, $p<0.004$) and 30-second Sit to Stand test (G1: 12.5±2.83 times, G2: 13.3±3.3 times; $p<0.01$). After the detraining period, G1, in relation to G2, maintained the differences on weight (G1: 73.1±11.5kg, G2: 67.6±10.2kg; $p<0.001$) and BMI (G1: 29.5±4.1, G2: 27.9±4 ;$p<0.001$), and decreased significantly on 4 of the 5 phases TUG test (sit to stand stage: G1: 1.38±0.52s, G2: 1.25±0.4s; $p<0.016$; turning stage: G1:1.16±0.48s, G2: 0.99±0.44s, $p<0.002$; stand to sit stage: G1:1.64±0.86s, G2:1.38±0.79s; $p<0.007$; TUG total time: G1: 8±2s, G2:7.3±1.5s; $p<0.004$) and 30-second Sit to Stand test (G1: 15.4±4.7, G2:16.5±4.5; $p<0.037$).

G1 got significant detraining effect on weight ($p<0.041$), BMI ($p<0.001$), TUG gait to go stage ($p<0.024$), turning stage ($p<0.001$), gait return stage ($p<0.003$), stand to sit stage ($p<0.007$), TUG total time ($p<0.001$). On 30-second Sit to Stand ($p<0.001$) and EQ-5D-5L index ($p<0.001$), both groups presented significant increases.

CONCLUSIONS

Three months of a detraining period in aged people who undertake supervised activities for less than 3-times/week has negative impact on agility, assessed as TUG test. Well-trained participants did not get any negative detraining impact. Nevertheless, after the detraining period both groups showed significant improvements on lower limb muscle strength and life quality, assessed as EQ-5D-5L index. The mechanism underlying these losses does not remain fully understood and should be investigated in more detail in future research.

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O7. A 6-month walking intensity progression monitoring in Peripheral Artery Disease

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INTRODUCTION

In Peripheral Artery Disease (PAD), the discomfort associated to intermittent claudication (IC) reduces physical fitness and walking performance (McDermott et al., 2004). Exercise has a positive effect on walking performance (Stewart, William, Hiatt, Regensteiner & Hirsch, 2002; McDermott, 2018), however, the cardiovascular effects of exercise intensity progression along a walking program have been poorly studied.

METHODS

A sample of 9 volunteer men with PAD, ankle-brachial index <0.90 and on stage II of Fontaine classification was arranged. They performed a 40-minute treadmill walking followed by 3 lower limbs resistant exercises (1-3 sets, 15 repetitions) 3 times a week with supervision. The work-rest cycle was used (i.e. walking until moderate/severe pain was felt, and restarting to walk after total pain relief). The load progression was manipulated in an individual and gradual way using pain associated with IC. The claudication onset distance (COD), absolute claudication distance (ACD), number of pauses (NP), perceived exertion (RPE), pain level and percent of heart rate reserve (%HRR) were evaluated. Initial, intermediate and final loads (ANOVA) were compared and values of first and last session for each load (T-test) were compared.

RESULTS

The loads' progression (intensity increase) promoted significant differences in ACD increase between initial and final loads (1460±386 and 2360±282 meters, p=0.000) and between initial and intermediate loads (1460±386 and 2299±249 meters, p=0.000). The NP decreased significantly between the initial and intermediate loads (0.54±0.61 and 0.08±0.21, p=0.034). The %HRR increased significantly (39±6 and 41±5%, p=0.020) between intermediate to the final loads revealing the intensity increase.

Within each load, there were significant differences throughout the sessions in the initial load in COD (485±499 and 919±665 meters, p=0.017), ACD (1001±646 and 1837±387 meters, p=0.016), and the NP (90±91 and 30±61 seconds, p=0.022). PSE, pain level and %HRR did not vary significantly within each of the 3 loads (Chart 1).

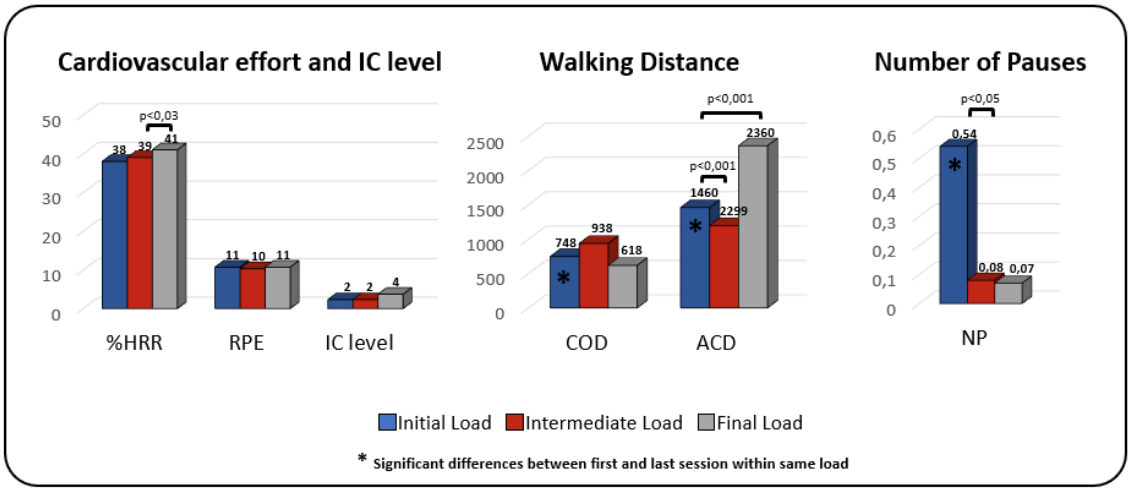

Figure 1. Initial, intermediate and final loads in %HRR, RPE, IC level COD, ACD and NP.

CONCLUSIONS

The load used in PAD participants represented mild/moderate exercise intensity. And, the progressive intensity increase did not change the COD, the pain level and the PSE. That is, with increasing intensity, IC continued to appear approximately at a similar distance and with a similar pain level, however, there was an increase in the walking distance until resting.

At the beginning of the exercise program (i.e. in the initial load) there was an improvement in COD, ACD and in the NP throughout the sessions.

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References

McDermott, M. M. (2018) Exercise rehabilitation for peripheral artery disease. *Journal of Cardiopulmonary Rehabilitation and Prevention*, 38, 63-69.doi: 10.1097/HCR.0000000000000343

McDermott, M. M., Liu, K., Greenland, P., Guralnik, J. M., Criqui, M. H., Chan, C., … Clark, E. (2004). Functional decline in peripheral arterial disease: Associations with the ankle brachial index and leg symptoms. *Journal of the American Medical Association*, 292(4), 453-461.

Stewart, K. J., Hiatt, W. R., Regensteiner, J. G., Hirch, A. T. (2002) Exercise training for claudication. *New England Journal of Medicine*, 347(24), 1941-1951

O8. Association of physical activity with arterial stiffness in resistant hypertension patients

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INTRODUCTION

Arterial stiffness is an important determinant of the cardiac work efficiency and it has been shown to be a predictor of increased cardiovascular risk and all-cause mortality (Vlachopoulos et al., 2010). Several studies have found a beneficial role of physical activity (PA) on blood pressure (BP) levels and arterial stiffness among healthy populations (Aoyagi et al., 2010) and cardiovascular patients (Gerage et al., 2015). Conversely, sedentary behaviour has been harmfully associated with an increased carotid-femoral pulse wave velocity (cf-PWV), the gold-standard measure of arterial stiffness (Germano-Soares et al., 2018). Nonetheless, little is known about the relationship between PA and vascular health among patients with resistant hypertension. We aimed to investigate the association of PA levels and sedentary time with arterial stiffness and brachial and central BP, in patients with resistant hypertension.

METHODS

In this cross-sectional study, 27 patients (11 men, 16 women; age, 56.7±8.6 years; weight, 75.0±11.7 kg; body mass index, 28.8±3.6 kg/m²) with resistant hypertension were recruited in the Hospital Infante D. Pedro (Aveiro) and Hospital Pedro Hispano (Matosinhos). PA intensity levels and sedentary time were measured by triaxial accelerometry. Participants used the accelerometer in 6.4±0.9 days, accumulating a total time of 5501.9±1006.9 minutes. Brachial BP was measured with a validated digital blood pressure monitor. Central BP and arterial stiffness was evaluated by applanation tonometry. Pearson and Spearman correlation analysis was conducted to assess the association between variables as appropriate.

RESULTS

A significant negative correlation was found between light PA (2421.5±806.8 minutes) and cf-PWV (8.5 [7.7-9.8] m/s, ρ=-0.389, p=0.045). cf-PWV was also inversely correlated with total PA (2624.7±834.6 minutes, ρ=-0.410, p=0.034). Independently of age and sedentary time, longer time spent on light PA (ρ=-0.453, p=0.023) and total PA (ρ=-0.439, p=0.028) was associated with lower aortic stiffening (ρ=-0.439, p=0.028). Light PA, moderate-to-vigorous physical activity (MVPA) (170 [107-314] minutes) and sedentary time showed no correlation with central systolic BP (139.2±21.3 mmHg), brachial systolic BP (147.1±21.2 mmHg) and diastolic BP (87.6±12.4 mmHg) and pulse pressure (PP) amplification ratio (1.2 [1.1-1.3] mmHg). In addition, there were no association of cf-PWV with MVPA and sedentary time.

CONCLUSIONS

This study confirms that higher time spent in PA is associated with lower cf-PWV, but not with brachial and central BP or PP amplification ratio in resistant hypertensive patients.

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References

Gerage, A. M., Benedetti, T. R., Farah, B. Q., Santana, F. D. S., Ohara, D., Andersen, L. B. & Ritti-Dias, R. M. (2015). Sedentary Behavior and Light Physical Activity Are Associated with Brachial and Central Blood Pressure in Hypertensive Patients. *PloS one, 10(12)*, e0146078. doi: 10.1371/journal.pone.0146078.

Germano-Soares, A. H., Andrade-Lima, A., Menêses, A. L., Correia, M. A., Parmenter, B. J., Tassitano, R. M., … & Ritti-Dias, R. M. (2018). Association of time spent in physical activities and sedentary behaviours with carotid-femoral pulse wave velocity: A systematic review and meta-analysis. *Atherosclerosis, 269*, 211-218. doi: 10.1016/j.atherosclerosis.2018.01.009

Vlachopoulos, C., Aznaouridis, K. & Stefanadis, C. (2010). Prediction of cardiovascular events and all-cause mortality with arterial stiffness: a systematic review and meta-analysis. *Journal of the American College of Cardiology, 55(13)*, 1318–1327. doi: 10.1016/j.jacc.2009.10.061.

O9. Supervised and adapted physical exercise program effects in health-related quality of life of breast cancer survivors

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INTRODUCTION

After localised breast cancer diagnosis, patients are subjected to several treatments, including surgery such as mastectomy or breast conservation surgery with sentinel node or axillary lymphadenectomy worldwide. Besides surgery, patients typically undergo at least one of other modalities such as radiotherapy, chemotherapy, hormonotherapy and anti-HER2 therapies. Despite their benefits, the induction of side effects is a common consequence of these therapies, which affects noticeably psychosocial and physiological outcomes as well as quality of life. In contrast, physical exercise may have an important role in the rehabilitation of breast cancer survivors. However, little is known about the effects of a combined exercise-training program on quality of life in breast cancer survivors.

METHODS

Twenty breast cancer survivors were recruited from the Medical Oncology Department of Gaia/Espinho Hospital Center to participate in a 16-week combined exercise-training program (MAMA_MOVE®). The combined (aerobic plus strength) exercise training was composed by 3 sessions of week, for 60 minutes at moderate intensity. The European Organisation for Research and Treatment of Cancer Core Quality of Life Questionnaire C30 (EORTC QLQ-C30) was used to assess Health-Related Quality of Life (HRQoL) while weekly physical activity levels were assessed by accelerometry.

RESULTS

Of the 20 recruited women, 18 initiated and 10 concluded the program. The participants had a median age of 51 years (36 - 72), and were diagnosed with invasive carcinoma. After surgery, the great majority underwent radiotherapy (n=9), chemotherapy (n=8) and were under hormonotherapy (n=9). Following exercise training, participants showed significant improvements in the global health status scale (55.5 ± 7.2 vs 68.5 ± 10.3; p=0.017). Moreover, looking to the five functional scales (physical, role, emotional, cognitive and social function) and the symptom scale of fatigue, there was also significant benefits in the emotional function (71.2 ± 23.9 vs 86.1 ± 15.5; p=0.039) and in the fatigue scores (30.8 ± 5.1 vs 18.5 ± 3.7; p=0.044). In contrast, there was no differences in the physical activity levels following the combined exercise-training program.

CONCLUSIONS

This study demonstrated that a combined exercise-training program is able to improve health-related quality of life, increase emotional function and reduce fatigue in women breast-cancer survivors, independently of changes in leisure-time physical activity.

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References

Torre, L. A., Siegel, R. L., Ward, E. M., & Jemal, A. (2016). Global Cancer Incidence and Mortality Rates and Trends-An Update. *Cancer Epidemiology Biomarkers & Prevention, 25*(1), pp. 16-27. doi:10.1158/1055-9965.Epi-15-0578

Jemal, A., Ward, E. M., Johnson, C. J., Cronin, K. A., Ma, J. M., Ryerson, A. B., . . . Weir, H. K. (2017). Annual Report to the Nation on the Status of Cancer, 1975-2014, Featuring Survival. *Jnci-Journal of the National Cancer Institute,109*(9)doi:10.1093/jnci/djx030

Binkley, J. M., Harris, S. R., Levangie, P. K., Pearl, M., Guglielmino, J., Kraus, V., & Rowden, D. (2012). Patient perspectives on breast cancer treatment side effects and the prospective surveillance model for physical rehabilitation for women with breast cancer. *Cancer, 118*, pp. 2207-2216. doi:10.1002/cncr.27469

Cantarero-Villanueva, I., Fernandez-Lao, C., Fernandez-De-Las-Penas, C., Diaz-Rodriguez, L., Sanchez-Cantalejo, E., & Arroyo-Morales, M. (2011). Associations among musculoskeletal impairments, depression, body image and fatigue in breast cancer survivors within the first year after treatment. *European Journal of Cancer Care, 20*(5), pp. 632-639. doi:10.1111/j.1365-2354.2011.01245.x

Battaglini, C. L., Robert, M. B., Lee, J. T., Story, C. E., Nascimento, M. G., & Hackney, A. C. (2014). Twenty-five years of research on the effects of exercise training in breast cancer survivors: A systematic review of the literature. *World J Clin Oncol, 5*(2), pp. 177-190

Steffens, D., Beckenkamp, P. R., Hancock, M., Solomon, M., & Young, J. (2018). Preoperative exercise halves the postoperative complication rate in patients with lung cancer: a systematic review of the effect of exercise on complications, length of stay and quality of life in patients with cancer. *British Journal of Sports Medicine, 52*(5), pp. 344-+. doi:10.1136/bjsports-2017-098032

Speck, R. M., Courneya, K. S., Masse, L. C., Duval, S., & Schmitz, K. H. (2010). An update of controlled physical activity trials in cancer survivors: a systematic review and meta-analysis. *Journal of Cancer Survivorship-Research and Practice, 4*(2), pp. 87-100. doi:10.1007/s11764-009-0110-5

O10. Sedentary time in different bout lengths and health-related quality of life in patients with fibromyalgia: the al-Ándalus project.

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INTRODUCTION

Sedentary time (ST) has been detrimentally associated with health outcomes in fibromyalgia (Ellingson, Shields, Stegner, & Cook, 2012; Segura-Jiménez et al., 2015). Previous evidence in general population showed that not only the total amount of ST but also the pattern of accumulation of sedentary behaviours is relevant to health, being prolonged, unbroken periods (i.e. bouts) particularly harmful (Dunstan et al., 2012). Therefore, this study aimed i) to analyse the association of ST spent in different bout lengths with health-related quality of life (HRQoL) in women with fibromyalgia, and ii) to study its independence of the moderate-to-vigorous physical activity (MVPA) performed.

METHODS

Four-hundred-and-seven (51.4±7.6 years old) women with fibromyalgia participated. Sedentary time and MVPA were measured with triaxial accelerometry. Time spent in different bout lengths (≥10 min, ≥20 min, ≥30 min, ≥60 min) were obtained and, to control for total ST, the percentage of total ST spent in different bout lengths categories was calculated (e.g.: time spent in ≥10 min/total ST). The 36-item Short-Form health survey (SF-36) was used to assess HRQoL. Separate linear regression models were built to assess the association of percentage of ST accumulated in different bout lengths (independent variable) with HRQoL (dependent variable) while controlling for age, fat percentage, occupational status, medication for pain, and medication for depression (model 1). Model 2 additionally included time spent in MVPA (model 1 + MVPA).

Table 1

Association of percentage of ST accumulated in different bout lengths with SF-36 domains (n=407)

		Percentage of sedentary time accumulated in bouts of different lengths (%)															
		≥ 10 min bout				≥ 20 min bout				≥ 30 min bout				≥ 60 min bout			
		B	SE	β	*p*	B	SE	β	*p*	B	SE	β	*p*	B	SE	β	*p*
Physical Function	model 1	**-0.267**	**0.086**	**-0.159**	**0.002**	**-0.253**	**0.074**	**-0.171**	**0.001**	**-0.271**	**0.077**	**-0.176**	**<0.001**	**-0.428**	**0.104**	**-0.201**	**<0.001**
	model 2	**-0.226**	**0.089**	**-0.134**	**0.012**	**-0.221**	**0.077**	**-0.149**	**0.004**	**-0.239**	**0.079**	**-0.156**	**0.002**	**-0.396**	**0.105**	**-0.186**	**<0.001**
Phsyical Role	model 1	-0.126	0.094	-0.067	0.178	-0.137	0.081	-0.082	0.093	-0.159	0.084	-0.092	0.058	**-0.239**	**0.114**	**-0.100**	**0.036**
	model 2	-0.063	0.097	-0.033	0.515	-0.089	0.083	-0.054	0.285	-0.115	0.086	-0.067	0.180	-0.195	0.115	-0.082	0.090
Bodily pain	model 1	**-0.130**	**0.065**	**-0.099**	**0.045**	**-0.108**	**0.056**	**-0.094**	**0.054**	**-0.114**	**0.058**	**-0.096**	**0.048**	**-0.190**	**0.078**	**-0.115**	**0.016**
	model 2	-0.106	0.067	-0.081	0.115	-0.089	0.058	-0.077	0.125	-0.096	0.059	-0.080	0.108	**-0.171**	**0.079**	**-0.104**	**0.032**
General Health	model 1	-0.034	0.069	-0.025	0.622	-0.048	0.060	-0.040	0.419	-0.058	0.062	-0.047	0.346	-0.076	0.084	-0.044	0.366
	model 2	-0.029	0.072	-0.021	0.685	-0.046	0.062	-0.038	0.461	-0.056	0.064	-0.045	0.379	-0.073	0.085	-0.042	0.393
Vitality	model 1	**-0.252**	**0.080**	**-0.160**	**0.002**	**-0.204**	**0.069**	**-0.148**	**0.003**	**-0.204**	**0.072**	**-0.142**	**0.004**	**-0.278**	**0.097**	**-0.140**	**0.004**
	model 2	**-0.209**	**0.083**	**-0.133**	**0.012**	**-0.168**	**0.071**	**-0.122**	**0.018**	**-0.169**	**0.073**	**-0.117**	**0.021**	**-0.242**	**0.098**	**-0.122**	**0.014**
Social functioning	model 1	**-0.399**	**0.106**	**-0.181**	**<0.001**	**-0.351**	**0.091**	**-0.182**	**<0.001**	**-0.361**	**0.095**	**-0.180**	**<0.001**	**-0.500**	**0.129**	**-0.181**	**<0.001**
	model 2	**-0.285**	**0.108**	**-0.130**	**0.009**	**-0.261**	**0.093**	**-0.135**	**0.005**	**-0.275**	**0.095**	**-0.137**	**0.004**	**-0.412**	**0.128**	**-0.149**	**0.001**
Emotional role	model 1	0.040	0.121	0.016	0.744	0.012	0.105	0.005	0.911	-0.016	0.109	-0.007	0.882	-0.034	0.148	-0.011	0.821
	model 2	0.077	0.126	0.031	0.539	0.039	0.109	0.018	0.718	0.008	0.112	0.004	0.942	-0.010	0.150	-0.003	0.945
Mental health	model 1	0.028	0.086	0.016	0.742	-0.015	0.075	-0.010	0.842	-0.029	0.077	-0.018	0.707	-0.104	0.105	-0.047	0.323
	model 2	0.059	0.090	0.034	0.510	0.006	0.077	0.004	0.938	-0.010	0.079	-0.006	0.898	-0.087	0.106	-0.039	0.414
Physical component	model 1	**-0.096**	**0.032**	**-0.156**	**0.003**	**-0.085**	**0.027**	**-0.158**	**0.002**	**-0.089**	**0.028**	**-0.159**	**0.002**	**-0.130**	**0.038**	**-0.168**	**0.001**
	model 2	**-0.083**	**0.033**	**-0.135**	**0.012**	**-0.075**	**0.028**	**-0.139**	**0.008**	**-0.079**	**0.029**	**-0.141**	**0.007**	**-0.119**	**0.039**	**-0.154**	**0.002**
Mental component	model 1	-0.023	0.050	-0.022	0.643	-0.031	0.043	-0.034	0.473	-0.039	0.045	-0.041	0.388	-0.065	0.061	-0.050	0.283
	model 2	0.003	0.052	0.003	0.949	-0.011	0.044	-0.012	0.802	-0.020	0.046	-0.021	0.659	-0.047	0.061	-0.036	0.441

B, unstandardised coefficient; β, standardised coefficient; SE, standard error.

RESULTS

Greater percentage of ST spent in all bout lengths was associated with worse physical function, bodily pain, vitality, social function, and physical component (all, $p<0.05$). In addition, higher percentage of ST spent in bouts of ≤60 min was related to worse physical role ($p=0.036$). Overall, these associations were independent of MVPA (all, $p<0.05$), except for bodily pain (for bouts lasting ≥10, 20 or 30 min) and physical role (all

bout lengths). Mostly, the strength of the association of percentage of ST spent in different bout lengths with physical function, physical role, bodily pain and physical component were higher with greater bout lengths.

CONCLUSIONS

Higher percentage of ST spent in different bout lengths is related to worse HRQoL (physical function, bodily pain, vitality, social function, and physical component). These associations were independent of MVPA, except for bodily pain and physical role. The results suggest that greater bout lengths are stronger associated with worse HRQoL than shorter bout lengths (except for vitality and social function). The effect on HRQoL of strategies aimed at reducing ST while avoiding prolonged sedentary behaviours need to be further evaluated.

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References

Dunstan, D. W., Kingwell, B. A., Larsen, R., Healy, G. N., Cerin, E., Hamilton, M. T., … others. (2012). Breaking up prolonged sitting reduces postprandial glucose and insulin responses. *Diabetes Care*, 35(5):976-83. doi: 10.2337/dc11-1931

Ellingson, L. D., Shields, M. R., Stegner, A. J., & Cook, D. B. (2012). Physical Activity, Sustained Sedentary Behavior, and Pain Modulation in Women With Fibromyalgia. *Journal of Pain*, *13*(2), 195–206. https://doi.org/10.1016/j.jpain.2011.11.001

Segura-Jiménez, V., Borges-Cosic, M., Soriano-Maldonado, A., Estévez-López, F., Álvarez-Gallardo, I. C., Herrador-Colmenero, M., … Ruiz, J. R. (2015). Association of sedentary time and physical activity with pain, fatigue, and impact of fibromyalgia: the al-Ándalus study. *Scandinavian Journal of Medicine and Science in Sports*. 27(1):83-92. doi: 10.1111/sms.12630

O11. Establishment and characterisation of primary skeletal muscle cell lines from patients with advanced Chronic Kidney Disease

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INTRODUCTION

Skeletal muscle wasting and dysfunction is a common feature of Chronic Kidney Disease (CKD), potentially limiting physical activity (Johansen, 1999), resulting in a downward spiral of atrophy and disuse leading to increased risk of mortality (Heiwe & Jacobson, 2014). The mechanisms underlying muscle wasting and dysfunction are not well explored in human CKD. To date, this important clinical question has been investigated using either animal models of CKD, which do not always replicate what we see in our CKD patients, or muscle biopsies, which represent a single time point only and with which we are limited in terms of what we are able to manipulate. The development of a clinically relevant model of human skeletal muscle culture model is important for the understanding of muscle loss and dysfunction in human CKD (Baker et al., 2018).

METHODS

A single skeletal muscle biopsy (~50 mg) was taken from the vastus lateralis of n=3 CKD patients (Stages 3b-5) and n=3 matched controls. Muscle precursor cells isolated from the tissue obtained through enzymatic matrix digestion were seeded onto a biologically relevant matrix. Cells were taken through serial passages for cell expansion leading to the seeding of cells into treated 6-well plates. Myoblasts were proliferated to 70% confluence at which point differentiation was induced. Cultures were left for a further 7-days for the development of mature myotubes. Cultures were harvested for gene expression analysis of proliferative, myogenic and maturity markers at confluence, 3-days and 7-days.

RESULTS

The expression of proliferative marker Myf5 was noted to be higher in CKD cultures compared to HC ($p=0.004$) at the earliest time point. The myogenic markers MyoD and Pax-7 were also noted to be significantly higher in CKD compared with HC ($p<0.05$), a trend which did not carry over to the expression of Myogenin. At the latest time point, the expression of an array of Myosin Heavy Chains (MyHC) were shown to be significantly higher in CKD when compared with HC cells (MyHC1, MyHC2, MyHC3, MyHC7, MyHC8; $p<0.01$ for all markers). This was also coupled with a significantly earlier onset of all of these markers in CKD cultures compared with those derived from HC.

CONCLUSIONS

Our data suggests that cells derived from CKD patients have a greater proliferative, myogenic and maturity potential than those derived from HC donors. Future research is required to provide context to these findings and continue to define this *in-vitro* model as a method of investigating the mechanisms of CKD related muscle atrophy.

Funding

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References

Johansen, K. L. (1999). Physical functioning and exercise capacity in patients on dialysis. *Advances in Renal Replacement Therapy*, *6*(2), 141–148.

Heiwe, S., & Jacobson, S. H. (2014). Exercise training in adults with CKD: a systematic review and meta-analysis. *American Journal of Kidney Diseases: The Official Journal of the National Kidney Foundation*, *64*(3), 383–393. https://doi.org/10.1053/j.ajkd.2014.03.020

Baker, L. A., Martin, N. R. W., Kimber, M. C., Pritchard, G. J., Lindley, M. R., & Lewis, M. P. (2018). Resolvin E1 (Rv E1) attenuates LPS induced inflammation and subsequent atrophy in C2C12 myotubes. *Journal of Cellular Biochemistry*, *119*(7), 6094–6103. https://doi.org/10.1002/jcb.26807

O12. Ultrasound-derived echo intensity: a novel indirect marker of local muscle damage following exercise in chronic kidney disease?

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INTRODUCTION

Increases in skeletal muscle size are well-established following exercise, specifically resistance training, in chronic kidney disease (CKD) (Watson et al. 2018). However, less is known about acute exercise-induced muscle damage. Echo intensity (EI) derived from ultrasonography (US) imaging is reportedly a novel indirect yet sensitive marker of muscle damage (Radaelli et al. 2012), with increased EI after 72 hours exercise signifying a potential inflammatory response and oedema formation (Fujikake et al. 2009). We assessed EI pre- and post- a 12-week exercise intervention in CKD.

METHODS

21 patients with non-dialysis dependent CKD [mean age: 60.1 (±12.0), 67% females, eGFR: 24.8 (±8.2) ml/min/1.73m^2, BMI: 28.7 (±5.8) kg/m^2] underwent a 12-week mixed aerobic and resistance training intervention (3x/week). Transverse B-mode 2D US of the right (quadriceps) rectus femoris (RF) were obtained pre- and post-intervention. RF-EI was determined by 8-bit grey-scale histogram analysis using ImageJ. RF-EI was expressed as arbitrary units (AU) between 0 (black) (i.e. muscle) and 255 (white) (i.e. fat/fibrotic tissue) (*Figure 1*).

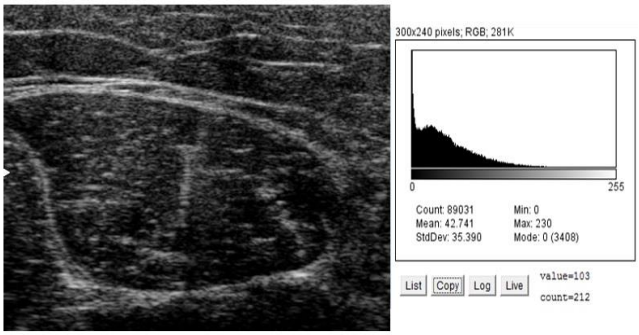

Figure 1. US image of the RF muscle with EI analysis.

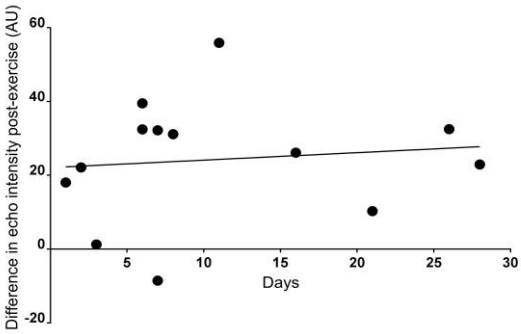

Figure 2. Difference in EI plotted across days post-exercise with linear regression line

RESULTS

The mean RF-EI pre-exercise was 77.4 (±22.3) AU. Following 12-weeks exercise, mean RF-EI increased to 95.1 (±25.1) AU, a significant increase of 17.7 [95%CI 9.8 to 25.5] AU, or 28% [range 16 to 114%], P < .001. Post-exercise ultrasound scans were performed on average 11 [range 1 to 28] days after the last training session. RF-EI changes were analysed in regard to the number of days post-exercise (i.e. scan conducted <72 hours, 4-7 days, 8-11 days, 12+ days after last session); no significant differences were found (P = .296) indicating that changes RF-EI remained elevated >12 days after the last exercise session (*Figure 2*).

CONCLUSIONS

Increased EI of the skeletal muscle suggests inflammatory responses, such as oedema, may occur post-exercise in CKD, and these can be visualised by US imaging (Fujikake et al. 2009). We observed no changes in EI up to 28 days post-exercise; however it may be that increased EI >72 hours reveal production of new connective tissue (Nosaka et al. 1996, Fujikake et al. 2009).

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References

Fujikake, T., Hart, R., & Nosaka, K. (2009). Changes in B-mode ultrasound echo intensity following injection of bupivacaine hydrochloride to rat hind limb muscles in relation to histologic changes. *Ultrasound in Medicine & Biology, 35*(4), 687-696. doi: 10.1016/j.ultrasmedbio.2008.10.008

Nosaka, K., & Clarkson, P. M. (1996). Changes in indicators of inflammation after eccentric exercise of the elbow flexors. *Medicine and Science in Sports and Exercise, 28*(8), 953-961. doi: 10.1055/s-2007-972819

Radaelli, R., Bottaro, M., Wilhelm, E. N., Wagner, D. R., & Pinto, R. S. (2012). Time course of strength and echo intensity recovery after resistance exercise in women. *The Journal of Strength and Conditioning Research, 26*(9), 2577-2584. doi: 10.1519/JSC.0b013e31823dae96

Watson, E. L., Gould, D. W., Wilkinson, T. J., Xenophontos, S., Clarke, A. L., Vogt, B. P., ... & Smith, A. C. (2018). Twelve-week combined resistance and aerobic training confers greater benefits than aerobic training alone in nondialysis CKD. *American Journal of Physiology-Renal Physiology, 314*(6), 1188-1196. doi: 10.1152/ajprenal.00012.2018

O13. Associations between physical activity and well-being in European university students

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INTRODUCTION

Physical activity is known to be a protective factor against several chronic diseases, contributing to people's health (Warburton & Bredin, 2017). Self-rated well-being is also considered an indicator of health status (Chida & Steptoe, 2008), related with a healthier physiological response to stress (Fredrickson, Mancuso, Branigan, & Tugade, 2000) and reduced probability of developing diseases (Cohen, Doyle, Turner, Alper, & Skoner, 2003). Late adolescence and young adulthood, where most of the university students belong, are age groups with decreasing levels of physical activity (Baptista et al., 2012; Hallal, 2012; Marques & Matos, 2014), however its relationship with well-being among this specific population remains inconclusive. Therefore, the purpose of this study was to analyse the relationship between physical activity, health perception and well-being in European university students.

METHODS

This cross-sectional study was based on data from the European Social Survey round 6, 2012, comprising 3143 European university students (1456 men, 1687 woman) from 27 countries, with mean age 21.3±2.9 years. Physical activity, six dimensions of well-being, health perception and demographic variables were assessed. Measures were self-reported. Meeting physical activity guidelines was assessed using World Health Organisation criteria. Differences between sexes and having attained the physical activity recommendations were analysed using Student's t test. Linear regression models were used to explore associations between these variables and physical activity frequency.

RESULTS

Less than half (47.5%) of the European university students, and more men than women (49.8% versus 45.5%, p=0.017), attained the physical activity recommendations. The well-being total score was also higher for men than for women (5.5±1.2 versus 5.2±1.3, p=0.017).Those who attained physical activity recommended levels had better health perception (4.2±0.8 versus 4.1±0.7, p<0.001), emotional well-being (5.5±1.7 versus 5.4±1.7, p=0.020), functioning (5.3±1.3 versus 5.1±1.2, p<0.001), vitality (5.5±1.5 versus 5.2±1.5, p<0.001), and well-being total score (5.4±1.3 versus 5.2±1.3, p=0.001). Physical activity frequency was linearly associated with health perception (B=0.05, 95% CI: 0.03, 0.06, p<0.001) as well as the well-being total score (B=0.06, 95% CI: 0.04, 0.09, p<0.001).

CONCLUSIONS

Attaining recommended physical activity levels and more frequent physical activity are associated with better health perception and well-being. Results suggest the existence of a positive association between the regular practice of physical activity and the well-being of European university students. This reinforces the importance of physical activity in the university students lifestyle and the need to develop programs that reduce the sedentary lifestyle among young people.

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References

Chida, Y., & Steptoe, A. (2008). Positive psychological well-being and mortality: a quantitative review of prospective observational studies. *Psychosomatic Medicine, 70*(7), 741-756. doi: 10.1097/PSY.0b013e31818105ba

Cohen, S., Doyle, W. J., Turner, R. B., Alper, C. M., & Skoner, D. P. (2003). Emotional style and susceptibility to the common cold. *Psychosomatic Medicine, 65*(4), 652-657.

Fredrickson, B. L., Mancuso, R. A., Branigan, C., & Tugade, M. M. (2000). The undoing effect of positive emotions. *Motivation and Emotion, 24*(4), 237-258.

Warburton, D. E. R., & Bredin, S. S. D. (2017). Health benefits of physical activity: a systematic review of current systematic reviews. *Current Opinion in Cardiology, 32*(5), 541-556. doi: 10.1097/HCO.0000000000000437

O14. Are activity wristbands valid to estimate moderate-to-vigorous physical activity in adolescents during free-living conditions?

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INTRODUCTION

Engaging in regular physical activity is considered crucial to the physical, psychological, and social health in adolescents (Janssen & LeBlanc, 2010). The World Health Organisation (2010) recommends that adolescents should achieve at least 60 minutes of moderate-to-vigorous physical activity (MVPA) daily. Nowadays, there is a growth in the use of the activity wristband, this type of technology helps with self-control and to provide changes in the behaviour lifestyle. Although activity wristbands are gaining traction in research, their validity has not been widely studied (Chung, Skinner, Hasty, & Perrin, 2017). Consequently, the aim of this study was to examine the validity of activity wristbands for estimating daily MVPA and steps in adolescents during free-living conditions.

METHODS

A sample of 85 high-school students (29 males and 56 females), aged 12-18 years old (M age = 14.0 yr., SD = 1.4), wore a GT3X+ accelerometer (ActiGraph, LLC, Pensacola, FL, USA) in the right hip (MVPA and steps reference measures) and four activity wristbands (Garmin Vivofit 4, Fitbit Alta HR, Polar A360 and Xiaomi Mi Band 2) on the non-dominant hand wrist during waking time of a day.

RESULTS

The results showed the following minutes of MVPA and steps per day: Accelerometer 57.8 minutes and 9,012 steps/ day; Garmin Vivofit 4 19.6 minutes and 9,902 steps/ day; Xiaomi Mi Band 2 73.8 minutes and 9,849.5 steps/ day; Fitbit Alta HR 34.4 minutes and 10,927.6 steps/ day; and Polar A360 84.8 minutes and 12,366.5 steps/ day. The agreement between the daily MVPA measured by the accelerometer and the activity wristbands were poor: Garmin Vivofit 4 (MAPE=26.8; ICC=0.35; LOA=38.2 (-3.5, 79.9)); Xiaomi Mi Band 2 (MAPE=127.2; ICC=0.17; LOA= -16.0 (-109.5, 77.5)); Fitbit Alta HR (MAPE=33.0; ICC=0.56; LOA=23.5 (-25.5, 72.5)); and Polar A360 (MAPE=193.3; ICC=0.28; LOA = -27.0 (-126.8, 72.8)). However, the agreement between the daily steps measured by the accelerometer and the activity wristbands ranged from moderate to good: Garmin Vivofit 4 (MAPE=16.3; ICC=0.91; LOA= -890.3 (-3998.9, 2218.3)); Xiaomi Mi Band 2 (MAPE=12.7; ICC=0.92; LOA= -837.8 (-3551.8, 1876.2)); Fitbit Alta HR (MAPE=20.7; ICC=0.78; LOA= -1,915.9 (-6283.4, 2451.6)); and Polar A360 (MAPE=40.3; ICC=0.63; LOA= -3,354.8 (-8660.5, 1950.9)).

CONCLUSIONS

The activity wristbands do not seem to be a good instrument to estimate the daily MVPA among adolescents. However, the Xiaomi Mi Band 2 and Garmin Vivofit 4 wristbands obtained good results to estimate the daily steps.

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References.

Janssen, I., & LeBlanc, A. G. (2010). Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *International Journal of Behavioral Nutrition and Physcal Activity, 7*(1), 40. doi: 10.1186/1479-5868-7-40.

Chung, A. E., Skinner, A. C., Hasty, S. E., & Perrin, E. M. (2017). Tweeting to Health: A novel mHealth intervention using Fitbits and Twitter to foster healthy lifestyles. *Clinical Pediatrics, 56*(1) 26–32. doi: 10.1177/0009922816653385.

World Health Organization. (2010). *Global recommendations on physical activity for health*. Geneva: WHO.

O15. PéAtivo program: Baseline results of physical activity, overweight, caloric intake of snacks and screen activities

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INTRODUCTION

The contemporary society is characterised by technological and scientific processes, among others, that have triggered the creation of new social, economic and cultural contexts with repercussions in the way of life. Among the major changes in current society's behaviour patterns, there is an increase in the levels of sedentarism and hypercaloric diets, on detriment of physical activity (PA) practice and healthy eating habits. The aims of this study were to characterise, and to compare between sexes, the baseline values of overweight, PA levels, hours of sleep, time spent on screen activities and the nutritional value of the snacks in pre-school children.

METHODS

The sample consisted of 241 pre-school children (121 boys and 120 girls), aged between 3 and 6 years old (4.49±0.69), from Bragança city. Several anthropometric variables were evaluated and the nutritional value of the snacks was calculated based on photographic record. The PA levels were monitored using the New-Lifestyles NL-2000 pedometer. A questionnaire was used to categorize the sedentary behaviours and the sleeping hours. To compare between sexes, it was used a chi-square test for the nominal variables and a t-test for continuous variables.

Table 1

Mean values±standard deviations of anthropometric variables, hours of sleep, time spent watching television (Tv) and playing videogames (Pc/games) on weekdays and weekends, caloric value of morning and afternoon snacks, and number of steps (PA) performed on weekdays and at the weekends, by sex.

	Mean±SD ♀♂	Mean±SD ♀	Mean±SD ♂	p value
Age (years)	4.49±0.69	4.50±0.68	4.48±0.68	0.93
Height (m)	1.09±0.06	1.08±0.06	1.09±0.06	0.93
Body mass (kg)	19.27±3.61	19.13±3.99	19.42±3.14	0.59
BMI (kg/m^2)	16.25±1.79	16.30±1.97	16.19±1.57	0.68
Abdominal Perimeter (cm)	53.11±4.91	53.06±5.49	53.18±4.16	0.88
% Fat	23.31±3.39	24.38±2.53	22.07±3.83	0.00*
BMI Percentil	55.96±29.20	55.76±29.59	56.15±29.03	0.94
Hours of sleep (hours)	9.94±1.04	9.88±1.06	10.01±1.02	0.44
Tv week (hours)	1.46±0.77	1.55±0.74	1.35±0.80	0.12
Tv weekend (hours)	2.24±1.05	2.19±0.99	2.30±1.11	0.52
Pc/games week (hours)	0.55±0.55	0.51±0.55	0.60±0.56	0.32
Pc/games weekend (hours)	1.01±0.91	0.90±0.91	1.14±0.90	0.11
Morning snack (Kcal)	195.36±103.54	183.48±104.45	207.61±101.95	0.19
Afternoon snack (Kcal)	361.77±119.13	360.86±118.20	362.78±121.20	0.93
PA week (steps nº)	13927.94±3652.37	13956.02±3791.77	13894.35±3512.12	0.93
PA weekend (steps nº)	11819.35±4593.51	11721.65±4624.64	11919.88±4592.91	0.80

*p≤0.05.

RESULTS

The results showed that 6.7% of the children had lower weight, 79.1% normal weight and 14.2% overweight. Regarding the levels of PA, the results showed that: on weekdays, 8.1% had low levels of PA, 52.0% were physically active and 39.8% were very active; on weekends, 25.7% had low levels of PA, 52.9% were physically active and 21.4% were very active. On screen activities, it was found that 50.6% of the children spent more than 2 hours/day in weekdays and 88.3% at the weekend. Regarding the snacks that children took to kindergarten, 24.8% were considered healthy, 44.4% little healthy and 30.8% unhealthy. 74.5% of children slept less than 10 hours/day. None of these variables presented statistically significant differences between sexes. The Table 1 shows mean values comparisons of the different variables, by sex. Only significant differences were found in the percentage of fat (girls=24.38±2.53 and boys=22.07±3.83; $p<0.05$).

CONCLUSIONS

The prevalence of overweight in pre-school children in Bragança is high. The PA levels are lower on weekend compared to weekdays, and only 1/4 of the children took healthy snacks to the kindergarten. These results highlight the importance of a structured intervention on pre-school level to increase children's PA, through active transportation to school and promotion of healthy lifestyles through meetings and lectures with the parents.

O16. Effects of a jump rope program on youth physical fitness

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INTRODUCTION

Currently, children and adolescents live in a very passive and sedentary environment. They are losing many movement experiences, spending most of their time watching television or playing on the computer, thus, leading to the development of unhealthy lifestyles. Accordingly, there is a great need to create attractive and motivating active proposals for this population. Jumping rope was demonstrated to be a motivating activity for young children, raising the question about its effectiveness. This work aimed to examine if a jump rope program would have beneficial effects on physical fitness. In addition, two types of programs were compared to analyse its efficacy.

METHODS

Effects of a jump rope program on three components of physical fitness – speed, agility, cardiorespiratory endurance – were assessed. Thirty male students, with an average age of 12.8±0.96 years, body mass of 49.5±11.26 Kg and height of 1.6±0.08 m volunteered for this study. Three groups were created: experimental group 1 (n = 10), experimental group 2 (n = 10) and control group (n = 10). Experimental group 1 trained jump rope for 7 weeks, 3 times a week using only the basic jump as jump style; experimental group 2 trained for 10 weeks, 3 times per week, using 6 different styles: Basic bounce, Alternate foot step, Side straddle, Forward straddle, Skier's jump, Bell jump; and the control group only engaged on regular Physical Education classes. The experimental design was made so that both groups would have the same volume (group 1 had a more significant increase on the number of jumps, thus, less weeks).

RESULTS

As exposed in table 1, both experimental groups obtained significant improvements for all the tested variables, whereas the control group did not improve their performance.

Table 1
Mean ± sd for the tested variables, according to group

		Pre	Post	p
Speed test (s)	*Group 1*	4.25±0.42	4.08±0.48	0.002
	Group 2	4.11±0.34	3.61±0.32	<0.001
	Control	4.21±0.45	4.25±0.48	n.s.
Agility test (s)	*Group 1*	6.73±0.66	5.89±0.55	<0.001
	Group 2	6.56±0.44	5.62±0.33	<0.001
	Control	6.63±0.46	6.55±0.45	n.s.
VO_2máx (ml/kg/min)	*Group 1*	35.9±1.83	40.0±2.46	<0.001
	Group 2	37.6±3.42	41.0±3.58	<0.001
	Control	38.4±2.77	38.2±3.22	n.s.

CONCLUSIONS

The main results showed that both a 7-week as a 10-week training program improved the physical fitness of these young adolescents. The type of progressive training that was elaborated allowed the subjects to be more active and motivated to the physical activities leading to further outcomes on speed, agility and cardiorespiratory endurance. It becomes clear that jump rope should be considered by the physical education teachers as an enhanced activity for children's development.

O17. How many steps are really enough to achieve the daily moderate-vigorous physical activity recommendations in adolescents? A study with activity wristbands

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INTRODUCTION

During the last years, step-based outputs are gaining increased credibility as an indicator of daily physical activity (Cameron, Craig, Bauman & Tudor-Locke, 2016). This is supported by the increasing use of activity wristbands which use the number of steps as the main variable (Thompson, 2018). However, the empirical studies focused on examining the total daily steps translation of the 60 minutes of moderate-to-vigorous physical activity recommendation in adolescents are limited and inconstant (e.g., Adams, Johnson & Tudor-Locke, 2013; Colley, Janssen & Tremblay, 2012; Fontana, da Silva, Marston, Finn & Gallagher, 2015). Consequently, the main purpose of the present study was to establish and compare the accuracy of activity wristband-determined steps per day thresholds related to the daily 60 minutes of moderate-to-vigorous physical activity recommendations in adolescents.

METHODS

A sample of 85 high-school students (29 males and 56 females) aged 12-18 years old (M age = 14.0 yr., SD = 1.4) participated in the present study. Adolescents' daily moderate-to-vigorous physical activity was objectively-determined by GT3X+ accelerometers (ActiGraph, LLC, Pensacola, FL, USA) fitted on the participants' right hip during the awake time of a day. At the same time, participants wore four activity wristbands (Garmin Vivofit 4, Fitbit Alta HR, Polar A360 and Xiaomi Mi Band 2) on the wrist of the non-dominant hand.

RESULTS

The results of the Receiver Operating Characteristic curve analysis with the Youden's index found the following steps/ day thresholds: Accelerometer 8,245 steps/ day (AUC = 0.94; J max = 0.78); Garmin Vivofit 4 8,807 steps/ day (AUC = 0.91; J max = 0.68); Fitbit Alta HR 10,880 steps/ day (AUC = 0.86; J max = 0.64); Polar A360 10,846 steps/ day (AUC = 0.83; J max = 0.58); and Xiaomi Mi Band 2 9,239 steps/ day (AUC = 0.90; J max = 0.69). The results of the accuracy of steps/ day thresholds ranged from low to high: Accelerometer (P = 0.87; k = 0.74); Garmin Vivofit 4 (P = 0.81; k = 0.63); Fitbit Alta HR (P = 0.81; k = 0.62); Polar A360 (P = 0.76; k = 0.54); and Xiaomi Mi Band 2 (P = 0.82; k = 0.65).

CONCLUSIONS

The Xiaomi Mi Band 2, Fitbit Alta HR and Garmin Vivofit 4 activity wristbands obtained the best results to estimate compliance with the physical activity recommendations using the daily step-based thresholds. This knowledge may help organisations responsible for public health to provide more accurate daily step-based recommendations that simplify moderate-to-vigorous physical activity guidelines for adolescents.

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References

Adams, M., Johnson, W., & Tudor-Locke C. (2013). A steps/day translation of the moderate-to-vigorous physical activity guideline for children and adolescents. International *Journal of Behavioral Nutrition and Physical Activity, 10*(49). doi: 10.1186/1479-5868-10-49.

Cameron, C., Craig, C. L., Bauman, A., & Tudor-Locke, C. (2016). CANPLAY study:
Secular trends in steps/day amongst 5-19year-old Canadians between 2005 and 2014.
Preventive Medicine, 86, 28–33. doi: 10.1016/j.ypmed.2015.12.020

Colley, R., Janssen, I., & Tremblay, M. (2012). Daily step target to measure adherence to physical activity guidelines in children. *Medicine & Science in Sports & Exercise, 44*(5), 977-982. doi: 10.1249/MSS.0b013e31823f23b1.

Fontana, F., da Silva, M., Marston, R., Finn, K. & Gallagher, J. (2015). Step-count guidelines referenced on 60-minutes of moderate/vigorous physical activity. *Motriz, 21*(1), 92-99. doi: 10.1590/S1980-65742015000100012.

Thompson, W. R. (2018). Worldwide survey of fitness trends for 2019. *ACSM's Health & Fitness Journal, 22*(6), 10-17. doi: 10.1249/FIT.0000000000000438

O18. Relationship between objectively measured sedentary behaviour, physical activity and adiposity in old people

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INTRODUCTION

The ageing process is followed by changes in body composition, generally leading to an increase in total and central adiposity and a decrease in muscle mass (Reinders, Visser, & Schaap, 2016). The prevalence of obesity in old people has steadily increased in recent decades and is expected to continue to rise (Porter Starr, McDonald, & Bales, 2014). This is particularly concerning given the numerous health risks (e.g., hypertension, hyperlipidemia, diabetes) and the increased costs associated with this condition (Gill, Bartels, & Batsis, 2015). Physical activity and sedentary behaviours are key factors which might influence body composition aspects (Rosique-Esteban et al., 2018). This study evaluates the associations between sedentary time (SED) and physical activity (PA) levels (light-, moderate- to vigorous intensity) with body composition aspects in old people.

METHODS

This cross-sectional study sample included 71 elderly individuals (72.44 ± 5.68 years old), both male and female. Sedentary time (counts min^{-1}<100) and physical activity time were assessed using the ActiGraph® GT1M Accelerometer, worn during waking hours for at least three consecutive days. Weight, fat mass (FM) and percentage of body fat were measured by bioelectric impedance balance Inbody 270®. Waist circumference (WC) was measured using a flexible measuring tape (Rosscraft®). Body mass index (BMI) and waist-to-height ratio (WHtR) were calculated. In order to analyse data, descriptive and inferential statistics were used. Spearman and Pearson tests were applied to bivariate correlations after assessing normality.

RESULTS

Significant positive associations were found between SED with FM and percentage of body fat. Light-intensity activity time showed a negative correlation with weight, WC, and FM. Moderate- to-vigorous physical activity time showed a negative correlation with BMI, WHtR, FM and percentage of body fat.

CONCLUSIONS

The results therefore suggest that promoting PA and reducing sedentary behaviour in old people may have a positive influence on their body composition aspects, as these levels are closely associated with several health conditions.

References

Gill, L. E., Bartels, S. J., & Batsis, J. A. (2015). Weight Management in Older Adults. *Current Obesity Reports*, *4*(3), 379-388. doi: 10.1007/s13679-015-0161-z.

Porter Starr, K. N., McDonald, S. R., & Bales, C. W. (2014). Obesity and Physical Frailty in Older Adults: A Scoping Review of Lifestyle Intervention Trials. *Journal of Americans Medical Directors Association*, *15*(4), 240–50. doi: 10.1016/j.jamda. 2013.11.008.

Reinders, I., Visser, M., & Schaap, L. (2016). Body weight and body composition in old age and their relationship with fragility. *Current Opinion in Clinical Nutrition & Metabolic Care*, *20*(1), 11-15. doi: 10.1097/MCO.0000000000000332

Rosique-Esteban, N., Babio, N., Díaz-López, A., Romaguera, D., Martínez, J., Sanchez, V., … Salas-Salvadó, J. (2018). Leisure-time physical activity at moderate and high intensity is associated with parameters of body composition, muscle strength and sarcopenia in aged adults with obesity and metabolic syndrome from the PREDIMED-Plus Study. *Clinical Nutrition*, *6*, 1-8. doi: 10.1016/j.clnu.2018.05.023.

P1. An eight months multicomponent training effect in elderly's functional fitness

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INTRODUCTION

Elderly's physical activity and exercise is a huge concern in fitness instruction to delay physical frailty (Jones & Rikli, 2002). The multicomponent training helps to improve the physical condition in different variables such as strength, resistance, flexibility and balance (Carvalho et al., 2009). Thus, the aim of this study was to assess the influence of an eight months multicomponent training program in functional fitness of community-living elderlies.

METHODS

Forty-nine 64.39 (± 6.33) year old elderlies took part of this research, 11 males who were 67.45 (± 4.93) and 38 females who were 63.50 (± 7.47) years old. All procedures were in accordance to the Declaration of Helsinki and a written consent was obtained from the participants.

The multicomponent training program was applied with the Carvalho et al, (2009) recommendations. It was a 8 months program and the training frequency was three times per week.

The elderly's functional fitness was assessed with the functional fitness test (FFT) of Jones & Rikli, (2002).

The T-test allowed to assess the differences between the pre and post training program in the body composition. The tests were performed with a significant level of 5%.

RESULTS

Table 1 presents the mean and standard deviation (± SD) between the two evaluation moments. The statistical significance is also presented in table 1.

Table 1

Mean and standard deviation (± SD) of the FFT variables between the pre and post-test.

FFT Variables	Pre-Test (mean ± SD)	Post-Test (mean ± SD)	F	Sig.	Eta Squared
Upper Limbs Strength (Reps)	27.39 ± 5.27	31.39 ± 6.17	8.147	0.005*	0.078
Lower limbs Strength (Reps)	20.90 ± 4.68	23.33 ± 4.82	4.282	0.041*	0.043
Upper Limbs Flexibility	-7.13 ± 6.95	-5.70 ± 6.22	0.754	0.387	0.008
Lower Limbs Flexibility (cm)	1.99 ± 7.01	2.54 ± 6.68	0.069	0.793	0.001
Aerobic Resistance (Reps)	104.63 ± 24.30	112.41 ± 25.03	1.425	0.236	0.015
Time Up and Go (sg)	4.65 ± 0.63	4.48 ± 0.62	0.899	0.345	0.009

*p<0.05; **p<o.oo1

CONCLUSIONS

The multicomponent training program improved significantly the elderly's functional fitness in upper and lower limbs strength. The other variables didn't present significant improvements with the multicomponent training program, however, it is worth noting that everyone improved their scores. Thus, it is possible to conclude that the multicomponent training program may improve and/or preserve elderlies' functional fitness.

References

Carvalho, M. J., Marques, E., & Mota, J. (2009). Training and detraining effects on functional fitness after a multicomponent training in older women. Gerontology, 55(1), 41-48.

Jones, C. J., & Rikli, R. E. (2002). Measuring functional. The Journal on active aging, 1, 24-30.

P2. Body Composition and hemodynamic profile of active adults and active older adults after 9 months of exercise

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INTRODUCTION

Sedentary lifestyles are increasingly prevalent in our society. Cardiovascular problems and increased body mass are prevalent in this type of lifestyle with greater incidence in advanced ages (Ford & Caspersen, 2012; INSEF, 2016; Kim, 2018). On the other hand physical exercise promotes clear benefits for this type of individuals' health (Chodzko-Zajko et al., 2009) so, our intention, with this study, is to analyse the effects of physical exercise on adults and elderly people, and to analyse if the age affects how the benefits occur. Prevention of cardiovascular disease through physical exercise is very important to avoid disease and decrease in the quality of life of older adults. The risk factors for this disease like high blood pressure, high cholesterol, overweight and obesity, diabetes mellitus, and physical inactivity can be changed through exercise (AHA, 2005; Chodzko-Zajko et al., 2009). As the main purpose of this study we intend to evaluate the effects of training and detraining during two years of an exercise program in blood pressure and resting heart rate of older adults.

METHODS

28 women were divided in two groups by age, (Group A: women between 45-55 years, N=12, 46.6 ± 4.5 years and 161.21± 11.37cm; Group B: women between 55-65 years, N=16, 63.4± 6.2 years and 158.54±13.53cm) who volunteered to participate in a 9 month combined exercise program. The component program was prescribed according to ACSM (Chodzko-Zajko et al., 2009) and conducted by a specialist in adults and older adults training. Each training period consisted in aerobic and muscle endurance group sessions held two days per week with forty-five minutes each session. All subjects were tested 4 times, in the start of the program and each 3 months after every evaluation. Each evaluation consisted in a blood pressure test to access systolic and diastolic blood pressure, and a body fat mass was assessed using bioelectrical impedance.

RESULTS

Body fat percentage (BF%) improved in all assessment moments in group A. Blood pressure improved after the end of the program but was not statistically significant in both groups.

	E-01		E-02		E-03		E-04	
	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B
Weight (Kg)[1.2]	68.76±7.56	72.32±8.63	69.64±6.45*	72.87±7.89	68,87±5.45	72.66±7.95	68.93±8.7	71.97.2±8.23
BF% (%)	37.32±3.96	39.67±4.61	34,87±3.15*	38.16±3.97	33.66±4.21*	36.29±4.14*	33.58±3.42**	36.54±4.61**
Systolic P (mmHg)[2]	136±12.15	138±9.52	133±11.56	137±10.48	132±12.31	138±11.21	131±10.79	136±9.76
Diastolic P (mmHg)[2]	82±10.21	80±8.43	81±11.10	79±8.84	81±10.83	79±9.69	80±9.81	78±10.45

+significant differences after the last evaluation (p≤ 0.05); ** significant differences between the beginning and the end of the program (p≤ 0.05)

CONCLUSIONS

The results of this study show that nine months of physical exercise were enough to improve BF% regardless of the age difference, and this improvement was more evident after 3 months in group A and only after 6 months in group B. Blood pressure did not show any significant changes in both groups despite being in normative values.

References

AHA. (2005). Recommendations for Blood Pressure Measurement in Humans and Experimental Animals: Part 1: Blood Pressure Measurement in Humans. A *Statement for Professionals From the Subcommittee of Professional and Public Education of the American Heart Association Council on High Blood Pressure Research, 45,* 142-161.

Chodzko-Zajko, W. J., Proctor, D. N., Fiatarone Singh, M. A., Minson, C. T., Nigg, C. R., Salem, G. J., & Skinner, J.S. (2009). American College of Sports Medicine position stand. Exercise and Physical Activity for Older Adults. *Medicine & Science in Sports & Exercise*, 41 (7), 1510-1530. doi. 10.1249/MSS.0b013e3181a0c95c.

Ford, E. S. & Caspersen C. J. (2012). Sedentary behaviour and cardiovascular diseace: a review of prospective studies. *International Journal of Epidemiology*, 41(5), doi: 10.1093/ije/dys078.

Kim, S. Y. (2018). Sedentary lifestyle and cardiovascular health. *Korean Journal of Family Medicine*. 39(1):1, doi:10.4082/kjfm.2018.39.1.1.

INSEF. (2016). Primeiro Inquérito Nacional de Saúde com Exame Físico (INSEF 2015). Instituto Ricardo Jorge, 1–12.

P3. Bone loss and risk of hip fractures in older adults with reduced and normal kidney function

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INTRODUCTION

Chronic kidney disease (CKD) is associated with poor bone health and increased risk of fractures. Although since 2017 the Kidney Disease: Improving Global Outcomes (KDIGO) working group recommends bone mineral density (BMD) measurements to assess fracture risk in CKD patients (Ketteler et al., 2017), this guideline was updated based on new prospective studies documenting that lower dual X-ray absorptiometry (DXA) BMD, measured at one time point, predicts incident fractures in patients with CKD. Studies examining the contribution of the rate of bone loss on incident fracture risk in CKD are scarce (Bucur et al., 2015). Therefore, this study aimed to determine the association of accelerated worsening over 5 years of femoral neck (FN) volumetric BMD (vBMD) and incident hip fracture among older adults with reduced and normal kidney function.

METHODS

A total of 2536 older adults (33.2% CKD stage 3-4), aged 66-92 years at baseline from the Age, Gene/Environment Susceptibility (AGES)-Reykjavik Study, who had valid hip quantitative computed tomography (QCT) scans at baseline and 5-years later, completed data on baseline serum creatinine and potential covariates were studied. Analyses employed Cox-proportional hazard regression models.

RESULTS

During the median follow-up of 5.7 years, 202 (8%) hip fractures occurred. Having reduced kidney function was associated with and increased risk of hip fracture (HR= 1.6, 95% CI 1.2 – 2.1) compared to having normal kidney function. Adjusted for important confounders (Table 1), in both normal and reduced kidney function subjects, a rapid FN bone loss was associated with higher hip fracture risk (HR =2.26, p>0.001 and HR= 2.03, p=0.002, respectively).

Table 1
Associations of accelerated decline (defined as being in the upper tertile of annual %-bone loss) in FN vBMD with hip fracture risk in participants with impaired and normal kidney function.

	Reduced kidney function (n= 844; eGFR <60 mL/min/1.73m^2)		
	Model	HR	95% CI
FN vBMD loss ≥ -1.3 %/year (no. of hip fractures = 87)	Unadjusted	2.45	1.61 - 3.73
	2	2.03	1.30 - 3.17
	3	1.93	1.22 - 3.06
	Normal kidney function (n= 1695; eGFR ≥60 mL/min/1.73m^2)		
	Model	HR	95% CI
FN vBMD loss ≥ -1.1 %/year (no. of hip fractures = 115)	Unadjusted	2.86	1.97 - 4.15
	2	2.26	1.54 - 3.33
	3	2.09	1.41 - 3.09

CONCLUSIONS

Results from this large cohort of older adults suggest that QCT-measured hip bone loss is a significant predictor of hip fracture risk in older adults with and without CKD. These associations were independent of baseline vBMD and major potential confounders. Thus, our findings support the utility of measuring the rate of change of vBMD, as it provides additional information on risk for fracture in older men and women with CKD.

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References

Bucur, R. C., Panjwani, D. D., Turner, L., Rader, T., West, S. L., & Jamal, S. A. (2015). Low bone mineral density and fractures in stages 3-5 CKD: an updated systematic review and meta-analysis. *Osteoporos Int, 26*(2), 449-458. doi:10.1007/s00198-014-2813-3

Ketteler, M., Block, G. A., Evenepoel, P., Fukagawa, M., Herzog, C. A., McCann, L., . . . Leonard, M. B. (2017). Executive summary of the 2017 KDIGO Chronic Kidney Disease-Mineral and Bone Disorder (CKD-MBD) Guideline Update: what's changed and why it matters. *Kidney Int, 92*(1), 26-36. doi:10.1016/j.kint.2017.04.006

P4. The effect of a multicomponent training program in elderly's body composition

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INTRODUCTION

Physical exercise is recommended to maintain the muscular mass in elderlies (Singh, 2002). Among the different types of exercise programs, there is the multicomponent training (Carvalho et al., 2010). The multicomponent training program allows the subjects to improve their physical condition (Strength, resistance, flexibility and balance) (Carvalho et al., 2009). However, there is no consensus about the influence of multicomponent training in body composition. Thus, the aim of this study was to access the multicomponent training effect in elderly's body composition.

METHODS

The sample of this study was composed of forty nine 64.39 (± 6.33) year-old elderlies. Among them, 11 were 67.45 (± 4.93) year-old males and 38 were 63.50 (± 7.47) year-old females. All procedures carried out in this research were in accordance to the Declaration of Helsinki. A multicomponent training program was applied with the Carvalho et al, (2009). The program took 8 months and the training frequency was three times per week.

The elderly's body composition were assessed with bio-impedance (Tanita, BC-545). The T-test allowed to assess the differences between the pre and post training program in the body composition. The tests were performed with a significant level of 5%.

RESULTS

Table 1 presents the mean and standard deviation (± SD) between the two evaluation moments. The statistical significance is also presented in table 1.

Table 1
Mean and standard deviation (± SD) of the body composition variables between the pre and post-test

Variables	Pre-Test	Post-Test	p
	Mean (± SD)	Mean (± SD)	
Body mass	68.92 (± 8.58)	68.51 (± 8.69)	*
Fat mass	32.06 (± 7.723)	31.55 (± 7.840)	0.011
Muscular mass	44.92 (± 7.23)	45.14 (± 9.28)	0.873
Body water (%)	49.49 (± 6.27)	49.67 (± 6.37)	0.004
Metabolic rate	1390.02 (± 202.67)	1415.02 (± 202.84)	0.006
Bone mineral mass	2.24 (± 0.48)	2.24 (± 0,48)	*
Visceral fat	9.61 (± 2.72)	9.35 (± 2.61)	0.000**

*p<0.05; **p<o.oo1

CONCLUSIONS

A multicomponent training program in elderlies seems to influence the body composition. The total body mass decreased between the two moments. The bone mineral mass and body water percentage had a significant increase between the two moments. Even more, all the variables improved between the two moments.

References

Singh, M. A. (2002). Exercise comes of age: rationale and recommendations for a geriatric exercise prescription. J Gerontol A Biol Sci Med Sci, 57(5), M262-282.

Carvalho, J., Marques, E., Soares, J. M., & Mota, J. (2010). Isokinetic strength benefits after 24 weeks of multicomponent exercise training and a combined exercise training in older adults. Aging Clin Exp Res.

Carvalho, M. J., Marques, E., & Mota, J. (2009). Training and detraining effects on functional fitness after a multicomponent training in older women. Gerontology, 55(1), 41-48.

P5. The effect of regular physical exercise in DNA damage and repair capacity: possible influence of the hOGG1 (Ser326Cys) polymorphism

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INTRODUCTION

Physical exercise is associated with an increase in aerobic metabolism, which may lead to an increase in the formation of reactive oxygen species (ROS). ROS can react with several macromolecules, namely with deoxyribonucleic acid (DNA), causing strands-breaks (DNA SBs) and a variety of modified bases. However, it has also been described that regular physical exercise may exert a positive physiological effect, leading to increased antioxidant protection and DNA repair mechanisms. The human 8-oxoguanin DNA glycosylase 1 (hOGG1) gene encodes an enzyme (OGG1) responsible for excising the most common product of oxidative DNA damage, 8-oxoguanine (8-oxoG). This enzyme repairs the damage through excision of bases. The polymorphism in the hOGG1 gene at codon 326 results in the substitution of a serine amino acid (Ser) (wild-type) for a cysteine (Cys) (mutant) (Ser326Cys), and it has been suggested that carriers of the mutant allele have an excision activity of 8-oxoG lower than that of wild-type individuals. Considering this, the objective of this study was to analyse the possible influence of hOGG1 Ser326Cys polymorphism on DNA damage and repair capacity in response to regular physical exercise.

METHODS

56 Caucasian individuals (29 males and 27 females) were enrolled in a program of 16 weeks of combined physical exercise (aerobic and strength physical exercise), 60 minutes duration, three times a week. The DNA damage was analysed through the comet assay, namely DNA SBs and FPG-sensitive sites, as well as DNA repair capacity, assessed through OGG1 activity. The genotypes were determined using the Polimerase Chain Reaction - Restriction Fragment Length Polymorphism (PCRRFLP) methodology. Ser / Ser individuals constituted the wild-type group (n = 35), while the remaining Ser / Cys and Cys / Cys individuals were analysed together, constituting the mutant group (n = 21).

RESULTS

After 16 weeks of exercise, a significant decrease in DNA SBs and also in FPG-sensitive sites ($p < 0.001$) was observed in the wild-type group, while in the mutant group a significant decrease only in DNA SBs ($p = 0.027$) was found. No significant differences in DNA repair capacity in both groups were found.

CONCLUSIONS

This pilot study suggests that DNA damage response to physical exercise, could be influenced by the Ser326Cys polymorphism in the hOGG1 gene.

P6. Using salivary biochemical markers to explain physical frailty status in institutionalised older adults

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INTRODUCTION

Early identification of older populations with an increased risk for Physical Frailty (PF) is one of the most important goals for geriatricians. A substantial number of research assessed adverse clinical ageing-related outcomes to evaluate how putative predictors of physical frailty (PF) may serve as screening tools (Furtado et al., 2018; Panza et al., 2018). However, identification of older populations at improved risk for the PF using biochemical approaches is a novel target for screening accuracy (Ruan et al., 2017; Schoufour, Echteld, Boonstra, Groothuismink, & Evenhuis, 2016). The goals of this exploratory study were to assess how different salivary biomarkers may be applied to accurately explain PF and analyse the subgroup of PF-differences on a set of salivary biomarkers.

METHODS

A group of 104 institutionalised-dwelling women, aged 75 years and older, were assessed for biosocial and general health status. The five Fried's frailty phenotype components of low levels of physical activity, low grip strength, subjective perception of fatigue, non-intentional weight loss and low gait speed were assessed and the sample divided into frail, pre-frail and non-frail subgroups (Fried et al., 2001). The quantification of different salivary biomarkers included Cortisol, α-amylase, Immunoglobulin-A, Lysozyme, Dehydroepiandrosterone and Testosterone. The diagnostic value of each of the variables was determined resorting to the receiver operating characteristics (ROC) analysis. For each model, a 95% confidence interval from percentiles for the area under the curve (AUC) was determined.

RESULTS

Comparative analyses revealed that, the frail subgroup performed significantly poorer on Cortisol and α-amylase. The analysis of AUC revealed good diagnostic accuracy for predicting PF using the SBM of α-amylase (AUC = 0.64, 95% CI[0.54; 0.75]; sensitivity and specificity were 64.6% and 64.5%, respectively).

CONCLUSIONS

These results have uncovered α-amylase as a new SBM that may be used as a PF screening tool. Future research needs to investigate the other SBM of the multiple systems involved in the relationship, especially makers of immune response.

Acknowledgments

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Funding

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References

Fried, L. P., Tangen, C. M., Walston, J., Newman, B., Hirsch, C., Gottdiener, J., … McBurnie, M. a. (2001). Frailty in older adults: evidence for a phenotype. *The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences*, *56*(3), M146-56. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11253156

Furtado, G. E., Caldo, A., Rieping, T., Filaire, E., Hogervorst, E., Botelho, A. M. T., & Ferreira, J. P. (2018). Physical Frailty and cognitive status over-60 age populations: a systematic review with meta-analysis. *Archives of Gerontology and Geriatrics*, *78*, 240–248. https://doi.org/10.1016/J.ARCHGER.2018.07.004

Panza, F., Lozupone, M., Solfrizzi, V., Sardone, R., Dibello, V., Di Lena, L., … Logroscino, G. (2018). Different Cognitive Frailty Models and Health-and Cognitive-related Outcomes in Older Age: From Epidemiology to Prevention. *Journal of Alzheimer's Disease*. IOS Press. https://doi.org/10.3233/JAD-170963

Ruan, Q., D'Onofrio, G., Sancarlo, D., Greco, A., Lozupone, M., Seripa, D., … Yu, Z. (2017). Emerging biomarkers and screening for cognitive frailty. *Aging Clinical and Experimental Research*. https://doi.org/10.1007/s40520-017-0741-8

Schoufour, J. D., Echteld, M. A., Boonstra, A., Groothuismink, Z. M. A., & Evenhuis, H. M. (2016). Biochemical measures and frailty in people with intellectual disabilities. *Age and Ageing*, *45*(1), 142–148. https://doi.org/10.1093/ageing/afv152

P7. 2bio4cartilage: an interdisciplinary project to prevent and treat osteoarthritis

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INTRODUCTION

Cartilage-related diseases are on the list of major concerns of the World Health Organisation by assuming the prevention of joint cartilage degeneration as an important issue, for which there are few effective solutions. On the other hand, ageing, commonly associated with obesity, nutritional deficiencies and physical (in)activity are the primary problems for public health. The main goals of this project are the implementation of healthy behaviours based on a physical exercise program to prevent osteoarthrosis (prevention) and the development of different bio-manufacturing technologies and innovative tools adapted to clinical (treatment) requirements.

METHODS

In the field of prevention, a technical dossier was developed that characterises and proposes different types of physical exercise. This exercise battery will be validated by exercise and health professionals and will be tested on patients diagnosed with osteoarthritis. Cumulatively, a mobile application is being created to facilitate access to this information. In the treatment domain, biodegradable, polymer-based temporary implants are being developed using additive manufacturing technologies. Composites from synthetic and natural biomaterials are being produced by different technologies (e.g., extrusion and photopolymerization).

RESULTS

This project has already demonstrated its applicability in the diverse domains. At the level of physical exercise, the discussion between researchers and clinicians has been promoting the development of a physical exercise program that can be individualised and, consequently, more appropriate. Regarding implants, the developed production system has shown high reliability, with optimal possibilities for the integration of different biomaterials. Structures produced with elastomeric resources have demonstrated a growing approximation to the mechanical properties of cartilage native tissue.

CONCLUSIONS

With a demographic trend towards an ageing population, society has now drifted into a vicious cycle over the proven relationship between osteoarthritis and obesity, and the increased prevalence of both. To contribute to the resolution of these problems it is mandatory to have integrated and multidisciplinary perspectives, and intervention approaches such as 2bio4cartilage.

Funding

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P8. 5-year changes in quadriceps muscle properties associated with impaired kidney function in older adults

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INTRODUCTION

Studies in patients with chronic kidney disease (CKD) demonstrate that muscle wasting is associated with loss of function, increased morbidity and mortality. However, the age-related changes in muscle properties – i.e. muscle morphology, strength and power - in older adults with impaired kidney function is not well understood, as these relations have not been evaluated longitudinally or using 3D imaging techniques to assess muscle morphology. Thus, a better understanding of the quadriceps muscle mass and function of older adults with impaired kidney function is needed to improve treatment and prevention strategies that can maintain physical functioning of this high-risk group. This study aimed to determine if lower estimated glomerular filtration rate (eGFR < 60 ml/min/1.73 m2) was associated with accelerated worsening over 5 years of quadriceps muscle cross-sectional area (CSA, cm^2), attenuation (HU), specific torque - quadriceps torque (N-m) / lean area (cm^2) - and maximum rate of torque development (RTD, N*m/s) among older adults with normal and impaired kidney function.

METHODS

A total of 2536 older adults (33.2% CKD stage 3-4), aged 66-92 years at baseline from the Age, Gene/Environment Susceptibility (AGES)-Reykjavik Study were studied. All participants had valid mid-thigh quantitative computed tomography (QCT) scans and isometric knee testing (using a dynamometer chair) at baseline and 5-years later; and had completed data on baseline serum creatinine and potential covariates (described below).

RESULTS

In multivariable linear regression models, adjusted for several potential confounders, compared to normal kidney function, subjects with CKD stages 3-4 had significantly greater loss of quadriceps muscle attenuation (OR= 1.34, 95% CI=1.13–1.60). Decreased kidney function was associated with accelerated decline in quadriceps muscle CSA (OR=1.21, 95% CI= 1.02–1.43), but after adjusting for confounders the association was attenuated and not statistically significant. We found that quadriceps specific torque and RTD were not different in impaired compared to normal kidney function older adults. Models were adjusted for age, sex, quadriceps intra-muscular adipose tissue area, percent weight change from age 50, weight, height, smoking status, and health status.

CONCLUSIONS

Our findings suggest that CKD patients have a higher risk of accelerated decline of quadriceps muscle attenuation, which is assumed as a marker of muscle fat infiltration. Muscle attenuation can be modulated by exercise training (Lang et al., 2014; Ryan, Ivey, Prior, Li, & Hafer-Macko, 2011). Thus, monitoring muscle quality changes and implementing exercise strategies that can be used in clinical practice may be two essential steps to prevent functional decline in CKD patients.

Funding

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References

Lang, T. F., Saeed, I. H., Streeper, T., Carballido-Gamio, J., Harnish, R. J., Frassetto, L. A., . . . Cavanagh, P. R. (2014). Spatial heterogeneity in the response of the proximal femur to two lower-body resistance exercise regimens. *J Bone Miner Res, 29*(6), 1337-1345. doi:10.1002/jbmr.2155

Ryan, A. S., Ivey, F. M., Prior, S., Li, G., & Hafer-Macko, C. (2011). Skeletal muscle hypertrophy and muscle myostatin reduction after resistive training in stroke survivors. *Stroke, 42*(2), 416-420. doi:10.1161/STROKEAHA.110.602441

P9. Association between physical activity and quality of life in hematologic cancer survivors - Systematic Review of Literature

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INTRODUCTION

Hematologic cancers are tumours of hematopoietic or lymphoid tissues and include diseases such as Hodgkin's Lymphoma, Non-Hodgkin's Lymphoma, Leukemias, and Multiple Myeloma. Both the disease and its treatment lead to several side effects that are important to control. Physical activity (PA) is an essential and promising way to improve the quality of life (QoL) of these cancer survivors (CS), but systematic literature reviews were not found. Hence, this study aims to conduct a systematic review of the literature (SRL) to analyse the association between PA and QoL in hematologic CS not under treatment.

METHODS

This SRL was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). We included studies that evaluated the association of physical activity and QoL in survivors of hematological cancer. The research was done in articles written in English and published until February of 2018, having been used the following databases: PsycINFO, SportDiscus and Pubmed. The authors examined all titles and abstracts resulting from the searches and excluded the articles according to the defined criteria, and afterwards they examined the full articles. For measuring the quality of the selected studies we used the Quality Assessment Tool for Quantitative Studies of the Effective Public Health Practice Project.

RESULTS

We found 100 possibly relevant studies. During the analysis of titles and abstracts, 80 studies were excluded, remaining 20 studies. The full articles of the 20 studies were collected and analysed, resulting in the inclusion of 6 studies. The main reasons for the articles not being included in the review were the fact that the studies did not isolate the results by type of cancer, nor did they related the quality of life to physical activity and physical exercise. In total, 1502 people participated in the included studies, with a mean age of 60.8 years and 50.01% being female. The studies present a large heterogeneity in the QoL instruments. Four studies found a statistical positive association between the practice of PA and the QoL, in the domains: emotional, functional, physical and social well-being, fatigue, depression and anaemia. The quality of the studies methods was considered weak.

CONCLUSIONS

Despite the different methodological characteristics, there was a positive association between physical activity and quality of life and several domains. Aiming for consistent conclusions, further well-designed studies are needed.

References

Alibhai, S. M., O'Neill, S., Fisher-Schlombs, K., Breunis, H., Timilshina, N., Brandwein, J. M., . . . Culos-Reed, S. N. (2014). A pilot phase II RCT of a home-based exercise intervention for survivors of AML. *Support Care Cancer*, 22(4), 881-889. doi:10.1007/s00520-013-2044-8

Battaglini, C. L., Hackney, A., Garcia, R., Groff, D., Evans, E., & Shea, T. (2009). The effects of an exercise program in leukemia patients. *Integrative Cancer Therapies*, 8(2), 130-138.

Bellizzi, K. M., Rowland, J. H., Arora, N. K., Hamilton, A. S., Miller, M. F., & Aziz, N. M. (2009). Physical activity and quality of life in adult survivors of non-Hodgkin's lymphoma. *Journal of Clinical Oncology*, 27(6), 960-966.

Bray, F., Ferlay, J., Soerjomataram, I., Siegel, R. L., Torre, L. A., & Jemal, A. (2018). Global Cancer Statistics 2018: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA: a Cancer Journal for Clinicians*, 68:394–424.

Jones, L. W., Courneya, K. S., Vallance, J. K., Ladha, A. B., Mant, M. J., Belch, A. R., . . . Reiman, T. (2004). Association between exercise and quality of life in multiple myeloma cancer survivors. *Support Care Cancer*, 12(11), 780-788.

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P., . . . Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *PLoS Medicine*, 6(7), e1000100.

Schmitz, K. H., Courneya, K. S., Matthews, C., Demark-Wahnefried, W., Galvão, D. A., Pinto, B. M., . . . Lucia, A. (2010). American College of Sports Medicine roundtable on exercise guidelines for cancer survivors. *Medicine & Science in Sports & Exercise*, 42(7), 1409-1426.

Smith, S. K., Mayer, D. K., Zimmerman, S., Williams, C. S., Benecha, H., Ganz, P. A., . . . Abernethy, A. P. (2013). Quality of life among long-term survivors of non-Hodgkin lymphoma: a follow-up study. *Journal of Clinical Oncology*, 31(2), 272-279.

Spector, D. J., Noonan, D., Mayer, D. K., Benecha, H., Zimmerman, S., & Smith, S. K. (2015). Are lifestyle behavioral factors associated with health-related quality of life in long-term survivors of non-Hodgkin lymphoma? *Cancer*, 121(18), 3343-3351. doi:10.1002/cncr.29490

Vallance, J. K. H., Courneya, K. S., Jones, L. W., & Reiman, T. (2005). Differences in quality of life between non-Hodgkin's lymphoma survivors meeting and not meeting public health exercise guidelines. *Psycho-Oncology*, 14(11), 979-991. doi:10.1002/pon.910

Vallerand, J. R., Rhodes, R. E., Walker, G. J., & Courneya, K. S. (2018). Feasibility and preliminary efficacy of an exercise telephone counseling intervention for hematologic cancer survivors: a phase II randomized controlled trial. *Journal of Cancer Survivorship*, *12*(3), 357-370.

Wolin, K. Y., Ruiz, J. R., Tuchman, H., & Lucia, A. (2010). Exercise in adult and pediatric hematological cancer survivors: an intervention review. *Leukemia*, 24(6), 1113.

P10. Can physical exercise prevent anthracycline-related cardiotoxicity in women with breast cancer: rationale and design of a randomised controlled trial

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INTRODUCTION

Anthracycline-containing chemotherapy (AC-CT) is a cornerstone for the treatment of breast cancer, improving disease-free and overall survival. Despite this undeniable clinical importance, these agents induce cardiac dysfunction contributing to morbidity and mortality in the patient population. Preventive strategies that optimize the treatment tolerability and cardiac health are needed. Particularly, physical exercise has been suggested as a promise approach for the prevention of anthracycline-related cardiotoxicity. However, the lack of evidence does not allow to test the truth of this hypothesis since this is mainly supported by data from animal studies. This study intents to explore the cardioprotective role of physical exercise in women undergoing AC-CT for early breast cancer.

METHODS

This is a protocol for a two-arm prospective randomised controlled, registered in the International Standard Randomised Controlled Trial Number (ISRCTN32617901). One hundred adult (>18 years old) women with early BC, follow-up at the Hospital Center of Vila Nova de Gaia/Espinho, and with therapeutic decision to receive AC-CT will be recruited and randomly assigned (1:1) to an intervention group or to a control group. Patients allocated to the intervention group will perform a 3-weekly supervised exercise program that will combine resistance and aerobic training during AC-CT and patients assigned to control group will only receive usual cancer care. Established cardiotoxicity related markers, such as circulating N-terminal pro-B-type natriuretic peptide resting left ventricular (LV) global longitudinal strain and resting LV ejection fraction will be measured before the start of the AC-CT (baseline); after the end of the AC-CT (post-intervention) and 3 months after the post-intervention (follow-up). These outcomes will be analysed by professional staff of the Hospital Center of Vila Nova de Gaia/Espinho blinded to the patient assignment group.

CONCLUSIONS

With this study, we intent to clarify the current role of physical exercise for the management of anthracycline-related cardiotoxicity.

Funding

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P11. Effects of intradialytic exercise in diabetic and non-diabetic hemodialysis patient´s physical function and body composition

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INTRODUCTION

End-stage renal disease and hemodialysis treatment (HD) are related with poor physical function (PF) and body composition (BC). This situation is particularly severe in HD diabetic patients. Previous studies have shown that PF and BC are related with mortality in this specific population (Kutner et al., 2015; Keane et al., 2016).

METHODS

This study aims to analyse the effect of an intradialytic exercise programme (IEP) on PF and BC of diabetic and non-diabetic HD patients.

An IEP was implemented in 19 dialysis units. We evaluate PF (sit to stand 30, handgrip strength, 8-foot up and go, sit to stand 5, single leg stance) and BC (bioimpedance – Body Composition Monitor) before and after 6 months. The IEP include aerobic training (cycling) during the first quarter. After this period the program combined aerobic and strength training.

RESULTS

The study was conducted with 419 patients that concluded the six month follow up (66,8% men, average age 61,97±14,14 years, dialysis vintage 67,3±77,48 months, 26,7% diabetics). Prior to IEP, diabetics had a worse performance in all PF tests (sit to stand 30: 13.08±4.44 vs 11.08±3.64 repetitions, $p<0.001$; handgrip strength: 30.47±11.62 vs 26.67±9.33 Kg, $p=0.001$; 8-foot up and go: 7.74±4.10 vs 10.85±13.70 seconds, $p<0.001$; sit to stand 5: 9.94±4.51 vs 11.64±4.96 seconds, $p=0.002$; single leg stance: 20.81±17.74 vs 8.19±12,25 seconds, $p<0.001$). Diabetics had also a worse BC according to fat tissue index (FTI) (11.31±5.29 vs 15.09±4.62 Kg/m2, $p<0.001$) and lean tissue index (LTI) (14.15±3.14 vs 12.41±2.54 Kg/m2, $p<0.001$). Diabetics and non-diabetics had similar adherence rates (78.38% and 77.47%, respectively) to IEP. Both groups improved the performance of PF measurements, except for handgrip strength. Non-diabetics reduced FTI (11.20±5.15 vs. 10.85±4.95, $p=0.005$) however no significant statistical results were observed for LTI (14.15±3.18 vs. 14.27±3.20, $p=0.205$), while diabetics reduced FTI (14.79±4.55 vs. 14.33±4.66, $p=0.001$) and improved LTI (12.42±2.55 vs. 12.87±2.55, $p=0.001$).

CONCLUSIONS

Diabetics had a worse performance in all PF tests and also a poorer BC compared to non-diabetics HD patients. Both groups had a good adherence rate to exercise sessions. The IEP improved PF and BC in both groups, however results were more prominent for diabetic patients.

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References

Kutner, N. G., Zhang, R., Huang, Y., Painter, P. (2015). Gait Speed and Mortality, Hospitalization, and Functional Status Change Among Hemodialysis Patients: A US Renal Data System Special Study. *Am J Kidney Dis*, 66(2):297-304. doi: 10.1053/j.ajkd.2015.01.024

Keane, D., Gardiner, C., Lindley, E., Lines, S., Woodrow, G., & Wright, M. (2016). Changes in Body Composition in the Two Years after Initiation of Haemodialysis: A Retrospective Cohort Study. *Nutrients*, 8(11), . doi:10.3390/nu8110702

P12. Effects of intradialytic resistance exercise training on bone health in Haemodialysis patients: a study protocol

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INTRODUCTION

Haemodialysis (HD) patients frequently develop bone mineral disorders that compromise their quality of life. Although mechanical stimulus from resistance exercise can induce bone adaptation, limited evidence is available regarding its effects on bone-related variables in HD patients. The few existent studies are characterised by small sample sizes and training protocols that are poorly described. Thus, this study aims to investigate the effects of 12 weeks of intradialytic progressive resistance exercise (RE) on bone circulating biomarkers in HD patients. In addition, the effects of the present training protocol on muscle strength and physical function will be explored.

METHODS

Eighty-eight adult HD patients will be recruited from one NephroCare Portugal SA clinic. Following a 6-week control run-in period, patients will be randomly allocated into a supervised intradialytic aerobic exercise (AE) (n= 44) or RE (n= 44) training protocol, 3 sessions per week for 12 weeks.

RE training will consist of 2 sets of 10-12 repetitions of 10 different exercises for upper and lower body using elastic bands and free-weight dumbbells to allow for increased exercise intensities, while AE training will be performed on a cycle ergometer at 50-70 rotations per minute (RPM) for 30 minutes.

All outcomes will be assessed at 3 time points: baseline, after the 6-week control run-in and the 12-week exercise periods. Resting venous blood samples will be collected to evaluate the following bone formation markers: propeptides of type 1 collagen N-terminal, osteocalcin and bone alkaline phosphatase; and bone resorption markers: telopeptides of type 1 collagen, receptor activator of nuclear factor-kB ligand, osteoprotegerin, and sclerostin. In addition, fibroblast growth factor 23 and soluble alpha-Klotho will also be examined. All bone biomarkers will be assessed by commercially available enzyme-linked immunosorbent assay kits. Muscle strength will be evaluated through maximum strength and force/time curve of hip flexion, arm flexion and handgrip strength. Physical function will be assessed by completing the sit to stand 60, the short physical performance battery, the incremental shuttle walking test and the timed up and go test. The 6-week control period will be analysed by paired sample t-tests as this is prior to randomisation. Training effects will be examined using an ANOVA with mixed design (within - and between-subjects).

RESULTS

It is expected that RE training will elicit higher bone and muscle adaptations compared to AE. The expected training-induced health-relevant changes may help to lower costs in the health care system and patient quality of life.

Funding

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P13. Evaluating the clinical implementation of an intradialytic exercise programme: a 2-year experience

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INTRODUCTION

Chronic kidney disease patients have low levels of physical activity compared to healthy population, and as disease severity progresses – such as patients under haemodialysis (HD) treatment – the inactivity is even more accentuated (Zelle et al., 2017). For HD patients, intradialytic exercise (IE) – performed while receiving HD treatment - is considered an effective strategy as it minimizes treatment boredom, is less time consuming, includes continuous medical supervision and can be a low-cost intervention. However, the translation of research evidence into clinical practice has been slow and information regarding effective approaches to achieve it is scarce. Therefore, we aimed to analyse the uptake, adherence, reasons for drop-out and safety of a supervised IE programme after two years of implementation in several dialysis units in Portugal.

METHODS

The IE was designed to be easily implemented in a clinical setting and followed the exercise prescription guidelines for this population, including aerobic (cycling) and resistance (weights and squeeze balls) training performed 3 times/week, each session lasting up to 80 min. Following a pilot implementation from June 2014 to September 2016 at a single dialysis unit, the NephroCare Portugal medical and executive boards presented this IE programme to all their clinics (n=37). The acceptance is made by the local medical director and involves at least 2 members from medical and nursing staff to deliver the IE. Before implementation, all staff members received specific training, and all clinics got exercise training equipment. Patients' uptake, adherence, reasons for drop-out and safety were collected after all exercise sessions using electronic training logs.

RESULTS

From September 2016 to August 2018 a total of 1413 patients from 21 NephroCare Portugal dialysis units were eligible to participate in the IE programme, whilst 882 patients failed to meet the inclusion criteria and 623 patients have not been fully screened for eligibility. From the eligible patients, 932 agreed to participate. However, over the last 2 years, 501 patients have dropped out - 37.9% withdrew due to clinical reasons and 62.1% voluntarily (personal reasons) or due to self-reported physical incapacity. Compliance with exercise sessions among patients currently exercising is high, as 78% completed more than 70% of the exercise sessions. There were no serious adverse events related to exercise training.

Table 1
Descriptive data of patients' participation

	n	%
Patients eligible to exercise (n=1413)		
Presently exercising	431	30.5
Dropped out	501	35.5
Refused to participate	481	34.0
Other patients (n=1505)		
Waiting for clinical decision	623	41.4
Did not meet inclusion criteria	882	58.6

CONCLUSIONS

These findings support that clinical implementation of an exercise regimen designed for HD patients is feasible with an expected high compliance rate. However, strategies particularly focusing on reducing refusals to exercise participation and voluntary withdrawals after engagement must be developed.

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References

Zelle, D. M., Klaassen, G., van Adrichem, E., Bakker, S. J. L., Corpeleijn, E., & Navis, G. (2017). Physical inactivity: a risk factor and target for intervention in renal care. *Nature Reviews Nephrology, 13*(3), 152-168. doi:10.1038/nrneph.2016.187

P14. Exercise for individuals with dementia

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INTRODUCTION

Four hundred and sixty-eight million people worldwide have dementia, and this number is expected to increase to 74.7 million by 2030 and 131.5 million by 2050 (Prince et al., 2015). In Portugal, the estimated number of people with dementia aged ≥ 60 years is about 5.91% (Santana, Farinha, Freitas, Rodrigues, & Carvalho, 2015). Physical activity (PA), by increasing aerobic fitness and cerebral blood flow, seems to contribute to the reduction of chronic inflammation in the central nervous system, increasing neuroplasticity and promoting the reorganisation of neural circuits (Erickson et al., 2011). PA is considered to be an effective non-pharmacologic strategy in attenuating or delaying the evolution of degenerative diseases related to dementia (Maliszewska-Cyna, Lynch, Jordan, Michael & Aubert, 2017; Paillard, Rolland & de Souto Barreto, 2015). Consequently, it is important to design and implement exercise programs specific for dementia. Literature presents several PA intervention in dementia patients (Fleiner, Leucht, Foerstl, Zijlstra, & Haussermann, 2017; Guure, Ibrahim, Adam & Said, 2017), but although PA presents benefits retarding dementia evolution, the amount/type of PA required for these benefits is unclear (Moore, et al. 2016). In fact, different interventions characteristics (exercise type, intensities, durations, frequency, among others) lead to different results on functional fitness and cognitive function (Guure et al., 2017). Therefore, it is essential to define an operative framework that supports the design of a PA intervention on dementia patients.

METHODS

A literature search was conducted in the following databases: Science Direct, Scopus and PubMed from January 2014 to October 2018, to include research studies that evaluate exercise programs in dementia. Search key words were Dementia, Alzheimer disease and physical activity. Exclusion criteria were: (1) exercise program was not properly described and (2) evaluation of both physical fitness and cognitive function was not presented.

RESULTS

Of the 1427 articles retrieved, 66 met the inclusion criteria. The reviewed studies revealed five operative principles for design exercise programs in dementia: (1) Need for a balance between individualisation and promote social relationship; (2) Cognitive stimulation should be combined with aerobic and strength exercises; (3) Need to include functional exercises together with fine motor skill stimulation; (4) Assure sufficient intensity and frequency in order to promote chronic adaptations; (5) Motivation to participate must be allied with enjoyment and self-esteem.

MEMO_MOVE
EXERCÍCIOS ESTIMULAÇÃO GLOBAL

CONCLUSIONS

Based on results, a PA program with a cognitive stimulation component (dual task program) was designed for functional fitness, and cognitive ability in patients with Dementia in - MEMO_MOVE program.

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References

Erickson, K. I., Voss, M. W., Prakash, R. S., Basak, C., Szabo, A., Chaddock, L., ... & Wojcicki, T. R. (2011). Exercise training increases size of hippocampus and improves memory. *Proceedings of the National Academy of Sciences, 108*(7), 3017-3022. Doi: 10.1073/pnas.1015950108

Fleiner, T., Leucht, S., Foerstl, H., Zijlstra, W., & Haussermann, P. (2017). Effects of short-term exercise interventions on behavioral and psychological symptoms in patients with dementia: a systematic review. *Journal of Alzheimer's Disease, 55*(4), 1583-1594. doi: 10.3233/JAD-160683

Guure, C. B., Ibrahim, N. A., Adam, M. B., & Said, S. M. (2017). Impact of Physical Activity on Cognitive Decline, Dementia, and Its Subtypes: Meta-Analysis of Prospective Studies. *BioMed Research International*. doi: 10.1155/2017/9016924

Maliszewska-Cyna, E., Lynch, M., Jordan Oore, J., Michael Nagy, P., & Aubert, I. (2017). The benefits of exercise and metabolic interventions for the prevention and early treatment of Alzheimer's disease. *Current Alzheimer Research, 14*(1), 47-60. doi: 10.2174/1567205013666160819125400

Moore, K. M., Girens, R. E., Larson, S. K., Jones, M. R., Restivo, J. L., Holtzman, D. M., ... & Timson, B. F. (2016). A spectrum of exercise training reduces soluble Aβ in a dose-dependent manner in a mouse model of Alzheimer's disease. *Neurobiology of disease, 85*, 218-224. doi: 10.1016/j.nbd.2015.11.004

Paillard, T., Rolland, Y., & de Souto Barreto, P. (2015). Protective effects of physical exercise in Alzheimer's disease and Parkinson's disease: a narrative review. *Journal of clinical neurology, 11*(3), 212-219. doi: 10.3988/jcn.2015.11.3.212

Prince, M. et al. World Alzheimer Report 2015. The global impact of dementia: an analysis of prevalence, incidence, cost and trends. *Alzheimer's Disease International* https://www.alz.co.uk/research/WorldAlzheimerReport2015.pdf

Santana, I., Farinha, F., Freitas, S., Rodrigues, V., & Carvalho, Á. (2015). Epidemiologia da Demência e da Doença de Alzheimer em Portugal: Estimativas da Prevalência e dos Encargos Financeiros com a Medicação. *Acta Médica Portuguesa, 28*(2), 182-188.

P15. HIIT in renal transplant recipients

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INTRODUCTION

Exercise can alter immune status depending on exercise type, intensity and duration (Robson, Blannin, Walsh, Castell, & Gleeson, 1999). In healthy people, moderate intensity exercise can boost immune parameters (Gleeson & Bishop, 2005) whereas, high intensity exercise can have an immunosuppressive effect 24 hours post exercise (Bishop et al., 2005). High intensity interval training (HIIT) has become a popular form of exercise however; there is a lack of research in renal transplant recipients (Didsbury et al., 2013) who have particular immunological vulnerability due to the combination of impaired renal function and immunosuppression. Therefore, this study aimed to investigate the acute responses to regular HIIT on leukocyte counts in renal transplant recipients.

METHODS

Three renal transplant patients (2 males and 1 female, age 50±16 years, BMI 22±2 kg·m2, eGFR 69±19 mL·min·1.73) completed 8 weeks of HIIT, 3 times a week (4×4 min interval training at 80%–90% V̇O2peak). Peripheral blood was collected PRE, immediately POST, 1HR, 4HR and 24HR after exercise, within the first two weeks (untrained) and last two weeks (trained) of the 8-week training programme. Differential leukocyte counts were performed on Diff-Quik stained preparations of peripheral blood.

RESULTS

In preliminary analysis, untrained renal transplant recipients had a reduced frequency of lymphocytes 1HR after exercise (P=0.004) which resolved by 24HR (P=0.01). After regular exercise training lymphocytes also decreased 1HR (P=0.02) and 4HR after exercise (P=0.03, Figure 1). Monocyte frequency decreased 1HR after exercise in the untrained state (P=0.03), in contrast, following regular exercise training the monocyte response lasted until 4HR after exercise (P=0.02). There was a difference in the untrained and trained response to exercise at 4HR (P<0.005, 5% and 1%, respectively, Figure 2). No differences were observed for neutrophils.

DISCUSSION

Preliminary findings suggest lymphopenia occurs following exercise in untrained renal transplant recipients lasting up to 1 hour which resolves 24 hours after exercise. Following regular training a similar trend was observed and appeared to persist for longer. Confirmation of this trend will require generation of more data sets from patients. Further in-depth analysis of the phenotypes of specific lineage subsets within the peripheral blood mononuclear cells is being undertaken using multi-colour flow cytometry. Specific analysis will include the frequency, phenotype and expression of functional markers of T cells, B cells, natural killer cells, dendritic cells and monocytes.

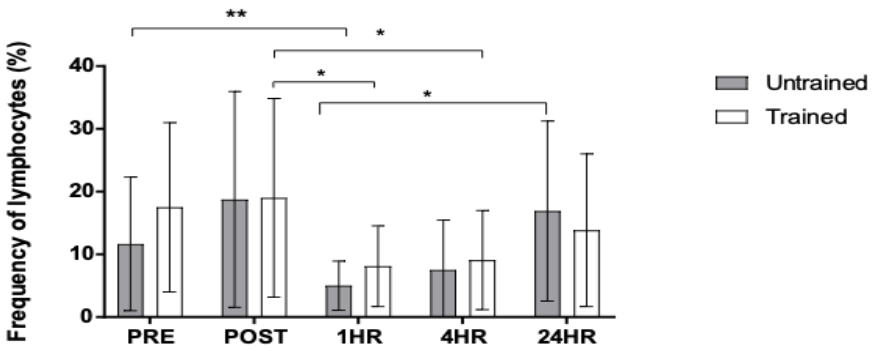

Figure 1. Untrained and trained lymphocyte frequency following 8 weeks of HIIT. *Significant difference P<0.05, ** Significant difference P<0.01

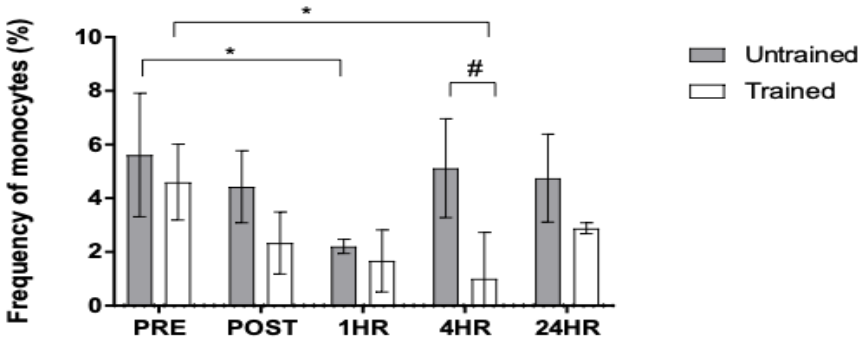

Figure 2. Untrained and trained monocyte frequency following 8 weeks of HIIT * Time interaction, # trial interaction $P<0.05$

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References

Bishop, N. C., Walker, G. J., Bowley, L. A., Evans, K. F., Molyneux, K., Wallace, F. A., & Smith, A. C. (2005). Lymphocyte responses to influenza and tetanus toxoid in vitro following intensive exercise and carbohydrate ingestion on consecutive days. *Journal of Applied Physiology (Bethesda, Md. : 1985)*, *99*(4), 1327–35. https://doi.org/10.1152/japplphysiol.00038.2005

Didsbury, M., McGee, R. G., Tong, A., Craig, J. C., Chapman, J. R., Chadban, S., & Wong, G. (2013). Exercise training in solid organ transplant recipients: a systematic review and meta-analysis. *Transplantation*, *95*(5), 679–87. https://doi.org/10.1097/TP.0b013e31827a3d3e

Gleeson, M., & Bishop, N. C. (2005). The T cell and NK cell immune response to exercise. *Annals of Transplantation*. https://doi.org/TNK0024 (paper)

Robson, P. J., Blannin, a K., Walsh, N. P., Castell, L. M., & Gleeson, M. (1999). Effects of exercise intensity, duration and recovery on in vitro neutrophil function in male athletes. *International Journal of Sports Medicine*, *20*(2), 128–135. https://doi.org/10.1055/s-2007-971106

P16. Normative values of AQoL-8D for Spanish women with fibromyalgia

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INTRODUCTION

Fibromyalgia is a chronic disease which is mainly characterised by widely spread non-inflammatory pain and other symptoms, such as stiffness, poor physical fitness, distress, sexual problems and sleep disturbance. All these symptoms lead to a reduced health-related quality of life (HRQoL). AQoL-8D (Richardson, Sinha, Iezzi, & Khan, 2014) is a HRQoL questionnaire more focused on the social and affective dimensions than the rest of the most widely used HRQoL questionnaires. The objective of this study was to provide normative values of the HRQoL questionnaire "AQoL-8D" in Spanish women suffering from fibromyalgia.

METHODS

A total of 177 Spanish women with fibromyalgia participated in the study. Mean age was 53.64 years. They fulfilled the AQoL-8D questionnaire as well as the revised version of the Fibromyalgia Impact Questionnaire (FIQ-R) (Luciano, Aguado, Serrano-Blanco, Calandre, & Rodriguez-Lopez, 2013; Salgueiro et al., 2013) and other socio-demographic questions. AQoL-8D score were stratified by age, years since the disease diagnostic and the severity of symptoms according to FIQ-R score. Impact of those three variables on AQoL-8D score was calculated through Analysis of Variance (ANOVA) and post-hoc (bonferroni) tests.

RESULTS

The mean score in the AQoL-8D was 0.47 ± 0.17. According to age, participants aged less than 40 showed a mean score of 0.49 ± 0.21. This score was higher than that reported by women aged 40.1-50 and 50.1-60 (43.06 ± 0.16 and 45.42 ± 0.15, respectively). Mean score for women aged 60 or more was 0.51 ± 0.19. Neither ANOVA nor post-hoc test were significant. Regarding years since diagnosis, there was a significant difference in the ANOVA. Bonferroni test revealed significant differences between those women diagnosed in 2011 or later (0.35 ± 0.14) and women diagnosed both between 1991 and 2000 (0.51 ± 0.16), and between 2001 and 2010 (0.48 ± 0.16). There were also significant differences according to the severity of the symptoms from the FIQ-R. Highest scores in AQoL-8D were reported by those women with mild fibromyalgia (0.62 ± 0.16) and the worst were reported by those with extreme fibromyalgia (0.34 ± 0.10).

CONCLUSIONS

The AQoL-8D questionnaire is affected by the years since diagnosis, but not by age. It is sensitive to the severity of fibromyalgia assessed using FIQ-R.

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References

Luciano, J. V., Aguado, J., Serrano-Blanco, A., Calandre, E. P., & Rodriguez-Lopez, C. M. (2013). Dimensionality, reliability, and validity of the revised fibromyalgia impact questionnaire in two Spanish samples. *Arthritis Care Res (Hoboken), 65*(10), 1682-1689. doi: 10.1002/acr.22034

Richardson, J., Sinha, K., Iezzi, A., & Khan, M. A. (2014). Modelling utility weights for the Assessment of Quality of Life (AQoL)-8D. *Qual Life Res, 23*(8), 2395-2404. doi: 10.1007/s11136-014-0686-8

Salgueiro, M., Garcia-Leiva, J. M., Ballesteros, J., Hidalgo, J., Molina, R., & Calandre, E. P. (2013). Validation of a Spanish version of the Revised Fibromyalgia Impact Questionnaire (FIQR). *Health Qual Life Outcomes, 11*, 132. doi: 10.1186/1477-7525-11-132

P17. Perception of exercise intensity during combined exercise training for middle-aged and older patients with type 2 diabetes: Agreement between Borg and OMNI scales

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INTRODUCTION

Subjective perceived exertion can be defined as the capacity to self-evaluate the sensations that appear due to acute physiological adaptations to exercise. The most commonly used and widely validated instrument in this area for the assessment of exercise intensity is the Borg scale (Borg, 1974). Another scale, the OMNI scale, originally designed for use in children (Robertson et al., 2000), has recently been validated as an alternative to the Borg scale for exercise prescription and monitoring at all ages. These 2 scales have different levels: the Borg scale is defined by a scale from 6 to 20 points (15 levels); and the OMNI scale is defined by a scale from 0 to 10 points (10 levels). However, middle-aged and older adults with limited experience in performing near-maximal to maximal exercise may have some difficulties to properly quantify their perceived exertion. The OMNI scale seems methodologically advantageous compared with the Borg scale as it includes pictorial description of sensations along with the numerical and verbal statements presented on the hill, which facilitate the appropriate understanding. This study aimed to test the agreement between the rating of perceived exertion (RPE) reported with both scales, the Borg (6-20) and OMNI (0-10) after one session of combined exercise training in middle-aged and older patients with type 2 diabetes (T2D).

METHODS

Twenty-one participants with T2D (women=9; age= 68.8 ± 5.0 years; BMI=29.9 ± 4.7 kg/m2) subjectively rated their level of exertion immediately in the end of one combined exercise training session (75 min; Diabetes em Movimento® community-based exercise program (Mendes, Sousa, Reis, & Themudo-Barata, 2017)), using the Borg and OMNI scales. Non-parametric ordinal correlation analysis was performed using Kendall's tau (Kendall's rank correlation coefficient) - which is a non-parametric measure of the degree of concordance between two variables measured on an ordinal scale.

RESULTS

Exercise session intensity was rated as somewhat hard using both Borg (14.2 ± 2.0 points) and OMNI RPE scales (6.8 ± 1.4 points). A moderate correlation (τ = 0.41, p=0.02) between Borg and OMNI RPE scales was found.

CONCLUSIONS

Our findings provide some evidence that RPE obtained from the Borg and OMNI scales have only a moderate agreement. Thus, participants may not be correctly using the scales, which highlight the need for exercise physiologists to take sufficient time to educate patients and ensure appropriate understanding prior to use.

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Participants of Diabetes em Movimento® Maia.

References

Borg, G. A. (1974). Perceived exertion. *Exercise and Sport Sciences Reviews, 2*, 131-153.

Mendes, R., Sousa, N., Reis, V. M., & Themudo-Barata, J. L. (2017). Implementing Low-Cost, Community-Based Exercise Programs for Middle-Aged and Older Patients with Type 2 Diabetes: What Are the Benefits for Glycemic Control and Cardiovascular Risk? *International Journal of Environmental Research and Public Health, 14*(9). doi:10.3390/ijerph14091057

Robertson, R. J., Goss, F. L., Boer, N. F., Peoples, J. A., Foreman, A. J., Dabayebeh, I. M., . . . Thompkins, T. (2000). Children's OMNI scale of perceived exertion: mixed gender and race validation. *Medicine and Science in Sports and Exercise, 32*(2), 452-458.

P18. Test–retest reliability of physical function tests in patients with knee osteoarthritis

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INTRODUCTION

Physical function is related to the ability to move around and perform daily activities, which is assessed using self-reported and performance-based measures (Dobson et al., 2012). The Osteoarthritis Research Society International (OARSI) recommended three minimum core set tests for outcome measures in patients with knee osteoarthritis: 30s chair stand test (CST); 40m fast-paced walk test (FWT); stair climb test (SCT) (Dobson et al., 2013). The purpose of this study was to investigate the test-retest reliability of these physical function tests in patients with knee osteoarthritis.

METHODS

The intraclass correlation coefficient (ICC) and their 95% confidence interval, the standard error of measurement (SEM), minimal detectable change (MDC) and limits of agreement were calculated for the three tests. The SEM and MDC were calculated using the following equations: SEM = SD*√(1-ICC) and MDC95 = 1.96*√2*SEM (de Vet, Terwee, Knol, & Bouter, 2006).

Table 1

Test–retest reliability of physical function tests

Physical function tests	ICC	95% CI		Mean	Minimum	Maximum	Diff	SD_{diff}	SEM	MDC
30s chair stand test	0.91	0.70	0.97	12.35	9.75	18.50	-0.71	1.59	0.86	2.39
40m fast-paced walk test	0.96	0.86	0.99	1.51	1.15	1.92	0.01	0.08	0.04	0.11
Stair climb test	0.98	0.93	0.99	15.60	10.33	26.03	0.51	1.35	0.68	1.89

RESULTS

This study includes 14 patients (9 female; mean age 62 ± 5.3; weight 77.6 ± 13.9 kg, and height 163 ± 8.6 cm) with diagnosed radiographic medial knee OA Kellgren/Lawrence grade 2 or 3. The results for the test-retest reliability can be seen in Table 1. The physical function tests presented an excellent reliability with the ICC> 0.90. The estimated value for SEM was 0.86 for the CST, 0.04 for FWT and 0.68 for SCT. The MDC for the CST was 2.39, for the FWT was 0.11 and for the SCT was 1.89.

CONCLUSIONS

The ICC suggests that these tests are appropriate for use in clinical practice and the values found for the SEM and MDC are useful to estimate the amount of change which is enough to produce real changes in patients with knee osteoarthritis.

References

de Vet, H. C., Terwee, C. B., Knol, D. L., & Bouter, L. M. (2006). When to use agreement versus reliability measures. *J Clin Epidemiol, 59*(10), 1033-1039. doi:10.1016/j.jclinepi.2005.10.015

Dobson, F., Hinman, R. S., Hall, M., Terwee, C. B., Roos, E. M., & Bennell, K. L. (2012). Measurement properties of performance-based measures to assess physical function in hip and knee osteoarthritis: a systematic review. *Osteoarthritis Cartilage, 20*(12), 1548-1562. doi:10.1016/j.joca.2012.08.015

Dobson, F., Hinman, R. S., Roos, E. M., Abbott, J. H., Stratford, P., Davis, A. M., . . . Bennell, K. L. (2013). OARSI recommended performance-based tests to assess physical function in people diagnosed with hip or knee osteoarthritis. *Osteoarthritis Cartilage, 21*(8), 1042-1052. doi:10.1016/j.joca.2013.05.002

P.19 Vitamin D supplementation down-regulates interleukin-6 and myosin heavy chain gene expression in skeletal muscle cells isolated from Vitamin-D deficient CKD patients

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INTRODUCTION

Skeletal muscle wasting is a common co-morbidity associated with chronic kidney disease (CKD), adversely affecting quality of life, physical function, morbidity and mortality. Patients are often Vitamin-D deficient, which has been correlated with frailty in elderly populations. Recent evidence also suggests that Vitamin-D supplementation regulates myogenic and inflammatory processes skeletal muscle. This study investigated the effect of Vitamin-D supplementation on myogenic and inflammatory gene expression in primary cultures derived from Vitamin-D deficient CKD patient donors.

METHODS

Six CKD patients (mean eGFR 23.7, range 9-41ml/min/1.73m2; mean age 58, range 27-80 years), with Vitamin-D deficiency (mean 25[OH]D 9.72, range 1-19.1 ng/mL, according to Endocrinology Society classification system) underwent a skeletal muscle biopsy from the vastus lateralis. Tissue was homogenised and satellite cells isolated and grown in HamsF10 (20% serum) at 37 °C and 5% CO2. Confluent cells were switched to DMEM (2% serum) and supplemented daily with either 0, 10 or 100nmol 1α,25(OH)2D3 for 5-days. RNA was extracted and reversed transcribed, with the resultant cDNA used for RT-PCR with specific primers for myogenic regulatory factors (MRFs: Pax7, MyoD, Myogenin) and myosin heavy chain (MyHC1, 2, 3, 7, 8), inflammatory (IL-6, TNFα, myostatin) and vitamin receptor (VDR) genes. Threshold cycle (Ct) was normalised to an internal control (18S) and analysed according to 2-ΔΔCT. Data was compared using one-way repeated measures ANOVA.

RESULTS

There was a significant effect of 1α,25(OH)2D3 on IL-6, with 10nmol reducing expression by 45% ($p=0.04$). Trends were seen for 34% ($p= 0.08$) and 47% ($p= 0.054$) decrease in myostatin expression by 10nmol and 100nmol 1α,25(OH)2D3, respectively. A general down-regulation in MyHC expression was observed in response to 1α,25(OH)2D3 treatment. MyHC1 and MyHC8 mRNA reduced by 76% ($p=0.045$) and 58% ($p=0.033$), respectively, in 10nmol 1α,25(OH)2D3 cultures, whereas, MyHC3 mRNA reduced by 57% and 66% following treatment with 10nmol ($p=0.059$) and 100nmol ($p=0.078$). There was no effect of 1α,25(OH)2D3 on Pax7, MyoD, Myogenin, TNFα, or VDR expression ($p>0.05$).

CONCLUSIONS

Supplementation of 10nmol 1α,25(OH)2D3 for 5-days significantly reduced inflammatory (IL-6) and myogenic (MyHC1 and MyHC8) gene expression in human primary myotubes derived from Vitamin-D deficient CKD patients. There was a strong trend for down-regulation of myostatin and MyHC3 expression, with no effect on mRNA of MRFs or VDR. This suggests Vitamin-D deficiency may play a role in intramuscular inflammation and muscle wasting, both of which are prevalent in CKD.

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P20. Acute effects of unilateral and bilateral gluteal bridge exercise performed on a stable or unstable surface on neuromuscular performance

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INTRODUCTION

Unstable surfaces are commonly used to perform unilateral and bilateral strength training exercises. However, little is known about the acute effects of these routines on neuromuscular performance. The aim of this study was to investigate the acute effects of unilateral and bilateral gluteal bridge exercise performed on a stable or unstable surface on neuromuscular performance.

METHODS

Ten females with no experience in strength training (25.3 ± 2.1 years) participated in the study. Gluteal bridge exercise was performed under four conditions: (i) bilateral on a stable surface; (ii) unilateral on a stable surface; (iii) bilateral on an unstable surface; (iv) unilateral on unstable surface. A BOSU® device was used as unstable. Peak torque was evaluated in maximum isometric contractions in a REV 9000 Technogym isokinetic device. The evaluations were performed as follows: immediately before the exercise; immediately after; 30 minutes after; 60 minutes after.

RESULTS

No differences were found in peak torque across time when bilateral exercise was performed in stable and unstable surfaces ($p>0.05$). In addition, there were no differences when unilateral exercise was performed in a stable surface ($p>0.05$). However, there was a significant decline in peak torque across time when the unilateral exercise was performed in an unstable surface (before, 84.3 ± 15.6; after, 83.3 ± 15.6; 30 min, 78.8 ± 13.0; 60 min, 77.9 ± 12.5 N*m, $p=0.03$). Peak torque was significantly lower 60 minutes after unilateral unstable exercise compared to the moment before exercise ($p=0.03$) and immediately after exercise ($p=0.02$). Additionally, peak torque 30 minutes after unilateral unstable exercise showed a tendency for being lower when compared to baseline ($p=0.06$).

CONCLUSIONS

Practitioners should be aware of the potential negative acute effects of unilateral exercise performed in unstable conditions on muscle strength levels across time.

P21. Does physical activity attenuate inflammaging?

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INTRODUCTION

Chronic low-grade inflammation plays an increasingly role in the rate of ageing and age-related diseases, also known as inflammaging, which has been described as a potential mediator of physical and functional decline among elders. Although physical activity (PA) is associated with a lower risk age-related inflammation and an improved physical functioning, few studies have demonstrated its association with inflammation and physical fitness. Therefore, we aimed to determine c-reactive protein (CRP) levels, physical and functional fitness in physically and non-physically active older adults.

METHODS

In this cross-sectional study, 269 non-institutionalised older than 70 years participants (female, 77.3±5.1 years and men, 77.7±4.8 years) were randomly recruited in the district of Viana do Castelo. Based on the General Physical Activity Questionnaire, older adults were divided into i) physically active (PA; n=196) for at least 150 min of moderate physical activity per week and ii) non-physically active (N-PA) groups. The cardiorespiratory fitness was measured by 6-minute walk distance (6MWD). Maximal handgrip and knee extension strengths were assessed three times for each limb and the maximal performance was used for analysis. Health-related quality of life was assessed by SF-36 health survey. Blood samples were collected and stored for serum high sensitivity CRP (hsCRP) assay.

RESULTS

Serum hsCRP levels were negatively correlated to 6WMD ($r=-.63$, $p<0.05$), handgrip maximal strength ($r=-.59$, $p<0.05$), SF-36 role physical function ($r=-.69$, $p<0.05$), SF-36 physical functioning ($r=-.58$, $p<0.05$). The PA group showed higher 6WMD (411.1±146.1 vs.289.0±127.9 m), maximal handgrip (25.0±7.7 vs.21.1±0.6 kgf) and knee extension (30.6±14.1 vs.23.13±11.2 kgf) strengths compared to N-PA group. Generally, PA group showed higher scores in SF-36 domains, including general health, role physical function, physical functioning and mental health. Serum hsCRP (1.6±1.0 vs.2.3±1.5 mg.L-1) was lower in PA group compared to N-PA group.

CONCLUSIONS

Data suggest that physically active older adults showed lower CRP levels and higher physical and functional fitness scores, suggesting that PA may play an important role attenuating inflammaging. Moreover, this data strengthen the relevance of the implementation of exercise programs to improve physical and functional fitness for aged population.

Funding

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P22. Eating and Physical Activity Behaviours in Young Overweight Footballers

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INTRODUCTION

Childhood obesity exposes inequity between dietary and physical activity (PA) behaviours, and the imbalance between calorie intake and energy expenditure. Acquiring and developing proper behaviours, such as healthy eating and an active lifestyle, are paramount measures to prevent obesity and its associated morbidities. Team sports, such as Football, play an important role as a PA context very popular among children and adolescents. Evidence suggests that eating habits are inadequate to nutritional needs of subjects engaging in Football practice (García, García-Zapico, Patterson, & Iglesias-Gutiérrez, 2014). Taking into account young subjects participating in sports, especially considering those already identified as overweighed, detailed data is still needed for preparing suitable recommendations. Therefore, this study aimed to analyse associations between eating and PA behaviours, energy intake (EI), expenditure (EE) and imbalance in young footballers.

METHODS

In a Football School, 19 boys (8 to 12 years) completed measurements of PA and dietary. Body mass and height were measured, and body mass index (BMI) was calculated. PA and eating behaviours were simultaneously measured by three-day diaries, including two week days and one weekend day. It was mandatory to measure one training day. PA intensities and EE were estimated as described elsewhere (Machado-Rodrigues et al., 2012). Ingestion of macronutrients and EI were estimated from national reference tables and food labels.

Differences were analysed with Student's t-test and correlations were examined from Pearson's coefficients. Statistical significance was set at 5% ($P \leq 0.05$). All analyses were carried out in SPSS version 21.

RESULTS

On average, (EI) was 1950.6 ± 268.0 kcal.day-1, (EE) was 1550.4 ± 433.8 kcal.day-1, time in sedentary/sitting PA (SEDPA) was 620.8 ± 59.2 min.day-1 and time in moderate-to-vigorous PA (MVPA) was 166.4 ± 54.5 min.day-1. There was a difference between EI and EE (Difference EI-EE = 400.3 ± 518.0; $t=3.368$; $P=0.003$). There were correlations between age and EE ($r=0.534$; $P=0.019$), age and Difference EI-EE ($r=-0.539$; $P=0.017$), BMI and EE ($r=0.844$; $P<0.001$), BMI and Difference EI-EE ($r=-0.745$; $P<0.001$), BMI and SEDPA ($r=0.569$; $P=0.011$), BMI and MVPA ($r=-0.560$; $P=0.013$), and SEDPA and MVPA ($r=-0.687$; $P=0.001$).

CONCLUSIONS

Results showed a pronounced imbalance between EI and EE in young overweight footballers. These findings suggest that this population would benefit from proper nutritional guidance in order to reduce energy imbalance and accomplish nutritional adequacy.

Funding

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References

García, P. M. R., García-Zapico, P., Patterson, Á. M., & Iglesias-Gutiérrez, E. (2014). Nutrient intake and food habits of soccer players: Analyzing the correlates of eating practice. *Nutrients*, *6*(7), 2697–2717. https://doi.org/10.3390/nu6072697

Machado-Rodrigues, A. M., Figueiredo, A. J., Mota, J., Cumming, S. P., Eisenmann, J. C., Malina, R. M., & Coelho-e-Silva, M. J. (2012). Concurrent validation of estimated activity energy expenditure using a 3-day diary and accelerometry in adolescents. *Scandinavian Journal of Medicine and Science in Sports*, *22*(2), 259–264. https://doi.org/10.1111/j.1600-0838.2010.01155.x

P23. Effects of a physical exercise on depression, self-esteem, body image, sexuality and quality of life in women with breast cancer

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INTRODUCTION

Breast cancer is the most common type of cancer in women worldwide, and is considered the second cause of death in the female gender. The time span from diagnosis to cure has a major impact on the quality of life of these women. The aim of this study is to evaluate the impact of a physical exercise program on body image, states of depression, sexuality, health and quality of life in women with breast cancer.

METHODS

The instruments used in this study were the Beck Depression Inventory (BDI-I), which is intended to evaluate the depressive symptomatological severity; and the Supplementary Breast Cancer Module Questionnaire - QLQ-BR23 for the evaluation of the variables quality of life, body image and sexuality. This study is currently underway in a northern city of Portugal. The sample is composed of thirty women, of whom ten are from the experimental group and twenty from the control group. With an average age of 47 years old. All of them were followed and referred by the Oncology Center of the Hospital Center of Trás-os-Montes and Alto Douro and considered clinically stable and able to perform physical exercise.
The duration of each training session will be 45-60 minutes. Two data collections will be obtained, the pre-test at time zero and the post-test at three months.

RESULTS

We are finishing the first test and subsequently a data processing.

CONCLUSIONS

After data processing, it is expected that most women will have mood disorder, low self-esteem and a lower quality of life.

References

Fayers, P.M., Aaraonson, N., Bjordal, K., Curran, D., & Groevold, M. (1999). EORTC QLQ-C30. Scoring Manual (2nd ed.). Brussels: European Organization for Research and Treatment of Cancer Quality of Life Study Group.

Gandini, R., Martins, M., Ribeiro, M., Santos, D. (2007). Inventário de Depressão de Beck – BDI: validação fatorial para mulheres com câncer. Psico-USF, Vol. 12, n. 1, p. 23-31.

Galvão, A., & Newton, R., (2005). Review of Exercise Intervention Studies in Cancer Patients. Journal of clinical oncology: Vol. 23, n. 4, 899-909.

World Health Organization (2009). Breast cancer: prevention and control, available from http://www.who.int/cancer/detection/breastcancer/en/index.html

P24. Importance of perceived social support for adolescents' physical activity promotion: Family in Move program

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INTRODUCTION

Adolescents' physical activity (PA) behaviours are decreasing worldwide and Portugal follows the same trend; few adolescents attain health recommendations for PA intensities (Tremblay et al., 2016). Social support can have a positive influence in promoting adolescents' health-related PA behaviours (Chen, Sun, & Dai, 2017). Therefore, the aim of this study was to evaluate the differences in perceived social support between active (AG) and inactive (IG) adolescents.

METHODS

143 Portuguese adolescents (mean age 10.9±0.7 years) took part in a school-based program, named Family in Move. This program aims to identify barriers, motivations and family perceptions, related to healthy lifestyles. The adolescents' PA was assessed by questionnaire (Ledent, Cloes, & Piéron, 1997) good reliability and strong intraclass correlation coefficients for Portuguese population (Mota et al., 2002); PA index was obtained according to the total sum of points with the highest score possible of 22. For comparisons between adolescent's PA and perceived social support, PA index was divided into tertiles and, then dichotomised. The highest tertile was defined as PA active and the 2 lowest tertiles as PA inactive. The family's demographic information and adolescents' perceived social support were assessed by questionnaire (Ommundsen, Page, Ku, & Cooper, 2008). Perceived social support included the following scales: perceived parental support (PPS), perceived parental encouragement (PPE), perceived peer support (PPeS) and perceived teacher support (TS). Data was analysed by independent sample t-tests.

RESULTS

143 Portuguese adolescents (AG= 100 and IG=43) were studied. Results showed that AG had significantly higher PPS (3.1±0.8 vs. 2.4±0.9, $p<0.001$, PPE (4.1±0.9 vs. 3.7±1.0, $p<0.014$ and PPeS (3.0±0.8 vs. 2.6±1.0, $p<0.001$ compared to IG. No significant differences in TS (2.9±0.8 vs 3.1±0.9 , $p= 0.262$) between groups were found.

CONCLUSION

Although based on cross-sectional data, our findings point for a positive relationship between PA and parental support (perceived and encouragement) and peer support only. Findings highlight that support provided by both parents and peers should be targeted in future interventions for adolescents' active lifestyle promotion. Future studies should explore how the contribution of perceived support for PA may modify from childhood to adulthood according to PA level.

References

Chen, H., Sun, H., & Dai, J. (2017). Peer Support and Adolescents' Physical Activity: The Mediating Roles of Self-Efficacy and Enjoyment. *Journal of Pediatric Psychology, 42*(5), 569-577. doi:10.1093/jpepsy/jsw103

Ledent, M., Cloes, M., & Piéron, M. (1997). Les jeunes, leur activité physique et leurs perceptions de la santé, de la forme, des capacités athlétiques et de l'apparence. *Sport, 159*, 90-95.

Mota, J., Santos, P., Guerra, S., Ribeiro, J. C., Duarte, J. A., & Sallis, J. F. (2002). Validation of a Physical Activity Self--Report Questionnaire in a Portguese Pediatric Population. *Pediatric Exercise Science, 14*(3), 269.

Ommundsen, Y., Page, A., Ku, P.-W., & Cooper, A. R. (2008). Cross-cultural, age and gender validation of a computerised questionnaire measuring personal, social and environmental associations with children's physical activity: the European Youth Heart Study. *The International Journal Of Behavioral Nutrition And Physical Activity, 5*, 29-29. doi:10.1186/1479-5868-5-29

Tremblay, M. S., Carson, V., Chaput, J. P., Connor Gorber, S., Dinh, T., Duggan, M., . . . Zehr, L. (2016). Canadian 24-Hour Movement Guidelines for Children and Youth: An Integration of Physical Activity, Sedentary Behaviour, and Sleep. *Applied Physiology, Nutrition, & Metabolism, 41*(6 Suppl 3), S311-327. doi:10.1139/apnm-2016-0151

P25. Influence of two work-time physical exercise programs on health-related kinanthropometric parameters and aerobic fitness

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INTRODUCTION

The workplace directly influences workers' physical, mental, economic, and social well-being (Sparling, Owen, Lambert, & Haskell, 2000), but many adults accumulate long hours seated while at work. Given this context, the study's aim was to determine the effects of two physical exercise programs carried out during working hours on health-related parameters and aerobic fitness.

METHODS

The participants were 34 workers (44.85 ± 12.83 years old, 10 men, 24 women). They were divided into three groups according to the exercise program followed: high intensity interval training (HIIT) group (n=12), brisk walking (BW) group (n=12), and control group (n=11). The physical exercise programs lasted 12 weeks. They comprised 30-minute sessions performed three times a week. The HIIT was a combination of high intensity aerobic and resistance strength exercises. The interval stations ranged from 10 at the start (2:1 work-rest ratio, 60:30 s) to 16 at the end (approximately 3:1 work-rest ratio, 60/50:20 s). The BW program sessions consisted of walking rapidly for 30 minutes. The intensity of the exercises and walking was prescribed through the Borg scale. The measurements were: weight, body mass index, waist-hip ratio, body fat and muscle, and 6 minutes walking test. A repeated measures ANOVA was applied.

RESULTS

The table 1 shows the results of study.

Table 1
Mean (M), standard deviation (SD), and repeated measures ANOVA for each group

Variable	High intensity interval training			Brisk walking			Control		
	M±SD	M±SD	p	M±SD	M±SD	p	M±SD	M±SD	p
Weight (kg)	84.8±20.3	84.3±19.7	.212	84.4±13.6	82.9±12.6	.134	83.1±14.4	84.6±13.2	.032
BMI (kg/m^2)	29.7±5.7	29.4±5.5	.184	28.6±4.1	28.1±3.7	.198	27.4±3.7	28.0±3.4	.433
WHR	1.0±0.8	0.9±0.7	.007	0.9±0.6	0.9±0.7	.542	0.9±0.6	0.9±0.7	.708
Fat mass (%)	38.5±9.2	37.3±9.4	.001	35.3±1.0	34.4±8.9	.085	30.0±9.6	31.0±9.0	.149
Muscle mass (%)	34.0±5.3	34.8±5.6	.006	34.9±5.3	36.5±5.2	.055	39.3±6.0	38.7±6.0	.229
6 min wt (m)	605.1±43.2	654.0±32.8	<.001	624.8±32.9	671.8±42.1	<.001	671.9±4.7	660.5±72.8	0.262

BMI, body mass index; WHR, waist hip ratio; wt, walking test

CONCLUSIONS

The HIIT group improved in four of the studied variables, but the BW only in aerobic condition. The data from this pilot study seem to indicate that a HIIT program carried out during working hours improves parameters related to workers' health. In this sense, one could recommend workplace health promotion strategies focused on all subjects, not just on those who may have some illness (Jørgensen, Villadsen, Burr, Mortensen, & Holtermann, 2015).

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References

Jørgensen, M.B., Villadsen, E., Burr, H., Mortensen, O.S, & Holtermann, A. (2015). Does workplace health promotion in Denmark reach relevant target groups? *Health Promotion International, 30*(2), 318-327. doi: 10.1093/heapro/dat041.

Sparling, P.B., Owen, N., Lambert, E.V., & Haskell, W.L. (2000). Promoting physical activity: the new imperative for public health. *Health Education Research, 15*(3), 367-376.

P26. Group exercise experience during pregnancy. Adaptation process and validation of a questionnaire

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INTRODUCTION

The importance of a healthy lifestyle during pregnancy is currently an indisputable fact in improving the health of both the pregnant and the newborn. There are few instruments measuring these indicators, such as the experience of taking part in group exercise programs. Moreover, the quality of human resources is one of the most valued attributes in fitness services and contributes to customer satisfaction and adherence. The purposes of this study are (1) to translate a questionnaire built by a Norwegian research group, and (2) to validate a questionnaire for a Portuguese pregnant population.

METHODS

The first instrument will be translated for the Portuguese language, and it will be applied to 50 pregnant women participating in group exercise programs delivered in fitness centers. The questionnaire will measure the women's experience regarding the program, including satisfaction, adherence, adverse effects, as well as motives and barriers for attending the classes. The second instrument already developed and validated regarding the pedagogical intervention in the context of fitness will be applied in the same pregnant population. This questionnaire will measure the quality indicators of fitness instructors.

RESULTS

This is a work in progress study. The women will report their experience regarding the participation in an exercise program during pregnancy, including satisfaction, adherence, adverse effects, motives and barriers for attending the classes, as well as the characteristics and the respective importance they give to the quality indicators of the fitness instructors.

CONCLUSIONS

The results will be useful to validate two instruments and to plan tailored group exercise programs for pregnant women.

References

Haakstad, L. A. H., Sanda, B., Vistad, I., Sagedal, L. R., Seiler, H. L., & Torstveit, M. K. (2017). Evaluation of implementing a community-based exercise intervention during pregnancy. *Midwifery*, *46*, 45–51. https://doi.org/10.1016/j.midw.2017.01.010

Valagão, A., Silva, B., Sousa, J., Silva, J., Campos, F., Damásio, A., Simões, V. (2018). Importância atribuída aos indicadores de qualidade dos instrutores de fitness.

Damásio, A. (2016). Importância Atribuída no Fitness - Instrutor de Fitness (IAF-IF).

P27. Literate the first steps with a structured exercise intervention for infants and toddlers in family: the PETIZ program

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INTRODUCTION

Following a worldwide trend, most of the Portuguese infants and toddlers are not sufficiently active, as they do not reach the physical activity recommendations for a healthy growth, development and lifestyle (European Union, 2018). Interventions based on physical literacy are an important route to promote healthy lifestyles among children (Longmuir & Tremblay, 2016). Gymnastics is efficient in developing motor skills and manipulation of objects, without impairing infants and toddlers body movements or motor coordination (Rudd et al., 2017a; Rudd et al., 2017b). The aim of this project is to create a gymnastics-based intervention tailored for infants and toddlers that is sustained on physical literacy to promote healthy behaviours.

METHODS

The Physical Exercise for Toddlers and Infants in Family (PETIZ) is a physical exercise and a behavioural multicomponent intervention. In the pilot implementation, a 6 month-intervention, with 2 sessions per week, will be offered for parents and infants or toddlers aged 9 to 24 months old and 3 to 5 years old, respectively. Following an advertising period in the community, parents interested in this project but with time constrains limiting their participation will be included in the control group; intervention group will include parents who participate in the 6-month exercise intervention. Written informed consent will be obtained from all participants. Supervised exercise sessions will include: warm-up period, creativity-based activities, main gymnastics-based activities (e.g. locomotives, not locomotives, manipulative, spatial awareness, rhythms and musical activities), circuit (e.g. fundamental movement skills), and a cool-down period. In addition, a 5-min period for lifestyle counselling on health- and physical activity-related behaviour will be included at the end of all exercise sessions. Examinations at baseline and after 6 months will include: children and parents physical activity using accelerometers, children fundamental movement skills by Peabody test (Chien & Bond, 2009), children weight and height by paediatric balance and stadiometer, eating behaviours (Birch et al., 2001) and family environment (Caçola, Gabbard, Montebelo, & Santos, 2015) by questionnaire.

DISCUSSION

This novel intervention aims to promote children's physical literacy, creativity and parental health and physical activity education. The findings of this pilot implementation will provide new evidence that may help to improve the design of gymnastics-based interventions engaging infants and parents and the dissemination of such initiatives.

References

Birch, L. L., Ficher, J. O., Grimm-Thomas, K., Markey, C. N., Sawyer, R., & Johnson, S. L. (2001). Confirmatory factor analysis of the Child Feeding Questionnaire: a measure of parental attitudes, beliefs and practices about child feeding and obesity proneness. *Appetite, 36*, 201-210. doi:10.1006/appe.2001.0398

Caçola, P. M., Gabbard, C., Montebelo, M. I. L., & Santos, D. C. C. (2015). The new affordances in the home environment for motor development - infant scale (AHEMD-IS): Versions in English and Portuguese languages. *Braz J Phys Ther, 19*(6), 507-525. doi:10.1590/bjpt-rbf.2014.0112

Chien, C. W., & Bond, T. G. (2009). Measurement properties of fine motor scale of Peabody developmental motor scales-second edition: a Rasch analysis. *American Journal of Physical Medicine and Rehabilitation, 88*(5), 376-386. doi:10.1097/PHM.0b013e318198a7c9

European Union. (2018). Special Eurobarometer 472 - Sport and physical activity. Retrieved from http://ec.europa.eu/commfrontoffice/publicopinion

Longmuir, P. E., & Tremblay, M. S. (2016). Top 10 research questions related to physical literacy. *Research quarterly for exercise and sport, 87*(1), 28-35.

Rudd, J. R., Barnett, L., Farrow, D., Berry, J., Borkoles, E., & Polman, R. (2017a). The Impact of Gymnastics on Children's Physical Self-Concept and Movement Skill Development in Primary Schools. *Measurement in Physical Education and Exercise Science, 21*(2), 92-100.

Rudd, J. R., Barnett, L. M., Farrow, D., Berry, J., Borkoles, E., & Polman, R. (2017b). Effectiveness of a 16 week gymnastics curriculum at developing movement competence in children. *Journal of Science and Medicine in Sport, 20*(2), 164-169.

P28. Monitoring of physical activity levels of guide dog owners – a preliminary study

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INTRODUCTION

Despite the well-documented benefits of regular physical activity, people with disabilities are often challenged with too many barriers that discourage an active lifestyle. This is particularly evident among people with visual impairments (VI). Previous studies have shown that adults with VI are significantly less active than the general population, and do not meet the physical activity recommendations of the World Health Organisation (WHO). However, most study samples are based on participants using a white cane. Owning a guide dog is often described as a factor for increased mobility and has the potential to increase physical activity. Therefore, the purpose of this preliminary study was to objectively assess the physical activity of adults with VI assisted by a guide dog.

METHODS

Fourteen adults with VI and owners of guide dogs (age average: 48.2 years; 8 male), living in the Lisbon metropolitan area, were recruited by email through the database of the only training school of guide dogs in Portugal. Daily physical activity was measured with the Actigraph activity monitor (model GT1M; Actigraph LLC). Participants were asked to wear the accelerometer, securely attached on the right hip, during all waking hours (except during water activities), for 7 consecutive days. The use of the accelerometer for at least 3 days (including 1 weekend day) with recordings of ≥600 min/day served as the criterion for a valid registration. Activity counts were recorded in 15-s epochs.

RESULTS

Despite spending most of the wear time in sedentary activity (75.9% on average), participants accumulated 32.5 min/day in health-related physical activity (moderate: 30.49 min/day; vigorous: 2.01 min/day). Fifty percent of the participants (n=7) reached the recommendations of 30 or more min/day of moderate-to-vigorous physical activity (MVPA). Participants also accumulated on average 6980 steps/day. When compared with previous studies regarding the physical activity of Portuguese adults with VI, our participants accumulated on average more min/day of MVPA, a higher percentage of participants reached the WHO recommendations of 30 min/day of MVPA on most weekdays and accumulated more steps per day.

CONCLUSIONS

Our results suggest that owning a guide dog can promote a higher level of daily physical activity on adults with VI, facilitating the achievement of the WHO recommendations on physical activity. In order to better understand this specific population, more data should be collected.

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References

Baptista, F., Santos, D. A., Silva, A. M., Mota, J., Santos, R., Vale, S., ... & Sardinha, L. B. (2012). Prevalence of the Portuguese population attaining sufficient physical activity. *Medicine & Science in Sports & Exercise*, 44(3), 466-473. doi: 10.1249/MSS.0b013e318230e441

Heath, G. W., & Fentem, P. H. (1997). Physical activity among persons with disabilities – a public health perspective. *Exercise and Sport Sciences Reviews*, 25, 195-234.

Marmeleira, J., Laranjo, L., Marques, O., & Pereira, C. (2014). Physical activity patterns in adults who are blind as assessed by accelerometry. *Adapted Physical Activity Quarterly*, 31(3), 283-296. doi: 10.1123/apaq.2013-0039

Rimmer, J. H., Riley, B., Wang, E., Rauworth, A., & Jurkowski, J. (2004). Physical activity participation among persons with disabilities: barriers and facilitators. *American Journal of Preventive Medicine*, 26(5), 419-425. doi: 10.1016/j.amepre.2004.02.002

Troiano, R. P., Berrigan, D., Dodd, K. W., Masse, L. C., Tilert, T., & McDowell, M. (2008). Physical activity in the United States measured by accelerometer. *Medicine and Science in Sports and Exercise*, 40(1), 181. doi: 10.1249/mss.0b013e31815a5lb3

Waxman, A. (2004). WHO global strategy on diet, physical activity and health. *Food and Nutrition Bulletin*, 25(3), 292-302. doi: 10.1177/156482650402500310

Whitmarsh, L. (2005). The benefits of guide dog ownership. *Visual Impairment Research*, 7(1), 27-42. doi: 10.1080/13882350590956439

Wiggett-Barnard, C., & Steel, H. (2008). The experience of owning a guide dog. Disability *and Rehabilitation*, 30(14), 1014-1026. doi: 10.1080/09638280701466517

Thomas, K. T., Gallagher, J. D., & Thomas, J. R. (2001). Motor development and skill acquisition during childhood and adolescence. In R. N. Singer, H. A. Hausenblas, & C. M. Janelle (Eds.), *Handbook of sport psychology* (2ª ed., pp. 20-52). New York, NY: Wiley & Sons.

P29. Morphology and physical activity in postpartum. Effect of physical activity, breastfeeding and body mass gain during pregnancy on maternal morphological changes.

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The level of physical activity, the type of lactation and body mass gain during pregnancy may cause changes in maternal morphology during the postpartum. This study aims to investigate the effects of these variables on the morphological changes during the postpartum period.

We evaluated 36 mothers attending postpartum exercise classes at the Center Pré e Pós-Parto for four months. The mothers were evaluated twice during the postpartum period with an interval of about one month between each evaluation. The morphology was obtained from 19 anthropometric measurements, physical activity was assessed by the IPAQ (short version), the body mass gain during pregnancy and the type of feeding were obtained by interview.

The results of this study seem to indicate that, between the 1st and 4th month postpartum: (1) the sedentary lifestyle is prevalent, but the morphology of more sedentary mothers does not differ from that given by mothers less sedentary; 2) the type of lactation (exclusive breastfeeding and mixed feeding) alone does not distinguish the morphology of the mothers; (3) the gain in body mass before pregnancy helps to explain between 11% and 27% of mothers of morphological variability.

References

Amorim, A.R., Rossner, S., Neovius, M., Lourenco, P.M., & Linne, Y. (2007). Does excess pregnancy weight gain constitute a major risk for increasing long-term BMI? *Obesity*, 15(5), 1278- 1286. doi:10.1038/oby.2007.149

Butte, N.F., Garza, C., Stuff, J.E., Smith, O., & Nichols, B.L. (1984). Effect of maternal diet and body composition on lactational performance. *The American Jounal of Clinical Nutrition*, 39(2), 296- 306. doi: 10.1093/ajcn/39.2.296

Dewey, K.G., Lovelady, C.A., Nommsen-Rivers, L.A., McCrory, M.A., & Lönnerdal, B. (1994). A randomized study of the effects of aerobic exercise by lactating women on breast-milk volume and composition. *The New Engalnd Journal of Medicine*, 330(7),449-451. doi: 10.1056/NEJM199402173300701

Dugdale, A.E., & Eaton-Evans, J. (1988). The effect of lactation and other factors on post-partum changes in body-weight and triceps skinfold thickness. *British Journal of Nutrition*, 61, 149-153.

Durnin, J.V., & Womersley, J. (1974). Body fat assessed from total body density and its estimation from skinfold thickness: measurements on 481 men and women aged from 16 to 72 years. *British Journal of Nutrition*, 32, 77-97. doi: 10.1079/BJN19740060

Forsum, E., Sadurskis, A., & Wager, J. (1989). Estimation of body fat in healthy Swedish women during pregnancy and lactation. *The American Journal of Clinicam Nutrition*, 50(3), 465-473. doi: 10.1093/ajcn/50.3.465

Hatsu, I.E., McDougald, D.M., & Anderson, A.K. (2008). Effect of infant feeding on maternal body composition. *International Breastfeeding Journal*, 3(1), 1-8. doi:10.1186/1746-4358-3-18

Heyward, V.H., & Stolarczyk, L. (1996). *Applied body composition assessment*. Champaign, Illinois: Human Kinetics Books.

Janney, C.A., Zhang, D., & Sowers, M. (1997). Lactation and weight retention. *The Americam Journal of Clinical Nutrition*, 66(5), 1116-1124. doi:10.1093/ajcn/66.5.1116

Leermakers, E.A., Anglin, K., & Wing, R.R. (1998). Reducing postpartum weight retention through a correspondence intervention. *International Journal of Obesity*, 22(11), 1103-1109. doi: 10.1038/sj.ijo.0800734

Lovelady, C.A., Garner, K.E., Moreno, K.L., & Williams, J.P. (2000). The effect of weight loss in overweight, lactating women on the growth of their infants. *The New England Journal of Medicine*, 342(7), 449-453. doi: 10.1056/NEJM200002173420701

Lovelady, C.A., Lonnerdal, B., & Dewey, K.G. (1990). Lactation performance of exercising women. *The American Journal of clinical nutrition*, 52(1), 103-109. doi: 10.1093/ajcn/52.1.103

Marfell-Jones, M., Olds, T., Stewart, A., & Carter, J. E. (2006). International Standards for Anthropometric Assessment. Potchestroom: ISAK.

Olson, C.M., Strawderman, M.S., Hinton, P.S., & Pearson, T.A. (2003). Gestational weight gain and postpartum behaviors associated with weight change from early pregnancy to 1 y postpartum. *Internacional Journal of Obesity & Related Metabol Disord*, 27(1), 117- 127. doi: 10.1038/sj.ijo.0802156

Ostbye, T., Krause, K.M., Lovelady, C.A., Morey, M.C., Bastian, L.A., Peterson, B.L., Swamy,G.K., Brouwer, R.J., McBride,CM. (2009). Active Mothers Postpartum - A Randomized Controlled Weight-Loss Intervention Trial. *American Journal of Preventive Medicine*, 37(3), 173-180. doi: 10.1016/j.amepre.2009.05.016

Rode, L., Kjærgaard, H., Ottesen, B., Damm, P., & Hegaard, H.K. (2011). Association Between Gestational Weight Gain According to Body Mass Index and Postpartum Weight in a Large Cohort of Danish Women. *Maternal and Child Health Journal*, 15 (published online: 24 March 2011). doi: 10.1007/s10995-011-0775-z

Rothberg, B.E., Magriples, U., Kershaw, T.S., Rising, S.S., & Ickovics, J.R., (2011). Gestacional weight gain and subsequent postpartum weight loss among young, low-income, ethnic minority women. *American Journal of Obstetrics & Gynecology*, 204(1), 52e1-52e11. doi: 10.1016/j.ajog.2010.08.028

P30. Effect of a functional training program in 10th grade physical education classes

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INTRODUCTION

By determining the effect of a functional training program on the development of the students' functional physical fitness, this study aims to contribute to the debate on the strategies to be used in the development of physical fitness in Physical Education (PE) classes.

METHODS

The study involved 102 students from five 10th grade classes in a secondary school in the north of Portugal; 14 and 15 years old. Throughout ten weeks, they were randomly distributed in two groups, the exercise group (EG n = 84), and control group (CG n= 18). The EG (39 male and 45 female) underwent a functional training programme implemented in the first 25 minutes of each of their two weekly PE lessons. A battery of tests (functional, somatic and physical activity-related) was applied at the beginning and at the end of the programme. Repeated measures ANCOVAs were used to test for the changes in the EG functional physical fitness, as well as on their somatic features, when compared to the ones obtained by the CG (7 male and 10 female) from a different 10th grade class which had not been subjected to the programme. Extra-curricular physical activity, as well as the students' maturational age were also assessed and used as covariates in the analysis. The SPSS, 22.0 version, was used for statistical analysis. The level of significance was established in $p \leq 0.05$.

RESULTS

General significant improvements for physical fitness were found, from the initial evaluations to the final ones ($p<.001$). Relevant differences between the CG and the EG ($p=.01$) and between the male and female groups ($p=.008$). The effects of the programme were notably better in the EG students, both generally and when separated according to sex. Furthermore, in general, boys' results improved more than girls'. Results also showed an improvement on the somatic values, especially for girls, but not statistically significant.

CONCLUSIONS

A functional training program may be considered as an efficient methodology in the development of the students' physical fitness in PE classes, providing that it is well-structured, and that it considers the role of the teacher in its implementation and in the identification of the variables linked to the teaching-learning process.

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P31. The relationship between physical activity patterns and body balance in young adult university students

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INTRODUCTION

The practice of physical activity has shown improvements in body balance and postural control in youngsters and adults. Whether physical activity level influences dynamic balance is not well established. It was our objective to investigate the relationship between physical activity level and dynamic balance in young adult university students; to analyse the relationship between Y Balance Test (YBT) measures (anterior, posteromedial and posterolateral directions).

METHODS

55 young adults, university students in Sports (35 males: 19.1±1.2yrs, 175.9±7.2 cm, 70.29±9.7kg; 15 females: 19.4±1.3yrs, 160.7±5.5 cm, 57.7±5.8kg) were divided in 2 groups: young adults who practice vigorous activities (VAG) and young adults who practice moderate activities (MAG). Single limb stance excursion distances were measured using the YBT. The physical activity level was assessed as International Physical Activity Questionnaire, short version. Pearson-product moment test was executed to test the magnitudes of correlations between physical activity level and between YBT and between YBT measures (anterior, posteromedial and posterolateral directions). Significance was set as $p < 0.05$. Correlation's magnitude was assessed using the Hopkin's scale.

RESULTS

Moderate and positive correlations were found between VAG and YBT anterior direction ($r = 0.41$, $p = 0.02$). Small correlations were found between VAG and YBT posteromedial ($r = 0.29$, $p = 0.09$) and posterolateral directions ($r = 0.17$, $p = 0.35$). Small and positive correlations were found between MAG and YBT posteromedial ($r = 0.13$, $p = 0.58$) and YBT posterolateral directions ($r = 0.18$, $p = 0.44$). No correlations were found between MAG and YBT anterior direction. Correlations between YBT measures were also assessed. In both groups, it was found strong positive correlations between YBT posteromedial and YBT posterolateral (VAG: $r = 0.74$, $p = 0.00$; MAG: $r = 0.83$, $p = 0.00$). However, no correlations were found between YBT anterior and both YBT posteromedial and posterolateral directions.

CONCLUSIONS

Our findings suggest that young adults practicing vigorous activities tend to have better performance in YBT for the anterior direction than their counterparts. Very large correlations were found between posteromedial and posterolateral directions in both groups (VAG and MAG). In this case, it seems that more than physical activity level, the testing skills are important to perform these two measures. It would be interesting to investigate the differences of muscle recruitment, muscle strength, joint mobility/stability in the 3 YBT measures, not controlled in this study.

P32. Acute effects of normobaric hypoxia on metabolic and nutrients oxidation rates in healthy women

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INTRODUCTION

The acute normobaric hypoxic exposure may stimulate a shift use to increase dependence on glucose and increase the resting energy expenditure (REE) (Le Moine, Morash, & McClelland, 2011). This effect has been demonstrated in males, however there are not many studies focused on females. This is important because the influence of the hormones between genders is very big (Braun, 2008). The aim of this study was to examine the effects of moderate hypoxia exposure on metabolic responses and substrate oxidation pattern in healthy women.

METHODS

Seven healthy females participated (Table 1) in two experimental trials over 8 hours, the first one in normobaric exposure (NOR) (at sea level; FiO2 = 20.9%) and passive normobaric hypoxia exposure (HYP) (at an altitude = 3000m; FiO2 = 15%).

8.30am	*9 am*	*9.30 am*	*10.30 am*	*11.30 am*	*12.30 am*	*1.30 pm*	*2 pm*	*2.30 pm*	*3.30 pm*
Baseline **Lactate Gluc REE** ***Control**** HR AMS SPO_2 SBP DBP	1st meal (consume within 7`) ***C****	**Gluc REE** ***C****	**Lact Gluc REE** ***C****	**Gluc REE** ***C****	**Lact Gluc REE** ***C****	**Gluc REE** ***C****	2º meal (consume within 7`) ***C****	**Lact Gluc REE** ***C****	**Lact Gluc REE** ***C****

Figure 1. Procedure

The metabolic variables (Resting Energy Expenditure (kcal/day), fat oxidation (g/min) and carbohydrates oxidation (g/min)) and blood glucose were collected every hour and blood lactate were collected every two hours. (Figure 1)

Table 1
Sample Characteristic

Variable	Mean ± SD
Age (year)	31.7 ± 5.9
Height (m)	1.65 ± 0.06
Weigth (kg)	57.5 ± 4.4
Body Mass Index (BMI) (kg/m2)	21.17 ± 1.87
% Fat	21.23 ± 5.11
Rest Heart Rate (bpm)	56.00 ± 10.00

RESULTS

Here were significant differences at 5 hours of exposition to HYP in REE (NOR: 1527 ± 73 kcal/day vs HYP: 1742 ± 243 kcal/day p=0.045). The REE was bigger in HYP than NOR without significant different but with large and moderate size effect values (Table 2). The blood glucose descended faster after consuming food in HYP than NOR (Figure 2).

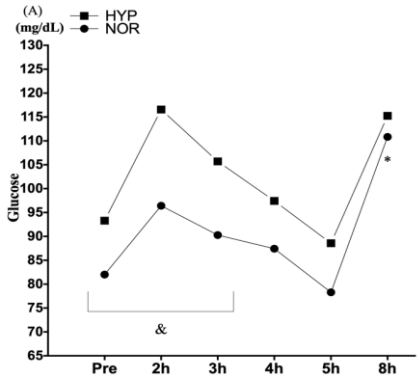

Figure 2. Changes in Blood Glucose (HYP and NOR)

Table 2
Metabolic Variables

		0h		2h		3h		4h		5h		7h	
		Mean±SD	d	Mean±SD	d	Mean±SD	d	Mean±SD	d	Mean±SD	d	Mean±SD	d
REE, (kcal/día)	NOR *n=7*	1623±405	1.08	1802±191	0.62	1659±173	1.02	1529±160	0.77	1527±73	1.36	1752±163	0.89
	HYP *n=7*	1938±258		1928±217		1906±312		1690±258		1742±243[&]		2003±399	
FAT Ox. (g/min)	NOR *n=7*	0.05±0.02	0.57	0.04±0.02	1.43	0.05±0.02	0.87	0.06±0.01	0.76	0.06±0.01	0.76	0.05±0.01	0.27
	HYP *n=7*	0.06±0.03		0.08±0.04[&]		0.07±0.03		0.07±0.02		0.07±0.01		0.06±0.03	
CH Ox. (g/min)	NOR *n=7*	0.16±0.07	0.56	0.23±0.04	1.07	0.18±0.05	0.11	0.13±0.05	0.10	0.13±0.04	0.16	0.20±0.05	0.24
	HYP *n=7*	0.21±0.09		0.15±0.11		0.17±0.10		0.13±0.08		0.14±0.08		0.22±0.11	

REE: FAT Ox: Fat oxidation rate; CH Ox: Carbohydrate oxidation rate; d=size effect
*p < 0.05 vs. 0h.
&p< 0.05 vs. NOR.
Size effect big (>0.8); Size effect moderate (0.5); Size effect small (0.2)

CONCLUSIONS

The conclusion is that hypoxia does not affect the oxidation rates but it affects the metabolism. The first result to discuss is that the SpO2 is lower in HYP than NOR with significance difference ($p<0.05$) between them. The SpO2 is the variable which confirms that the hypoxic stimulation affects the subjects. (Morishima & Goto, 2014) The metabolism in normobaric hypoxia is bigger than in normoxia, it's not significant but there are big-to-moderate size effects. The blood glucose descends faster in hypoxia than normoxia. The decrease is bigger for three reasons: (1) The quantity of insulin that the body segregates (2) The sensibility of the insulin that the body segregates (3) The HIF-1 active genetics routes that segregates glucose transporters (GLUT-1 y GLUT-3). (Díaz Hernández, Carlos, & Herrera, 2002; Trayhurn, Wang, & Wood, 2008) For futures studies it will be important to measure insulin and muscle glycogen to know why the blood glucose decreases and where is it storage. Futures studies should research longer-term protocol to analyse how the metabolism and oxidation rates could change.

Acknowledgments

Normobaric hypoxia, health, metabolic rate, oxidation rate

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References

Braun, B. (2008). Effects of High Altitude on Substrate Use and Metabolic Economy. *Medicine & Science in Sports & Exercise*, *40*(8), 1495–1500. https://doi.org/10.1249/MSS.0b013e3181729dd3

Díaz Hernández, D. P., Carlos, L., & Herrera, B. (2002). ¿Cómo se transporta la glucosa a través de la membrana celular? *IAtreia*, *15*(3). Retrieved from http://www.scielo.org.co/pdf/iat/v15n3/v15n3a4.pdf

Le Moine, C. M. R., Morash, A. J., & McClelland, G. B. (2011). Changes in HIF-1 protein, pyruvate dehydrogenase phosphorylation, and activity with exercise in acute and chronic hypoxia. *AJP: Regulatory, Integrative and Comparative Physiology*, *301*(4), R1098–R1104. https://doi.org/10.1152/ajpregu.00070.2011

Morishima, T., & Goto, K. (2014). Successive exposure to moderate hypoxia does not affect glucose metabolism and substrate oxidation in young healthy men. *SpringerPlus*, *3*(1), 370. https://doi.org/10.1186/2193-1801-3-370

Trayhurn, P., Wang, B., & Wood, I. S. (2008). Hypoxia in adipose tissue: a basis for the dysregulation of tissue function in obesity? *British Journal of Nutrition*, *100*(02), 227–235. https://doi.org/10.1017/S0007114508971282

P33. Center of pressure alterations with the application of lateral wedge insoles

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INTRODUCTION

Laterally wedged insole (LWI) is a device inserted in the shoes with a thicker lateral border predisposing the calcaneus into a valgus position (Abdallah & Radwan, 2011). It was theorised that LWI causes a lateral shift of the center of pressure (CoP) which results in a decrease in the knee adduction moment arm reducing the external knee adduction moment (EKAM) (Hinman, Bowles, Metcalf, Wrigley, & Bennell, 2012; Yasuda & Sasaki, 1987). Understanding the changes with incremental lateral wedges in CoP is fundamental to maximize the treatment strategies of these patients.

METHODS

Twenty-three healthy volunteers (15 males, age of 21.0 ± 5.13, weight of 65.8 ± 8.7 kg, and height 170 ± 5.13 cm) were recruited. The inclusion criteria for the subjects included healthy young adults, aged 18 – 40 years, without any symptoms or neuromuscular disorders. Eleven cameras three-dimensional Qualisys Oqus motion analysis system sampling at 200 Hz, with four force platforms sampling at 1000 Hz, were used to collect the kinematic and kinetic data from participants walking along a 10-meter walkway. Reflective markers were placed on the pelvis and on both lower limbs according to the CAST protocol (Cappozzo, Catani, Croce, & Leardini, 1995). Six experimental conditions were tested: a control condition (shoes with a 0° insole), and LWI with 2°, 4°, 6°, 8° and 10 degrees. The kinematic and kinetic data were time normalised to 100% of the stance phase and all post-processing calculations were conducted using Visual3D software. The displacement of CoP was defined as distance of the CoP from the line of the foot (calcaneus to the midpoint between first and fifth metatarsals) and was calculated at the first peak, second peak and in the lower peak of the mid-stance EKAM. A negative value means that the CoP was in the medial side and a positive value means the CoP was in lateral side of the line of the foot (Sawada et al., 2016).

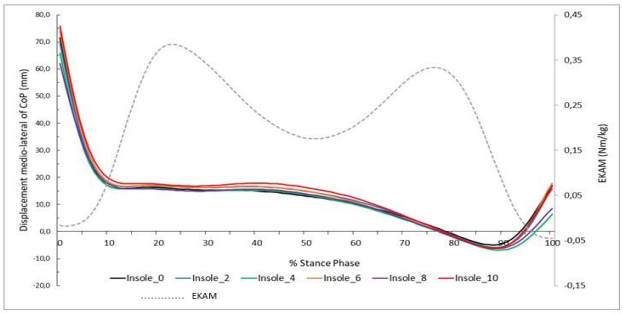

Figure 1. CoP during the stance phase by the experimental LWI conditions. Each colour line represents the mean of different LWI. Dashed lined represents the EKAM

RESULTS

No differences ($p > 0.05$) were observed in the CoP at first peak, second peak and in the lower peak of the mid-stance of EKAM, with the experimental conditions compared to the control condition as it can be seen in Figure 1.

CONCLUSIONS

With this design of LWI, no changes were found in the displacement of the CoP. Perhaps the displacement of CoP is not an essential condition for the reduction of the EKAM. Other factors that alter EKAM should be studied.

References

Abdallah, A. A., & Radwan, A. Y. (2011). Biomechanical changes accompanying unilateral and bilateral use of laterally wedged insoles with medial arch supports in patients with medial knee osteoarthritis. *Clin Biomech, 26*(7), 783-789. doi:10.1016/j.clinbiomech.2011.03.013

Cappozzo, A., Catani, F., Croce, U. D., & Leardini, A. (1995). Position and orientation in space of bones during movement: anatomical frame definition and determination. *Clin Biomech (Bristol, Avon), 10*(4), 171-178. doi:10.1016/0268-0033(95)91394-T

Hinman, R. S., Bowles, K. A., Metcalf, B. B., Wrigley, T. V., & Bennell, K. L. (2012). Lateral wedge insoles for medial knee osteoarthritis: effects on lower limb frontal plane biomechanics. *Clin Biomech (Bristol, Avon), 27*(1), 27-33. doi:10.1016/j.clinbiomech.2011.07.010

Sawada, T., Tokuda, K., Tanimoto, K., Iwamoto, Y., Ogata, Y., Anan, M., . . . Shinkoda, K. (2016). Foot alignments influence the effect of knee adduction moment with lateral wedge insoles during gait. *Gait Posture, 49*, 451-456. doi:10.1016/j.gaitpost.2016.08.011

Yasuda, K., & Sasaki, T. (1987). The mechanics of treatment of the osteoarthritic knee with a wedged insole. *Clin Orthop Relat Res*(215), 162-172.

P34. Cultural adaptation and reliability of the Health and Quality of Life Questionnaire (ISAQ-A) for the Portuguese University Students

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INTRODUCTION

The entry into university is a significant and difficult change of the life cycle, implying new challenges, readjustments and student responses. These changes can bring modifications in the behavioural pattern, becoming a risk factor for the adoption and maintenance of healthy lifestyles. The use of instruments with psychometric properties is essential for a correct assessment and promotion of university lifestyles.

The aim of this study was to adapt and evaluate the reliability of the Health and Quality of Life Questionnaire (ISAQ-A) for the Portuguese University Students.

METHODS

The ISAQ-A questionnaire was developed by Sousa et al. (2013), based on other questionnaires. This instrument consists of seven sections, namely: (1) information about degree; (2) sociodemographic data; (3) lifestyle and health indicators; (4) eating habits and control of body weight; (5) physical and leisure activities; (6) preventive behaviours; and (7) indicators of the environment and learning conditions. The questionnaire consists of 71 questions and was designed to be self-administered.

The questionnaire was created in Brazilian Portuguese language according to internationally recommended methods. After the cultural adaptation, a pre-test was carried out. The Portuguese version of ISAQ-A, was applied to 30 university students in order to assess the clarity of the instrument. Reliability was tested using a test–retest design with a 3 week interval between measurements, with a new sample of university students (n=60). Later, the test-retest reliability will be calculated with Intra-class Correlation Coefficient (ICC) for interval scale and Cohen's kappa statistics for nominal scales.

RESULTS

Preliminary results point to excellent item comprehension for the Isaq-A Portuguese version. We are finishing a first test-retest reliability data collection. CONCLUSIONS: We are expecting that the reliability will be considered acceptable. Further studies are necessary to evaluate its psychometric properties.

References

Sousa, T.; Fonseca, S.; José, H.; Nahas, M. (2013).Validade e reprodutibilidade do Questionário Indicadores de Saúde e Qualidade de Vida de Acadêmicos (ISAQ-A). *Arquivos de Ciências do Esporte. 1*(1): 21-30.

P35. Determinants Associated with Obesity Prevalence in University Students

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INTRODUCTION

The first year of university has been identified as an "at risk" period for body weight gain, and a recent meta-analysis found out that more than 60% of students gained on average 3.38kg over the first academic year (Vadeboncoeur et al, 2015). The literature pointed a consistent weight gain across several countries linked to poor eating habits, stress and lower physical activity (Sprake et al., 2017), however, some contradictory results are blurring the unclear relationship between physical activity, eating patterns and weight change (Finlayson et al., 2012). Despite the wealth of literature describing body weight gain at university, the factors underpinning these changes are less clear. The main aim of the present study was to determine the prevalence and the factors associated with the prevalence of obesity among university students.

METHODS

The sample included 324 (23.44 ± 0.280 years) university students from Ceará, Brazil who participated in a research project to determine the health and quality of life of Brazilian university students. The Isaq-A (Sousa et al, 2012), a self-administered questionnaire, was applied to determine factors associated with obesity prevalence. Obesity prevalence was estimated by BMI and the OMS cut-off points for >18 years old: overweight 25-29,9 Kg/m2 and obesity ≥30,0 kg/m2.

The multinomial logistic regression was performed to test the factors associated with obesity prevalence. Obesity (overweight+obesity) entered as the dependent variable and sex, age, BMI, marital status, social-economical status, academic performance, number of years at the university, smoking habits, consumption of fruit, vegetables, sweet drinks, stress, satisfaction with life, bedtime quality and sleeping hours, blood pressure, cholesterol and leisure physical activity as independent variables.

RESULTS

The prevalence of obesity was 43,2%, 52% for males and 39,1% for females. Among the independent variables that entered the model, the following variables showed a significant association: stress (OR= .091; 95% CI: .014 - .568), life satisfaction (OR: .197; 95% CI: .059 - .659), blood pressure (OR: 14.783; 95% CI: 1.840 –. 118.751) number of years at the university (OR: .354; 95% CI: .129 - .972) and academic performance (OR: .041; 95% CI: .004 - .457).

CONCLUSION

About half of the university students are overweight or obese, and hypertensive students are 14 percent more likely to be obese. Successful students, who are more satisfied with life, not stressed and who have more years at the university are not associated with obesity. Prospective studies are needed to confirm these cross-sectional associations and to explore how the university setting may contribute to this effect.

References

Vadeboncoeur, C., Townsend, N., & Foster, C. (2015). A meta-analysis of weight gain in first year university students: is freshman 15 a myth? *BMC Obes*, 2-22, https://doi:10.1186/s40608-015-0051-7.

Sprake, E., Lavin, J., Grabowski, P., Russell, J., Featherstone, M., & Barker, M. (2017) "Eating habits associated with body weight gain in female university students: A UK-based study of Slimming World members", *British Food Journal*, 119 (12), 2571-2582, https://doi.org/10.1108/BFJ-10-2016-0495.

Finlayson, G., Cecil, J., Higgs, S., Hill, A. & Hetherington, M. (2012). "Susceptibility to weight gain. Eating behaviour traits and physical activity as predictors of weight gain during the first year of university". *Appetite*, 58 (3), 1091-1098.

Sousa, T., Ferreira, F., Silvio, A., José, H., Pio, M., & Nahas, M. (2012). Estudo MONISA: características e aspectos metodológicos. *Revista Brasileira de Epidemiologia, 15*(4),904-907. https://dx.doi.org/10.1590/S1415-790X2012000400020

P36. Food Consumption and Nutrition Knowledge in Athletes: systematic literature review

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INTRODUCTION

Sports nutrition involves the application of nutritional principles to improve the performance of individuals who practice some sporting modality. The nutritional knowledge of the athlete is relevant, to acquire competences in the correct choice of food, in order to meet the daily energy needs.

METHODS

The objective of the systematic review is to evaluate the food consumption of athletes and their nutritional knowledge. The bibliographic research was carried out in the databases PubMed And Science Direct, According to the guidelines PRISMA and Collaboration Cochrane (Galvão, Pansani, & Harrad, 2015) for the period between 2008-2018. After applying the inclusion and exclusion criteria, 12 articles were selected from a total of 1130 articles.

RESULTS

The inadequacy of energy (Praz, Granges, Burtin, & Kayser, 2015) consumption and the carbohydrate (Coutinho, Porto, & Pierucci, 2016) intake deficit was 50% (n = 6) in the articles analysed. Regarding protein (M. Sousa et al., 2016) and total saturated fat consumption, 25% (n = 3), showed excessive consumption according to recommendations. In the micronutrient intake there was a deficit of vitamins and minerals in 42% (n = 5) of the studied articles. In the water intake, the prevalence of inadequacy was 33% (n = 4). Regarding food frequency, there was a low intake of fruits and vegetables, in at least 42% (n = 5) of the articles; and regarding cereals in 33% (n = 4). About nutritional knowledge, the articles that evaluated it (n = 3): 67% (n = 2) have investigated that the average nutritional knowledge index was higher than 50% (Alaunyte, Perry, & Aubrey, 2015), verifying a statistically significant association between food consumption and nutritional knowledge ($p < 0.05$).

CONCLUSIONS

The obtained results allowed the observation that most of the athletes do not have an adequate diet for their respective sport practice. It is imperative to reinforce research on the nutritional knowledge of athletes.

References

Alaunyte, I., Perry, J. L., & Aubrey, T. (2015). Nutritional knowledge and eating habits of professional rugby league players: Does knowledge translate into practice? *Journal of the International Society of Sports Nutrition*, *12*(1), 1–7. https://doi.org/10.1186/s12970-015-0082-y

Coutinho, L. A. A., Porto, C. P. M., & Pierucci, A. P. T. R. (2016). Critical evaluation of food intake and energy balance in young modern pentathlon athletes: A cross-sectional study. *Journal of the International Society of Sports Nutrition*, *13*(1), 1–8. https://doi.org/10.1186/s12970-016-0127-x

Galvão, T. F., Pansani, T. de S. A., & Harrad, D. (2015). Principais itens para relatar Revisões sistemáticas e Meta-análises: A recomendação PRISMA. *Epidemiologia e Serviços de Saúde*, *24*(2), 335–342. https://doi.org/10.5123/S1679-49742015000200017

Praz, C., Granges, M., Burtin, C., & Kayser, B. (2015). Nutritional behaviour and beliefs of ski-mountaineers: A semi-quantitative and qualitative study. *Journal of the International Society of Sports Nutrition*, *12*(1), 1–8. https://doi.org/10.1186/s12970-015-0108-5

Sousa, M., Fernandes, M. J., Carvalho, P., Soares, J., Moreira, P., & Teixeira, V. H. (2016). Nutritional supplements use in high-performance athletes is related with lower nutritional inadequacy from food. *Journal of Sport and Health Science*, *5*(3), 368–374. https://doi.org/10.1016/j.jshs.2015.01.006

P37. Motor Competence and Obesity in active young men: an exploratory study

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INTRODUCTION

Obesity and physical inactivity are strong and independent predictors for total and abdominal obesity in young adulthood. Physical inactivity and increasing obesity are multidimensional, but the development of motor competence (MC) is a primary underlying mechanism that promotes engagement in physical activity, working as a precursor and a consequence of weight status. Longitudinal studies established that MC is a strong predictor of physical fitness and physical activity. This study aimed to investigate the agreement between MC and adiposity analysed through Dual X-Ray Absorptiometry, on a physically active group of young men.

METHODS

36 young men (21.6 [6.7] years old; 69.0 [10.5] kg; 173.6 [7.8] meters), participated in this study, who exercised at least 5 times per week at 6 METS or more. All participants were evaluated on their motor competence and adiposity (Body Mass Index; Total percentage of Fat mass; Trunk percentage of Fat mass; Total Fat mass), using the Motor Competence Assessment (MCA) battery and a dual-energy X-ray absorptiometry (DXA) General Electric Hologic Discovery scanner (Hologic Inc., Waltham, MA, USA). Spearman correlation tests were performed to examine the association between MCA scores and DXA results, using the SPSS (version 22.0.0.0 for Windows, IBM, USA) for a $p < 0.05$.

RESULTS

There was only one positive statistical association between Body Mass Index and Throwing Velocity (r= -0.397;p= 0.045; positive and moderate). The rest of the statistical associations were negative: Standing Long Jump and Total percentage of Fat mass (r= -0.589;p= 0.002; negative and large); Standing Long Jump and Trunk percentage of Fat mass (r= -0.527;p= 0.005; negative and large); Standing Long Jump and Total Fat mass (r= -0.529;p= 0.003; negative and large); Shifting Platforms and Total percentage of Fat mass (r= -0.432;p= 0.039; negative and moderate); Shifting Platforms and Trunk percentage of Fat mass (r= -0.434;p= 0.038; negative and moderate); Shifting Platforms and Total Fat mass (r = -0.483;p= 0.020; negative and moderate).

CONCLUSIONS

In active young males, locomotor and stability tasks are negatively influenced by fat mass while throwing tasks are positively associated with fat mass. MC specially locomotor and stability tasks are influenced by weight status, however it isn't so evident in young adults as in children and adolescents.

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P38. Psychological Well-Being in Adolescence

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INTRODUCTION

According to the World Health Organisation, 10-20% of children and adolescents experience mental illnesses worldwide. Half of all mental diseases begin by the age of 14 and three-quarters by mid-20s. Emerging evidence proposes that sedentary time may also interact with mental health (Hoare, Milton, Foster, & Allender, 2016).

The present study aim is to make a contribution to the understanding and identification of multidimensional factors, which explain the dynamics of psychological well-being in adolescence as a factor of evaluation in the context of mental health. Thus, we intend to analyse physical activity and its association with the psychological welfare, as proposed by Carol Ryff.

METHODS

The sample comprised 354 adolescents (167 males and 187 females) aged between 12 and 18 years old (M = 14.85, SD = 1.55). The instruments used were the Portuguese version of Carol Ryff's psychological well-being scales adapted and validated to adolescents by Fernandes and Vasconcelos (2008). The survey item assessing physical activity was as follows: "How often did you engage in moderate physical activity per week?" with four answer options (never practiced, practiced once, two or three, three hours or more).

RESULTS

Main results denoted that the adolescents belonging to a more active group, performing more physical activity, more than 3 times per week, when compared with the other groups, never practiced, practiced 1 time, and 2 to 3 times per week, evidenced superior levels of autonomy, social domain, positive relationships, life objectives, self-acceptation and global well-being, although without significant statistical expression.

CONCLUSIONS

The importance of factor identification and characterisation that contribute to the understanding of the dynamics of the psychological well-being is relevant, highlighting as an added value the context of physical activity, as a way of maximising the levels of health in general and of mental health in particular.

References

Fernandes, H. M. & Vasconcelos-Raposo, J. (2008). *O bem-estar psicológico em adolescentes: Uma abordagem centrada no florescimento humano*. Dissertação de doutoramento publicada, Universidade de Trás-os-Montes e Alto Douro, Vila Real, Portugal.

Hoare, E., Milton, K., Foster, C., & Allender, S. (2016). The associations between sedentary behaviour and mental health among adolescents: a systematic review. *International Journal of Behavioral Nutrition and Physical Activity*,13(1),108. Doi: 10.1186/s12966-016-0432-4

P39. The consumption of supplements by sportsmen: a systematic review of literature

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INTRODUCTION

A varied and energetically adequate diet is able to provide the appropriate amounts of all the essential nutrients. However, many sportsmen take food supplements without consulting a health professional and without the exact knowledge of its possible benefits.

The purpose of this project is to present a systematic review of literature on the prevalence and main types of dietary supplements consumed by sportsmen and to understand the main sources of indication and reasons for using nutritional supplements.

METHODS

A bibliographical research was performed on the PubMed and Web of Science databases. In this context, all available publications were included between January 2007 and February 2018 that complied with the following inclusion criteria: (1) individual practitioners of any sport; (2) individuals between the age of 18 and 65 years old of both genders; (3) available studies in full text published in English, Spanish and Portuguese. 14 articles of a total of 1054 were selected, using these criteria.

RESULTS

The prevalence of supplement use ranged between 13.3% (Figueira & Cazal, 2017) and 100% (Peçanha, Navarro, & Maia, 2015), determining that the articles included merely professional athletes in their samples (n = 6; 42 , 9%). The prevalence of the consumption of nutritional supplements varied from 46.2% (Ivković, 2016) and 90.9% (Stewart, Outram, & Smith, 2013). The most consumed supplements were protein supplements (n=9; 69.2%) (Tsitsimpikou et al., 2011; Silva & Marins, 2013; Assis, Silveira, & Barbosa, 2015; Peçanha, Navarro, & Maia, 2015; Gacek, 2016; Ivković, 2016; Korczak et al., 2016; Naves, Isizuka, Ruas, Ramada, & Nacif, 2016; Figueira & Cazal, 2017), amino acids (n=6; 46.2%) (Tsitsimpikou et al., 2011; Assis, Silveira, & Barbosa, 2015; Peçanha, Navarro, & Maia, 2015; Korczak et al., 2016; Naves, Isizuka, Ruas, Ramada, & Nacif, 2016; Figueira & Cazal, 2017), vitamins (n=5; 38.5%) (Dascombe, Karunaratna, Cartoon, Fergie, & Goodman, 2008; Tsitsimpikou et al., 2011; Stewart, Outram, & Smith, 2013; Gacek, 2016; Ivković, 2016) and minerals (n=4; 30.8%) (Dascombe, Karunaratna, Cartoon, Fergie, & Goodman, 2008; Stewart, Outram, & Smith, 2013; Ivković, 2016; Figueira & Cazal, 2017). Furthermore, we also found out that sportsmen seek information about the consumption with nutritionists (n=5; 62.5%) (Lima, Moraes, & Kirsten, 2010; Assis, Silveira, & Barbosa, 2015; Judge et al., 2015; Peçanha, Navarro, & Maia, 2015; Figueira & Cazal, 2017), self-prescription (n=5; 62.5%) (Lima, Moraes, & Kirsten, 2010; Tsitsimpikou et al., 2011; Silva & Marins, 2013; Ivković, 2016; Figueira & Cazal, 2017), friends (n=4; 50.0%) (Lima, Moraes, & Kirsten, 2010; Tsitsimpikou et al., 2011; Silva & Marins, 2013; Peçanha, Navarro, & Maia, 2015), the coach (n=3; 37.5%) (Assis, Silveira, & Barbosa, 2015; Judge et al., 2015; Ivković, 2016) and with a personal trainer (n=3; 37.5%) (Lima, Moraes, & Kirsten, 2010; Tsitsimpikou et al., 2011; Silva & Marins, 2013). The main motifs for its ingestion were related to an enhanced performance in the sports practice (n=4; 57.1%) (Silva & Marins, 2013; Stewart, Outram, & Smith, 2013; Judge et al., 2015; Frączek, Warzecha, Tyrała, & Pięta, 2016) and maintenance of their health (n=3; 42.9%) (Dascombe, Karunaratna, Cartoon, Fergie, & Goodman, 2008; Stewart, Outram, & Smith, 2013; Figueira & Cazal, 2017).

CONCLUSIONS

The data reveals a broad range of variation in the use of supplements by sportsmen. It is considered crucial to promote nutritional education programs for sportsmen. The message about risks and benefits associated with the consumption of food supplements should be emphasised, as well as the advantages associated with a healthy and balanced diet.

References

Assis, L., Silveira, J., & Barbosa, M. (2015). Avaliação antropométrica, ingestão alimentar e consumo de suplementos em atletas e praticantes de mixed martial arts (mma) do município de araraquara. *Revista Brasileira de Nutrição Esportiva*, São Paulo, 9, 307–310.

Dascombe, B. J., Karunaratna, M., Cartoon, J., Fergie, B., & Goodman, C. (2008). Nutritional supplementation habits and perceptions of elite athletes within a state-based sporting institute. *Journal of Science and Medicine in Sport*, 13(2), 274–280. doi: 10.1016/j.jsams.2009.03.005

Figueira, I., & Cazal, M. (2017). Análise comparativa do consumo de proteínas e suplementos por praticantes de spinning e musculação. *Revista Brasileira de Nutrição Esportiva*, 11, 437–444.

Frączek, B., Warzecha, M., Tyrała, F., & Pięta, A. (2016). Prevalence of the Use of Effective Ergogenic Aids Among Professional Athletes. Rocz Panstw Zakl Hig, 67(3), 271–278.

Gacek, M. (2016). Association between general self-efficacy level and use of dietary supplements in the group of American football players. Roczniki Państwowego Zakładu Higieny, 67(1), 31–36.

Ivković, G. (2016). The use of dietary supplements by Croatian female basketball players. Acta Kinesiologica, 44–47.

Judge, L., Petersen, J., Craig, B., Hoover, D., Holtzclaw, K., Leitzelar, B., Bellar, D. (2015). Creatine usage and education of track and field throwers at national collegiate athletic association division i universities. *The Journal of Strength and Conditioning Research*, 2034–2040.

Korczak, R., Kruszewski, M., Kruszewski, A., Kuźmicki, S., Olszewska, A., Kępa, G., & Landowski, K. (2016). Preferences in the use of nutritional supplements and the correctness of their selection for training purposes. *Baltic Journal of Health and Physical Activity*, 8(4), 100–108.

Lima, L., Moraes, C., & Kirsten, V. (2010). Dismorfia muscular e o uso de suplementos ergogênicos em desportistas. *Revista Brasileira de Medicina Do Esporte*, 16(6), 427–430. doi: 10.1590/S1517-86922010000600006

Naves, A., Isizuka, K., Ruas, M., Ramada, R., & Nacif, M. (2016). Avaliação nutricional de jogadores de rúgbi, 10, 612–618.

Peçanha, M., Navarro, F., & Maia, T. (2015). O consumo de suplementos alimentares por atletas de culturismo. *Revista Brasileira de Nutrição Esportiva*, 9(51), 215–222.

Silva, Â., & Marins, J. (2013). Consumo e nível de conhecimento sobre recursos ergogênicos nutricionais em atletas. *Bioscience Journal*, 29(4), 1038–1048.

Stewart, B., Outram, S., & Smith, A. C. T. (2013). Doing supplements to improve performance in club cycling: A life-course analysis. *Scandinavian Journal of Medicine and Science in Sports*, 23(6), 361–372. doi: 10.1111/sms.12090

Tsitsimpikou, C., Chrisostomou, N., Papalexis, P., Tsarouhas, K., Tsatsakis, A., & Jamurtas, A. (2011). The use of nutritional supplements among recreational athletes in Athens, Greece. *International Journal of Sport Nutrition and Exercise Metabolism*, 21(5), 377–384. doi: 10.1123/ijsnem.21.5.377

P40. Analysis of the human walking gait with and without external weight added on lower limbs of physically active individuals

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INTRODUCTION

Human walking is one of the most studied tasks in biomechanics and in other sport sciences fields (Alexander, 1984; Branco, Santos-Rocha, Vieira, Aguiar, & Veloso, 2016; Stolze et al., 1997; Tao, Liu, Zheng, & Feng, 2012). Nevertheless, walking continues to be widely used as a form of exercise (Siegel, Brackbill, & Heath, 1995) or physical activity (Eyler, Brownson, Bacak, & Housemann, 2003). However, it is common to see practitioners using ankle weights or other types of weights attached to the lower limbs. The aim of the present study is to verify if there are any changes in gait when weights are used in lower limbs, in young and active adults. Methods: Three cycles of three subjects were included for analysis. For the collection, markers were attached in lower limbs and SkillSpector was used for kinematic analysis. Excel and IBM SPSS Statistics softwares were used for data treatment.

RESULTS

The variables in analysis are in Table 1. The Stance Phase time with weights (WN) has 4% higher duration than without weights (WW). The stride length was 0.19m higher when performed without external weight. The peak of velocity was 0.3m/s higher when performed without weight. The range of motion of the ankle, knee and hip joints, were 6.62º, 6.21º and 4.77º, respectively greater when performed without load.

Table 1
Spatial, temporal and angular variables in analysis (mean ± standard-deviation).

	Without external Weight	With External Weight
Stride time (s)	1,08 ± 0,07	1,37 ± 0,01
Stance Phase time (%)	0,61 ± 0,04	0,65 ± 0,03
Swing Phase time (%)	0,39 ± 0,04	0,35 ± 0,03
Max Velocity peak (m/s)	1,52 ± 0,10	1,22 ± 0,12
Stride Length (m)	1,17 ± 0,10	0,99 ± 0,12
Ankle ROM (deg)	29,44 ± 6,14	22,82 ± 3,76
Knee ROM (deg)	55,25 ± 1,35	49,04 ± 6,59
Hip ROM (deg)	32,50 ± 2,22	27,73 ± 2,67

Beside the absolute values differences, statistical analysis doesn't reveal any significant changes between both conditions of external weight added to lower limbs

CONCLUSIONS

The addition external weight to the lower limbs seems to induce some changes of kinematic variables, however, in this study, statistical differences between the conditions in analysis were not found. We recommend the increasing of the sample to ensure these results.

References

Alexander, R. M. (1984). Walking and Running. *American Scientist, 72*(4), 348-354.

Branco, M., Santos-Rocha, R., Vieira, F., Aguiar, L., & Veloso, A. P. (2016). Three-Dimensional Kinematic adaptations of gait throughout pregnancy and postpartum. *Acta of Bioengineering and Biomechanics, 18*(2). doi:10.5277/ABB-00418-2015-05

Eyler, A. A., Brownson, R. C., Bacak, S. J., & Housemann, R. A. (2003). The epidemiology of walking for physical activity in the United States. *Med Sci Sports Exerc, 35*(9), 1529-1536. doi:10.1249/01.MSS.0000084622.39122.0C

Siegel, P. Z., Brackbill, R. M., & Heath, G. W. (1995). The epidemiology of walking for exercise: implications for promoting activity among sedentary groups. *American Journal of Public Health, 85*(5), 706-710. doi:10.2105/ajph.85.5.706

Stolze, H., Kuhtz-Buschbeck, J. P., Mondwurf, C., Boczek-Funcke, A., Johnk, K., Deuschl, G., & Illert, M. (1997). Gait analysis during treadmill and overground locomotion in children and adults. *Electromyography and Motor Control-Electroencephalography and Clinical Neurophysiology, 105*(6), 490-497.

Tao, W., Liu, T., Zheng, R., & Feng, H. (2012). Gait Analysis Using Wearable Sensors. *Sensors (Basel, Switzerland), 12*(2), 2255-2283. doi:10.3390/s120202255

P41. Child Developmental Assessment: development assessment tools, years of professional experience and duration of the evaluation.

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INTRODUCTION

The developmental assessment allows early identification of psychomotor disorders, adjusting the necessary therapeutic interventions («Programa Nacional de Saúde Infantil e Juvenil», 2013). In a pediatric therapeutic intervention, it's very important to justify the need of therapeutic intervention with standardised evaluation. This assessment shall measure the areas of development to be considered in an Intervention (Missiuna & Pollock, 1995).

The purpose of this study is to understand the relation between the development assessment tool used by each professional, years of professional experience and duration of the evaluation.

METHODS

For this sample, we contacted 251 child development Professionals to answer an online questionnaire in which they were presented with questions related to their satisfaction with the instruments for assessing child development. The sample was constituted by 42 individuals of 29,69±7,99 years old, 38 females (90,5%) and 4 males (9,5%). Regarding the academic degree, the sample was composed mostly by professionals with graduation (61,9%), only 38,1% of the professionals hold a master's degree. 66,7% of the individuals are Psychomotor Therapists, 4,8 % are Psychologists, 23,8 % are Speech Therapist, 2,4% are Occupational Therapist and 2,4 % are Physiotherapist.

RESULTS

The assessments Bateria Psicomotora de Vitor da Fonseca (24,5%) and Schedule of Growing Skills- SGS II (17,6%) are the most used instruments, mostly used by less experienced professionals. Individuals with more than 10 years of experience tend to privilege the informal assessment of development. Professionals spend an average of 101.07 ±45,26 minutes evaluating the child's development. There are no differences between the more experienced professionals or less experienced ones regarding the duration of the evaluation, which usually takes 90 minutes.

CONCLUSIONS

Most child development professionals use formal developmental assessment tools, but with the gain of professional experience they resort to more informal methods of evaluation. There is no difference in the duration of the assessment in relation to professional experience.

References

Missiuna, C., & Pollock, N. (1995). Beyond the Norms:: Need for Multiple Sources of Data in the Assessment of Children. *Physical & Occupational Therapy In Pediatrics*, *15*(4), 57–74. https://doi.org/10.1080/J006v15n04_04

Programa Nacional de Saúde Infantil e Juvenil. (2013). Direção Geral da Saúde.

P42. Comparison between school backpack loads on ground reaction forces of walking running and jumping.

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INTRODUCTION

The load carriage daily on backpacks to school induces several modifications on posture and gait (Chow et al., 2005; Dahl, Wang, Popp, & Dickin, 2016). Once high magnitudes of ground reaction forces (GRF) have been associated with several adverse health issues (Voloshin, 2000; Zadpoor & Nikooyan, 2011) it was our purpose to analyse the influence of daily school loads on walking, running and jumping.

METHODS

Twenty-one students were divided in two groups, those who frequent the last year of basic school (9th school year) and those who initiate the second cycle of basic school (5th school year). The participants were asked to perform 5 times for each of the conditions (walk, run and jump). The task took place on a wood platform with 5,8m length, after an extended period of preparation, with the MuscleLab force plate from Ergotest placed at the middle of the wood platform.

RESULTS

When walking with the backpack on, the 5th year students recorded a first peak magnitude increase of 17.3% and a second peak magnitude increment of 15.4% compared with unloaded condition. The loading rate incremented 380N/s (11.1%). The 9th students did not register significant differences on time variables but, again, all force variables increased when carrying the backpack.

Running with the backpack on, lead to an increase on stance time comparing with unloaded condition, allowing to keep peak values without changes and to decrease the loading rate.

When landing of jumping over an obstacle with both feet at the same time and carrying the backpack, the integral of force increased compared with unloaded condition, however, remaining variables were affected distinctly on 5th students and on 9th students: no differences were observed on 5th students, while on 9th students time variables increased, and force variables decreased.

CONCLUSIONS

The backpack load resulted in adjustments in walking, running and jumping to overcome the external load carried. When walking loaded, GRF magnitudes increased proportionally to the relative load added. So 5th students had a greater increment as they carried more relative weight. They also increased stance time, what allowed them to limit the increment induced by the backpack. The stance time increased with relative external load with running, avoiding GRF magnitudes to increase. In addition, the students adapted the movement to prolong the reception time on about 20% so they could minimize the increment on GRF magnitudes after jumping.

Acknowledgments

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References

Chow, D. H., Kwok, M. L., Au-Yang, A. C., Holmes, A. D., Cheng, J. C., Yao, F. Y., & Wong, M. S. (2005). The effect of backpack load on the gait of normal adolescent girls. *Ergonomics, 48*(6), 642-656. doi:V2K23Q8116100212 [pii] 10.1080/00140130500070921

Dahl, K. D., Wang, H., Popp, J. K., & Dickin, D. C. (2016). Load distribution and postural changes in young adults when wearing a traditional backpack versus the BackTpack. *Gait & Posture, 45*, 90-96. doi:10.1016/j.gaitpost.2016.01.012

Voloshin, A. (2000). Impact propagation and its effects on the human body *Biomechanics in sport* (pp. 577-587): Blackwell Science Ltd.

Zadpoor, A. A., & Nikooyan, A. A. (2011). The relationship between lower-extremity stress fractures and the ground reaction force: a systematic review. *Clinical Biomechanics, 26*(1), 23-28. doi:S0268-0033(10)00225-1 [pii] 10.1016/j.clinbiomech.2010.08.005

P43. Determinants of self-rating health among university students from Ceará, Brazil

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INTRODUCTION

Health self-ratings reveal the global health status of an individual as a result of the interactions among biological, social, psychological, behavioural and spiritual domains (Picard, Juster and Sabiston, 2013). Health self-assessment investigations are widely used in population surveys because of their ease of application and high reliability. These investigations assist in the implementation of public policies to promote healthy behaviours and to prevent morbidity in the population.

The main objective of the present study was to determine the prevalence and the variables associated with self-rating of health through logistic regression analysis.

METHODS

324 university students from Ceará, Brazil, participated in a research project aimed to determine the health and the quality of life of university students. The Isaq-A (Sousa et al., 2012), a self-administered questionnaire, was applied to collect data about self-rating of health. Self-rating of health was assessed by direct and objective questions, categorised as bad/regular or good/excellent. In addition to this variable, socio-demographic, behavioural variables and nutritional status were also measured. The independent variables that show statistical significance association, by the chi-square test, entered the multinomial logistic regression model. The multinomial logistic regression test was performed with self-rated health as the dependent variable, and stress, satisfaction with life, quality and hours of sleep, blood pressure and smoke habits as independent variables. All data were analysed using SPSS 17.0.

RESULTS

Among the 324 recruited students, 32.1% were men, and 67.9% were women. According to age 76.5% were ≤ 25 years of age and 23.5% > 25 years of age. The prevalence of unsatisfactory self-rated health university students was 34%. The regression analysis revealed that some health-related variables as bad quality of sleep (OR= 3.46; 95% CI: 1.40 – 8.54), high stress (OR= 0.20; 95% CI: 0.83 – 0.51) and high blood pressure (OR=0.18; 95% CI: 0.06 -0.57) contributed significantly to the negative self-perception of health. Bad sleep quality is a risk factor for self-rating health.

CONCLUSIONS

The health status of a population is an indicator of great concern for economists and policy makers. The impact of lifestyles on individual health status is of great relevance for the correct establishment of health policies. A high prevalence of unsatisfactory self-rated health was detected in this group of university students. Findings suggest immediate implementation of programs to promote healthy behaviours like increase sleep quality and to prevent stress and high blood pressure.

References

Picard, Martin, Juster, Robert-Paul and Sabiston, Catherine M. (2013) Is the Whole Greater than the Sum of the Parts? Self-Rated Health and Transdisciplinarity. *Health*, 5, 24-30. http://dx.doi.org/10.4236/health.2013.512A004

Sousa, Thiago Ferreira de, Fonseca, Silvio Aparecido, José, Helma Pio Mororó, & Nahas, Markus Vinicius. (2012). Estudo MONISA: características e aspectos metodológicos. *Revista Brasileira de Epidemiologia*, *15*(4), 904-907. https://dx.doi.org/10.1590/S1415-790X2012000400020

P44. Injury risks for fitness instructors: a review of key factors

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INTRODUCTION

The labour risks control is an occupational health concern. Fitness participants have been increasing in the last years (Lindwall, 2004). Clients' demand and the increase in classes number take the fitness instructors (FI) to a higher injuries exposure due to high workload. It is possible to observe several variations in aerobic dance, cycling, pilates, strength training, flexibility and balance. The main differences are in the cardiovascular intensities and the low to high impact dance (Van Mechelen, Hlobil & Kemper, 1992). The FI are exposed to high volumes of classes and injuries risks due to the high number of students and classes (Couto et al., 2016). As far as our understanding goes, FI are 50% more prone to injuries incidence in comparison to students. Thus, the aim of this study was to assess by a bibliographic research the health and injuries risk in FI.

METHODS

This is a bibliographic review made in PUBMED, Google Scholar, SCIELO and Web of Science. The used keywords were "fitness instructors injuries", "fitness professor's injuries", and "fitness instructor's risks". From an analysis of 23 papers, ten were chosen considering title and abstract. After a full integral analysis, only five papers were selected for revision. The others did not aimed to analyse the injuries and the health risks for FI. The selected papers approached the injuries and health risk factors for FI.

RESULTS

There is a positive and significant correlation between the formation levels and injuries incidence prevention in FI and students (Malek, Nalbone, Berger & Coburn, 2002). FI with higher classification prevent higher frequency of injuries events. The injuries prevalence was superior in FI than in students (72.4 – 75.9% and 22.8 – 43.3% respectively) (Mutoh, Sawai, Takanashi & Skurko, 1998; Francis, Francis & Welshons-Smith, 1985). The injuries were general inflammations, muscle strains or sprains and stress fractures by overuse (Rothenberger, Chang & Cable, 1988). The FI are more exposed to injuries than students are (0.17 injuries/100h vs 0.15/100h of practice, respectively) and about 77% of the injuries were in the lower limbs (Garrick, Gillien & Whiteside, 1986).

CONCLUSIONS

There is a lack of research in FI injuries risk of factors. However, FI seem to have a higher exposure to injuries in comparison to students. The high workload seem to be determinant to the incidence of overuse injuries.

References

Lindwall, M. (2004). Exercising the self: on the role of exercise, gender and culture in physical self-perception. Doctoral dissertation. Stockholm University. Sweden

Van Mechelen, I., Hlobil, H., & Kemper, H. C. (1992). Incidence, severity, aetiology and prevention of sports injuries. A review of concepts. Sports Medicine, 14(2), 82–99.

Couto, J. O., Santos, T. K. A., Oliveira, R. G., Soares, N. M. M., & dos Santos Silva, R. J. (2016). Prevalência de lesões nos professores de ginástica de academia. Caderno de Graduação-Ciências Biológicas e da Saúde-UNIT, 3(2), 83-96.

Malek, M. H., Nalbone, D. P., Berger, D. E., & Coburn, J. W. (2002). Importance of health science education for personal fitness trainers. *The Journal of Strength & Conditioning Research*, *16*(1), 19-24.

Mutoh, Y., Sawai, S., Takanashi, Y., & Skurko, L. (1988). Aerobic dance injuries among instructors and students. The Physician and sportsmedicine, 16(12), 81-86.

Francis, L. L., Francis, P. R., & Welshons-Smith, K. (1985). Aerobic dance injuries: a survey of instructors. The physician and Sportsmedicine, 13(2), 105-111.

Rothenberger, L. A., Chang, J. I., & Cable, T. A. (1988). Prevalence and types of injuries in aerobic dancers. The American Journal of Sports Medicine, 16(4), 403–407.

Garrick, J. G., Gillien, D. M., & Whiteside, P. (1986). The epidemiology of aerobic dance injuries. The American Journal of Sports Medicine, 14(1), 67–72.

P45. Study of body composition and habits in children from elementary school in portugal (projeto pró-lúdico)

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INTRODUCTION

Portugal is one of the countries with the highest percentage of overweight children (32%). In the medium term, some are expected to become obese as adults (Who, 2013). This study aims to relate the body composition and the thoughts of parents about the condition of their children.

METHODS

The sample consisted of 555 7-year-old children. Body data (BMI) were collected and the parents answered a questionnaire. To relate the data, the chi-spuare test was used.

RESULTS

The overweight is 22.7%.

56.7% of parents of overweight children think they have normal weight ($p = 0.000$)*.

74.6% of physicians did not tell their parents that their children were overweight ($p = 0.000$)*.

The studied overweight children practice 1 to 4 times physical exercise per week (41.8% - 1 to 2 times, 43.3% - 3 to 4 times). We asked the parents why the children didn't do more exercise. 73.2% answered that "there is no time", "no options" or "do not know" ($p = 0.033$)*.

82.3% of parents of overweight children strongly encourage or are always encouraging their children to adopt healthy lifestyle habits. 73.1% likewise encourage them to be physically active.

55.4% of parents of overweight children agree that parental eating and physical activity habits can influence their children's eating habits. 50.8% are not worried about their weight ($p = 0.036$)*.

56.7% agree that overweight children will in future be obese adults. ($p = 0.005$)*.

* The results point out significant differences when compared to the parents' responses of children without excessed weight

DISCUSSION

Approximately 3 in 10 children are overweight, It seems to be relevant the use of physical activity as a tool in the fight against obesity since these children are expected to become obese adults (WHO, 2013).

We conclude that parents may not know that their children are overweight. To combat overweight in these children, an informational session should be held with the parents, as they encourage children to be healthier, but it does not seem to be effective. Most parents say that children do not have time or there are no options or they do not know why children do not do more physical activity.

References

WHO. (2013). *Nutrition, Physical Activity and Obesity - Portugal*. World Health Organization - Regionaal Ofice for Europe.

P46. A noninvasive tool for postural assessment in young students at school: validation, sensibility, specificity and accuracy.

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INTRODUCTION

The literature presents several tools and technics for postural evaluation but spine radiographs are still the gold standard method (Kilinc, Yaman & Atay, 2009; Guimarães, Saco & João, 2007). Spine alignment assessment by visual scan is the most known method, however small postural alterations are hard to detect (Singla & Vegar, 2014; Iunes et al., 2009). The aim of this study was to assess the validity, sensitivity, specificity and accuracy of a noninvasive method of postural assessment in adolescents at school.

METHODS

The sample was composed by 81 subjects aged 14.23 (± 3.11). Table 1 presents the sample characteristics.

Table 1
Sample age, height and mass for males and females

Variables	Males	Females
N	31	50
Age (years)	14.84 ± 3.39	13.86 ± 2.91
Height (cm)	165.48 ± 17.77	155.46 ± 11.49
Mass (Kg)	55.32 ± 15.94	47.20 ± 12.56

Vertebral column misalignments were detected by an experimental instrument (based in a symetrograph). C7-L5 spinous processes and the intergluteal fold were used as anatomic landmarks to visually detect asymmetries (Fransoo, 2003). Subjects were also clinically inspected by a spine surgeon and made long standing radiographs. The Spearmen's correlation test between the experimental data and X-Ray evaluated the validity. The true and false negative and positives cross-tabulation, assessed the test sensitivity, specificity and accuracy.

RESULTS

Table 2 presents the frequency of postural asymmetries for the experimental test and X-Ray. Table 3 presents the true and false negatives analysis. A significant and positive correlation was observed between the experimental test and X-Ray ($rs = 0.763$; $p < 0.001$). The instrument sensitivity was 97%, the specificity was 67% and the accuracy 88%.

Table 2
Frequency and percentage of postural asymmetries in the experimental test and X-Ray

	Frequency		Percentage	
	Experimental test	X-Ray	Experimental test	X-Ray
Aligned	9	10	11.1%	12.3%
Asymmetry at right	23	15	28.4%	18.5%
Asymmetry at left	26	27	32.1%	33.3%
Bilateral asymmetry	23	29	28.4%	35.8%

Table 3
True and false negative and positives cross-tabulation analysis

	True	False
Without postural asymmetries	8	1
With postural asymmetries	70	2

CONCLUSIONS

A significant and positive correlation confirmed the test validity. The evaluation of true and false negative and positives cases allowed to conclude that the instrument present sensibility, specificity and accuracy for postural analysis at schools.

References

Kilinç, F., Yaman, H., & Atay, E. (2009). Investigation of the effects of intensive one-sided and double-sided training drills on the postures of basketball playing children. Journal of Physical Therapy Science, 21(1), 23-28.

Guimarães, M.M.B., Sacco I.C.N., João S.M.A. (2007). Postural characterization of young female Olympic gymnasts. Rev. Bras. Fisioter. 2007; 11(3): 185–90.

Singla, D., & Veqar, Z. (2014). Methods of postural assessment used for sports persons. Journal of clinical and diagnostic research: JCDR, 8(4), LE01.

Iunes, D.H., Bevilaqua-Grossi, D., Oliveira, A.S., Castro, F.A., Salgado, H.S. (2009). Comparative analysis between visual and computerized photogrammetry postural assessment. Rev Bras Fisioter;13(4): 308–15.

Fransoo, P. (2003). Examen Clínico del Paciente con Lumbalgia – Compendio práctico de reeducación. Barcelona, Espanha: Editorial Paidotribo.

O19. Can the summer break affect critical and maximal instantaneous velocity of young swimmers?

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INTRODUCTION

Young swimmers take a summer break of several weeks and most of them engage in non-oriented swimming sessions over that period. Nevertheless, it still remains unclear if such break affects their energetic profile. The aim of this study was to analyse the changes in critical velocity and maximal instantaneous velocity of young swimmers after a summer break.

METHODS

Twenty-one young swimmers (13.38 ± 1.02 yo) undertook several in-water maximal bouts at the end of season #1 (pre-test) and ten weeks later, at the beginning of season #2 (post-test). No specific swim training was conducted during such period. The aerobic critical velocity (AerCV) as a measure of aerobic capacity was computed using the 50m and 400m front-crawl performances (Toubekis and Tokmakidis, 2013). The anaerobic critical velocity (AnCV) as a measure of anaerobic capacity was computed based on three trials (Neiva et al., 2011) selecting the 15m, 20m and 25m performances. The maximal instantaneous velocity (Vmax) as a measure of anaerobic power was retrieved from the 15m bout (Dekerle et al., 2002). Within-subjects mean differences were analysed with Repeated Measures ANOVA ($p \leq 0.05$) and concurrent analysis of standardised effect sizes.

RESULTS

After the 10 weeks of detraining the AerCV decreased from 1.21 ± 0.09 m/s at pre-test to 1.15 ± 0.08 m/s at post-test (delta = 4.62%, $p < 0.01$, eta^2 = 0.10, 95CI of the change: 1.92-4.74%). The AnCV remained unchanged being 1.42 ± 0.16 m/s at the end of the season and 1.41 ± 0.18 m/s at the beginning of the following season (delta = 0.37%, $p < 0.77$, eta^2 = 0.10, 95CI of the change: -2.77-4.05%). The Vmax also decreased from 1.68 ± 0.16 m/s at pre-test to 1.58 ± 0.16 m/s at post-test (delta = 5.58%, $p < 0.01$, eta^2 = 0.09, 95CI of the change: 4.38-9.12).

CONCLUSIONS

The results show that a 10-weeks detraining period lead young swimmers to experience an impairment of their aerobic capacity and anaerobic power but not in their anaerobic capacity, maintaining AnCV.

References.

Dekerle, J., Sidney, M., Hespel, J.M., & Pelayo P. (2002). Validity and reliability of critical speed, critical stroke rate, and anaerobic capacity in relation to front crawl swimming performances. *International Journal of Sports Medicine*, *23*(2), 93-8.

Neiva, H.P., Fernandes, R.J., & Vilas-Boas, J.P. (2011). Anaerobic critical velocity in four swimming techniques. *International Journal of Sports Medicine*, *32*(3):195-8.

Toubekis, A.G., & Tokmakidis, S.P. (2013). Metabolic responses at various intensities relative to critical swimming velocity. *Journal of Strength & Conditioning Research*, 27(6), 1731-41.

O20. Analysis of the resistive forces acting on a world-ranked wheelchair sprinter at different speeds

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INTRODUCTION

The main resistive forces (RF) in wheelchair racing are rolling resistance (RR) and aerodynamic drag (D) (Barbosa et al., 2016; Forte et al., 2018). Typically, a T52 wheelchair sprinter reaches an instantaneous maximal speed of about 7m/s (Barbosa & Coelho, 2018). However, in a 100m sprinting event, the athlete only reaches a speed over 6 m/s after the 30m mark (Barbosa & Coelho, 2018). The contribution of the RR and D to overall RF in wheelchair racing is yet unclear (Barbosa et al., 2016). Thus, the aim of this study was to assess the partial contributions of RR and D to RF at different speeds by computational fluid dynamics (CFD) and analytical procedures.

METHODS

A male world-ranked wheelchair sprinter was recruited for this research. All procedures were in agreement to Helsinki's declaration. The Artec Scanner was used to obtain the subject 3D model in the racing position. Fluent CFD software measured the effective area at 2.0, 3.5, 5.0 and 6.5 m/s. Then, effective area was calculated. A 3.0x2.0x1.5m domain was meshed with 35 million of prismatic elements on the Ansys meshing module (Ansys Meshing 16.0, Ansys Inc., Pennsylvania, USA). The D and RR were computed as (equation 1 and 2):

$$D = 0.5 \cdot \rho \cdot ACd \cdot v^2 \quad (1)$$

Where ρ is the air density (1.203 kg/m^3 at 15º C), ACd is the effective area and v the velocity.

The RR was estimated by an analytical procedure:

$$RR = \mu R \cdot m \cdot g + kf \cdot m \cdot g \cdot v^2 \quad (2)$$

Where, m was the mass, g gravitational acceleration and v the velocity. The μR and kf are the rolling friction coefficients for linear and non-linear velocity dependency, respectively. The μR and kf were assumed to be 0.01 and 5x10^{-6} respectively.

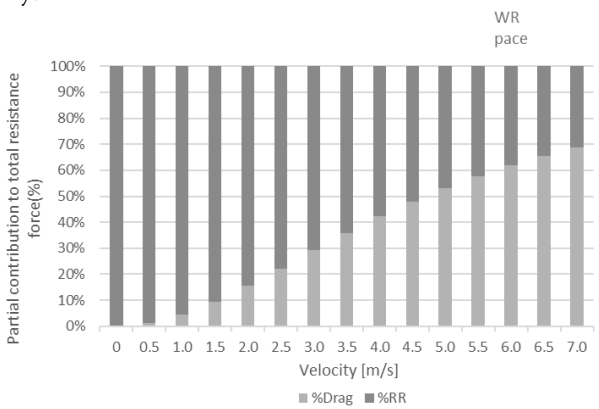

Figure 1. Partial contribution of Drag and rolling resistance (RR) to total resistance forces at different velocities in wheelchair sprinting.

RESULTS

From 0 to 7m/s, the D ranged between 0% and 70%, whereas RR from 100% to 30% (Figure 1). At the world record pace (6.08 m/s), the D contribution was about 60%.

CONCLUSIONS

The athletes might be aware that at speeds over 5 m/s the Drag is the main RF, outweighing the partial contribution by RR. Hence, in the first fifth of a 100m race (i.e. by 20m mark) the key resistance force is

RR; conversely in the second stretch it is Drag. Therefore, wheelchair sprinters should implement different strategies to minimize both RR and Drag.

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References.

Barbosa, T. M., Forte, P., Estrela, J. E., & Coelho, E. (2016). Analysis of the aerodynamics by experimental testing of an elite wheelchair sprinter. Procedia engineering, 147, 2-6.

Barbosa, T. M., & Coelho, E. (2017). Monitoring the biomechanics of a wheelchair sprinter racing the 100 m final at the 2016 Paralympic Games. European Journal of Physics, 38(4), 044001.

Forte, P., Marinho, D. A., Morais, J. E., Morouço, P., Pascoal-Faria, P., & Barbosa, T. M. (2018). Aerodynamics of a wheelchair sprinter racing at the 100m world record pace by CFD. AIP Conference Proceedings. AIP Publishing, 1978, 1, 160008.

O21. Load: too much or too little?

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INTRODUCTION

From a labour perspective the manual handling of loads (MHL) may compromise workers health. From an exercise perspective MHL may improve physical fitness and health. A Council Directive defines MHL as "any transporting or supporting of a load, by one or more workers, including lifting, (…), which, by reason of its characteristics or of unfavourable ergonomic conditions, involves a risk particularly of back injury to workers" (Council, of 29 May 1990). Portuguese law specifies a load limit of 30kg for occasional operations at work or 20kg if handled frequently (DL, 330/1993 of September 25). More than 25kg and or 25 times/day of lifting during work were associated with an annual incidence increase of low back pain (LBP) (Coenen et al., 2014). The World Health Organisations (WHO) states health benefits for adults (aged 18–64) from muscle-strengthening activities (moderate to vigorous intensity, 3-5 days/week, 30-60 minutes/session) (WHO, 2010). Dose-response recommendations for strength development ranged from 60% of one-repetition maximum (1RM) for untrained individuals to 85% of 1RM for athletes (Peterson, Rhea, & Alvar, 2005). The National Institute for Occupational Safety and Health (NIOSH) developed the Revised NIOSH lifting equation (RNLE) to find a recommended weight limit (RWL) and lifting index (LI) for workers based on seven lifting related task factors (Waters, Putz-Anderson, & Garg, 1994). The RWL is the lifting weight that nearly all healthy workers could perform over a substantial period (e.g., up to 8 hours) without an increased risk of developing LBP. The LI estimates the level of physical stress associated to lifting. Both are widely used and there is considerable literature on the subject (Boda, Bhoyar, & Garg, 2010; Lu, Waters, Krieg, & Werren, 2013; Ngo, Yazdani, Carlan, & Wells, 2017). The present paper aims to apply the RNLE to deadlift, an exercise commonly used in weight lifting programs.

METHODS

Three healthy adult males (34±10 years old; 167.3±2.5 cm height) were engaged to the study: P1) untrained (<1 year of consistent strength training), P2) recreationally trained (>1 year of consistent strength training; and P3) professional athlete.

One deadlift was performed under the following weight conditions: P1) 60% of 1RM (20kg), P2) 80% of 1RM (40kg), and P3) 85% of 1RM (50 kg).

RESULTS

The RNLE did not apply to P2 and P3. Both exceeded the load constant of 23kg (RWL for ideal conditions of lifting). RWL for P1 was 17.5kg and LI was 1.14 suggesting 20kg may increase the risk of developing LBP (Table 1).

Table 1

Data introduced for the 7 multipliers used to calculate RWL and LI

Participant	Load constant	Horizontal	Vertical	Distance	Asymmetric	Frequency	Coupling	**RWL**	**LI**
P1)Untrained	23 kg	1 (25cm)	0.844 (23cm)	0.90 (56cm)	1 (0º)	1 (≤0.2 lifts/min; ≤1 hour; <75cm)	1 (good)	**17.5 kg**	**1.14**

CONCLUSIONS

Is there a science for workers and another for untrained, recreational or athletes' populations? Should regulations and laws apply to all? Are professional athletes workers? Is "science" facing the problem from different and contradictory perspectives?

References.

Boda, S. V., Bhoyar, P., & Garg, A. (2010). *Validation of revised NIOSH lifting equation and 3D SSP model to predict risk of work-related low back pain.* Paper presented at the Proceedings of the Human Factors and Ergonomics Society Annual Meeting.

Coenen, P., Gouttebarge, V., van der Burght, A. S. A. M., van Dieën, J. H., Frings-Dresen, M. H. W., van der Beek, A. J., & Burdorf, A. (2014). The effect of lifting during work on low back pain: a health impact assessment based on a meta-analysis. *Occupational and Environmental Medicine, 71*(12), 871.

Council Directive of 29 May 1990 on the minimum health and safety requirements for the manual handling of loads where there is a risk particularly of back injury to workers (fourth individual Directive within the meaning of Article 16 (1) of Directive 89/391/EEC), 90/269 C.F.R. (of 29 May 1990).

Estabelece o enquadramento, relativo às prescrições mínimas de segurança e de saúde na movimentação manual de cargas (Establishes the framework for minimum safety and health requirements for manual handling of loads), Decree-Law 330/93 C.F.R. (330/1993 of September 25).

Lu, M.-L., Waters, T. R., Krieg, E., & Werren, D. (2013). Efficacy of the Revised NIOSH Lifting Equation to Predict Risk of Low-Back Pain Associated With Manual Lifting: A One-Year Prospective Study. *Human factors, 56*(1), 73-85. doi:10.1177/0018720813513608

Ngo, B. P., Yazdani, A., Carlan, N., & Wells, R. (2017). Lifting height as the dominant risk factor for low-back pain and loading during manual materials handling: A scoping review. *IISE Transactions on Occupational Ergonomics and Human Factors, 5*(3-4), 158-171.

Peterson, M. D., Rhea, M. R., & Alvar, B. A. (2005). Applications of the dose-response for muscular strength development: a review of meta-analytic efficacy and reliability for designing training prescription. *Journal of Strength and Conditioning Research, 19*(4), 950-958.

Waters, T. R., Putz-Anderson, V., & Garg, A. (1994). Applications manual for the revised NIOSH lifting equation.

WHO. (2010). *Global recommendations on physical activity for health*: World Health Organization.

O22. Assessment of the upper-limbs propulsive force at front crawl

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INTRODUCTION

At front crawl, the upper-limbs are responsible for nearly 90% of the forward propulsion (Zamparo, 2006). Therefore, the assessment of the upper-limb propulsive force is of major importance. Usually, this is assessed based in tethered swimming (Morouço, Keskinen, Vilas-Boas, & Fernandes, 2011). However, it might be claimed that tethered swimming may infer constrictions while simulating the swim technique. Hence, the aim of this study was to assess the upper-limb propulsive force at front crawl based in a sensor system, allowing to measure it while swimming (i.e., with displacement).

METHODS

Five collegiate swimmers (3 males and 2 females) were recruited. Swimmers performed a 25m bout at maximal front crawl. The mean propulsive force and the peak force of each stroke (dominant and non-dominant limb) were analyzed during three consecutive stroke cycles, during the intermediate 15m were analyzed. The Aquanex system (v4.2 C1211, Richmond, USA) was used to acquire the data. The mean difference (Δ) was used to assess the differences between limbs, and Cohen's d to assess the magnitude of the effect size.

RESULTS

Table 1 presents the descriptive data (with 95% confidence interval: 95CI) and the differences between limbs, for the mean and peak propulsive force.

	Males				Females			
	Mean±1SD	95CI	Δ	d	Mean±1SD	95CI	Δ	d
Mean dominant [N]	37.39±12.99	(28.87;37.60)	23.70	0.65	32.42±8.79	(32.20;32.64)	17.64	0.80
Mean non-dominant [N]	28.53±14.11	(28.19;28.87)			26.70±4.97	(27.10;26.31)		
Peak dominant [N]	77.86±9.47	(77.71;78.01)	19.74	1.96	61.22±2.95	(61.89;60.56)	17.74	2.84
Peak non-dominant [N]	62.49±5.79	(62.35;62.93)			50.37±4.52	(50.80;49.93)		

CONCLUSIONS

For both males and females, a substantial difference with a large effect size, was observed between the upper-limbs (dominant versus non-dominant) for the mean and peak propulsive force.

Acknowledgments

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References.

Zamparo, P. (2006). Effects of age and gender on the propelling efficiency of the arm stroke. *European Journal of Applied Physiology, 97*, 52-58.

Morouço, P., Keskinen, K. L., Vilas-Boas, J. P., & Fernandes, R. J. (2011). Relationship between tethered forces and the four swimming techniques performance. *Journal of Applied Biomechanics, 27*, 161-169.

O23. Application of two external training load quantification methods in football: a comparative study

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INTRODUCTION

The amount of activity performed (i.e., external training load, ETL) by football (soccer) players is commonly quantified using arbitrary (i.e., player-independent, ARB) speed zones (Akenhead & Nassis, 2016). Since this method is biased by the potential players' diversity within a team, the use of individualised (i.e., player-dependent, IND) speed zones has therefore been proposed for quantifying ETL (Hunter et al., 2015; Mendez-Villanueva, Buchheit, Simpson, & Bourdon, 2013). Beyond the well-established importance of accounting for individual capacities when interpreting ETL data, the actual superiority of IND versus ARB speed zones has yet to be investigated. This study aimed to examine the interchangeability of two ETL monitoring methods: ARB vs IND speed zones.

METHODS

Thirteen male professional football players were monitored using 10-Hz GPS units over an 8-week competitive period (n= 302 training recordings). Low-speed activities (LSA), moderate-speed running (MSR), high-speed running (HSR), and sprinting were defined using ARB speed zones as <14.4, 14.4–19.8, 19.8–25.1 and ≥25.2 km·h-1, whereas IND speed zones were based on a combination of maximal aerobic speed (MAS, derived from the Yo-Yo Intermittent Recovery Test level 1), maximal sprinting speed (MSS, derived from the maximal speed reached during training), and anaerobic speed reserve (ASR, computed on MAS and MSS) as <80% MAS, 80–100% MAS, 100% MAS or 29% ASR and ≥30% ASR. This analysis process was repeated twice, once applying ARB speed thresholds and once applying IND speed thresholds. Data were analysed using within-participant correlations (Bland & Altman, 1995) and linear mixed model.

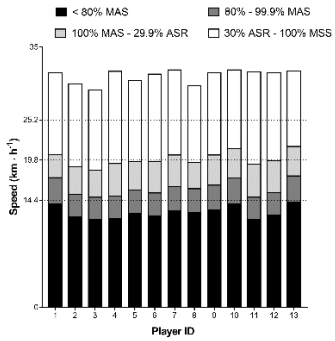

Figure 1. Graphical representation of arbitrary and individualized speed zone of each player. MSS= maximal sprinting speed, ASR= anaerobic speed reserve, MAS= maximal aerobic speed. Dotted lines delimitate arbitrary speed zones.

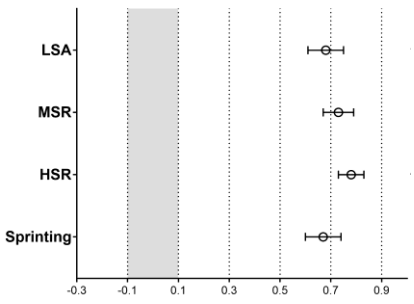

Figure 2. Within-subject correlations between distance covered in arbitrary and individualized speed zones (n = 302 training observations). LSA= low-speed activity, MSR= moderate-speed running, HSR= high-speed running. The grey-filled space represents an unclear correlation (P≤ 0.05, r< 0.1). Dotted lines delimitate the magnitude of correlations.

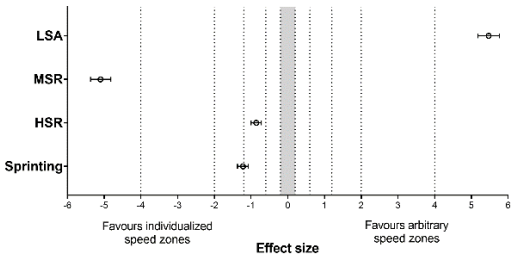

Figure 3. Differences between distance covered using arbitrary and individualized speed zones. LSA= low-speed activity, MSR= moderate-speed running, HSR= high-speed running. The grey-filled space indicates trivial differences (P≤ 0.05, ES< 0.2). Dotted lines delimitate the magnitude of differences.

RESULTS

Average players' estimated MAS was 17.7±0.6 km·h-1, and their MSS was 31.1±0.9 km·h-1 (Fig. 1). Distance covered in both ARB and IND methods was largely correlated in all speed zones (P< 0.01; r[90%CIs]= 0.67-0.78; Fig. 2). However, significant differences between methods were observed in all speed zones (P<0.01; Fig. 3). LSA was almost certainly higher when using the ARB method than when using the IND method (P< 0.01; Effect size, ES [90%CIs]= 5.5 [5.2; 5.8], respectively). Conversely, MSR,

HSR and sprinting speed were higher in the IND method than in the ARB method (P< 0.01; ES [90%CIs]= 5.1 [-5.4; -4.8], -0.8 [-1.0; -0.7] and -1.2 [-1.0; -1.3], respectively).

CONCLUSION

Both ARB and IND methods for ETL quantification showed similar sensitivity in depicting player locomotor demands. However, since these methods differ at the absolute level (i.e., based on measurement bias), ARB and IND speed zones should not be used interchangeably.

Acknowledgments

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References.

Akenhead, R., & Nassis, G. P. (2016). Training Load and Player Monitoring in High-Level Football: Current Practice and Perceptions. *Int J Sports Physiol Perform, 11*(5), 587-593. doi:10.1123/ijspp.2015-0331

Bland, J. M., & Altman, D. G. (1995). Calculating correlation coefficients with repeated observations: Part 1--Correlation within subjects. *BMJ : British Medical Journal, 310*(6977), 446-446.

Hunter, F., Bray, J., Towlson, C., Smith, M., Barrett, S., Madden, J., . . . Lovell, R. (2015). Individualisation of time-motion analysis: a method comparison and case report series. *Int J Sports Med, 36*(1), 41-48. doi:10.1055/s-0034-1384547

Mendez-Villanueva, A., Buchheit, M., Simpson, B., & Bourdon, P. C. (2013). Match play intensity distribution in youth soccer. *Int J Sports Med, 34*(2), 101-110. doi:10.1055/s-0032-1306323

O24. Maximal Lactate Steady State Relationship To An Incremental Test in Swimming

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INTRODUCTION

The determination of blood lactate concentrations is a very popular tool used by technicians and researchers to quantify the training intensities (Pyne et al., 2001), although, the methodology associated to maximal lactate steady state (MLSS) measurement separates it from most other lactate parameters. The aim of this study was to evaluate the relationship between the direct measurement of MLSS and parameters and variables associated to an incremental swimming test.

METHODS

14 male swimmers voluntarily participated in the study (16.8±2.8 years of age, 178.2±4.7 cm in height and 66.5±7.3 kg in body weight). Each subject completed a maximal 400 m front crawl in order to use the average velocity between 50 and the 350 m as an estimate of the maximal aerobic speed (MAS). In random order and different days, swimmers performed 30-min at constant velocity at 85, 90 and 95% of MAS for MLSS determination. An all-out test of 200 m (T200) for the determination of the incremental test intensities was also performed and, afterward the 7x200 m front crawl incremental step test (Pyne et al., 2001). Rate of perceived exertion (RPE) stroke rate (SR) and stoke length (SL) were registered in all tests.

RESULTS

Mean SR at MLSS velocity ($MLSS_v$) was 32.8±4.1 (cycles.min^{-1}) and mean SL 2.54±0.33 (m.cycle^{-1}). MLSS (4.8±1.5 mmol.L^{-1}) was associated to extreme values of 2.6 and 7.1 mmol.L^{-1}. Mean RPE during MLSS test was 13.5±1.51 (6-20 scale). $MLSS_v$ (1.36±0.6 m.s^{-1}) was significantly lower than Vmax and MAS, ($p<0.01$) and we found out that MAS can be determined with accuracy from Vmax, both parameters were not different ($r^2=0.93$, SEE=0.025; $p<0.05$). $LT_{log\text{-}log}$ (1.34±0.06 m.s^{-1}) and $LT_{D\text{-}max}$ (1.40±0.06 m.s^{-1}) were, respectively, significantly lower and higher than $MLSS_v$ ($p<0.05$). $MLSS_v$ was very close related to 85% of best 200 m performance (T_{200}) and represented not only a physiological, but a mechanical boundary above which athletes achieved fatigue and the swim technique started to deteriorate in the incremental swimming test.

CONCLUSIONS

Both the continuous and incremental tests provide useful indexes of aerobic potential, but they cannot be used interchangeably for MLSS estimation. The direct determination of MLSS remains the more accurate for exercise evaluation and prescription.

References.

Pyne, B.D., Lee, H.E., Swanwick, K.M. (2001). Monitoring the lactate threshold in world ranked swimmers. *Medicine and Science in Sports and Exercise,* 33, 291-297.

O25. Comparisons of anthropometric characteristics and physical activity patterns between International Elite and Junior Bodyboarders: an exploratory study

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INTRODUCTION

Surfing will be included in the 2020 Olympic Games giving an increased popularity and the opportunity to influence the development of its different disciplines. Bodyboarding is a surfing discipline considered one of the world's fastest-growing water sports. This exponential growth lead to an increased number and level of competitive athletes. Despite the strong associations between physical variables and surfing performance, higher levels of muscularity and lower levels of adiposity are associated with improvement in surfing skill from intermediate to professional. The regular participation in a sport per se does not result in the manage of weight status, resulting in a lack of information about differences between physical activity rates and age groups. This study aimed to investigate the differences between International Elite and Junior Bodyboarders concerning body composition and physical activity patterns.

METHODS

In this study, there were 26 elite (25.8 [6.0] years; 70.6 [8.0] kg; 174.7 [6.4] meters) and 36 juniors (16.5 [1.1] years; 63.5 [5.8] kg; 173.1 [4.9] meters) bodyboarder participants who were recruited in the 2018 Viana World Bodyboard Championship. All participants were evaluated in 4 skinfolds (triceps; abdominal; thigh and calf) and 4 body circumferences (arm; waist; thigh; calf) according to the International Society for Advancement of Kinanthopometry and fulfilled the International Physical Activity Questionnaire. Variations between elite and junior athletes were made by using standardised effect size of Cohen and the percentage differences between averages.

RESULTS

Comparisons between elite (EB) and junior bodyboarder (JB) demonstrate that JB are largely younger (-34.8,[-39.3;-29.9]; ES: -2.00,[-2.33;-1.66]), moderately lighter (-9.8%,[-13.8;-5.7]; ES: -0.90,[-1.28;-0.51]) and trivially shorter (-0.9%,[-2.3;0.5]; ES: -0.25,[-0.63;0.14]) than EB. JB had meaningful greater arm circumference (3.5%,[-0.7;7.8]; ES: 0.32,[-0.06;0.71]), thigh circumference (3.2%,[0.1;6.4]; ES: 0.44,[0.01;0.86]), calf circumference (7.8%,[-4.8;22.1]; ES: 0.21, [-0.13;0.54]), percentage of fat mass (3.3%,[-13.3;23.0]; ES: 0.06,[-0.27;0.40]) and meaningful smaller abdominal circumference (-3.3%,[-16.9;12.5]; ES: -0.07,[-0.40;0.26])) and lean mass (-13.1%,[-30.9;9.3]; ES: -0.20,[-0.53;0.13]). JB spend meaningful less time in moderate activities (-40.9%,[-59.4;-14.0]; ES: -0.62,[-1.06;-0.18]) and in light activities (-0.8%,[-39.5;62.6]; ES: -0.01,[-0.41;0.40]).

CONCLUSIONS

Junior Bodyboarders are in general more physically active than their elite counterpart. Nevertheless, meaningful small percentage of fat mass, arm, thigh and calf circumferences may be a determining factor in discerning elite and junior bodyboarders. Higher levels of lean mass and lower levels of adiposity are crucial factors in the transition from junior to elite bodyboarding.

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O26. Effects of concurrent training with whole-body electrostimulation on anaerobic performance and biochemical parameters

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INTRODUCTION

Concurrent training is a methodology that combine endurance and strength training. This method has always been in controversy due to the interference phenomenon, as it was thought that endurance training affected adversely strength training. However, it has been proved that this fact depends on the modality, frequency and duration of endurance training (Wilson et al., 2012). Moreover, the addition of whole-body electrostimulation in concurrent training could have positive effects in anaerobic performance (Filipovic et al., 2016). In addition, it has been established that electrostimulation training could increase CK (Stöllberger & Finsterer, 2018) and LDH (Moreau et al., 1995) markers. Thus, this study aim was to determine which concurrent training protocol is more effective to enhance anaerobic performance and biochemical parameters in recreationally-trained subjects: consecutive (weightlifting + HIIT) vs. simultaneous (WB-ES + HIIT).

METHOD

22 recreationally trained subjects (age 20.08 ± 2.08 years, Weight 72.49 ± 5.20 kg, BMI 22.23 ± 2.47 kg/m^2) were randomised in 3 groups: Concurrent Consecutive (CC), Concurrent Simultaneous (CS) and Control Group (CG). The training period was 5 weeks, 2 days per week, for a total of 10 sessions. CC training group performed a strength circuit training (4 exercises: bench press, front pull down, back squat and femoral curl) executing 4 x 8 reps 60% 1RM in the first 5 sessions and 65% 1RM in the last 5 sessions, followed by HIIT (4 x 4 min 90-95% maximal aerobic power (VO2max) with 3 min of recovery at 40-50% VO2max) on a cycle ergometer. CS training group performed the same HIIT combined with whole body electrostimulation (WiemsPro, USA). All participants were evaluated before initiation of the training protocol (PRE), after 10 training sessions (POST) and after 3 weeks of detraining (DET). Testing included Wingate for maximal power, 20 meters acceleration test for speed and blood test to measure biochemical parameters (BUN, CK, LDH, GOT and GTP). Statistical analysis was performed using two-way ANOVA with repeated measures.

RESULTS

Both groups increased BUN in POST (CS 12.50±2.93 vs 18.00±3.67 $p<0.05$; CC 11.27±1.78 mg/dL vs 15.57±2.23 mg/dL $p<0.05$). LDH increased in CS in POST (203.25±26.95 UI/L vs 242.75±45.42 UI/L $p<0.05$) and DET (203.25±26.95 UI/L vs 245.88±21.65 UI/L $p<0.01$). However, CC only increased LDH in DET (185.29±28.95 UI/L vs 261.71±39.58 UI/L). No differences were found in the rest of the parameters.

CONCLUSIONS

Concurrent simultaneous training is not effective in improving anaerobic performance. In addition, this type of training induces more muscular damage than concurrent consecutive training.

Funding

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References.

Filipovic, A., Grau, M., Kleinöder, H., Zimmer, P., Hollmann, W., & Bloch, W. (2016). Effects of a whole-body electrostimulation program on strength, sprinting, jumping, and kicking capacity in elite soccer players. *Journal of sports science & medicine*, *15*(4), 639. DOI: 10.1519/JSC.0b013e3181d43790

Moreau, D., Dubots, P., Boggio, V., Guilland, J. C., & Cometti, G. (1995). Effects of electromyostimulation and strength training on muscle soreness, muscle damage and sympathetic activation. *Journal of sports sciences*, *13*(2), 95-100. DOI: 10.1080/02640419508732216

Stöllberger, C., & Finsterer, J. (2018). Side effects of whole-body electro-myo-stimulation. *Wiener Medizinische Wochenschrift*, 1-8. DOI: 10.1007/s10354-018-0655-x

Wilson, J. M., Marin, P. J., Rhea, M. R., Wilson, S. M., Loenneke, J. P., & Anderson, J. C. (2012). Concurrent training: a meta-analysis examining interference of aerobic and resistance exercises. *The Journal of Strength & Conditioning Research*, *26*(8), 2293-2307. DOI: 10.1519/JSC.0b013e31823a3e2d

O27. Effects of force-vector manipulation on physical profiles of young football players

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INTRODUCTION

Football is characterised by short-term high-intensity triaxial activities that require optimised neuromuscular capacity (Abade, Goncalves, Leite, & Sampaio, 2014). Thus, training routines must consider the direction of force application when specific strength exercises are performed. This study aimed to explore the effects of including horizontal and vertical force-vector exercises in a 20-week in-season general strength training program on physical profiles of young football players.

METHODS

Twenty-four elite male under-17 soccer players with no experience in strength training participated in the study and were randomly assigned to a Control, Vertical or Horizontal strength training group. Control group performed a general strength training program that included free weights, eccentric-overload and body weight exercises once a week during 20-weeks of in-season. Vertical and Horizontal groups' routines additionally included a specific exercise performed in a vertical (back half squat) or horizontal vector (barbell hip thrust), respectively. Players' physical profile assessment included vertical jump, horizontal jump and linear sprint capacity. Training loads progressively increased from 3 sets of 8-10RM in week one to 3 sets of 4-6 RM in the last week, with exercises being performed at maximum concentric velocity.

RESULTS

Comparatively to control, Vertical group showed improvements on vertical performance with small effect (SJ, likely of 4.4%±3.8% and CMJ, possibly of 4.0%±4.1%) and horizontal performance with moderate effect (HJ, most likely of 7.5%±2.5%; 10-m, likely -1.5%; ±1.7% and 20-m, most likely -3.4; ±1.4% decrease in time). Horizontal group showed unclear results in vertical performance. However, notorious large improvements were observed in HJ (11.5% ±4.6%), 10-m and 20-m (-3.0%±1.8% and -3.5; ±1.1% decrease in time, respectively).

CONCLUSIONS

This investigation shows that adding vertical and horizontal force production exercises to in-season strength routines enhances both jumping and sprinting capacity. However, when compared to the effects of back squat on jump capacity, barbell hip-thrust improves horizontal jump and sprint capacity to a greater extent. This study reinforces the importance of performing horizontal vector exercises as well as accepted strategies to develop neuromuscular function of hip extensors, prevent injuries and enhance football players performance, even when performed only once a week during in-season.

References.

Abade, E. A., Goncalves, B. V., Leite, N. M., & Sampaio, J. E. (2014). Time-motion and physiological profile of football training sessions performed by under-15, under-17 and under-19 elite Portuguese players. *Int J Sports Physiol Perform, 9*(3), 463-470. doi: 10.1123/ijspp.2013-0120

O28. Lower Body Power performance in Elite and Regional Portuguese Surfers

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INTRODUCTION

High-level surfing is a series of compression and extension movements where the surfer produces and arrests force through the riding of a wave. Furthermore, with the increase execution of aerial surfing, the ability to produce greater lower-body explosive power may enable surfers to launch themselves off the lip of the wave into a higher height (Tran et al., 2015). When competing, surfers are judged on their ability to perform radical maneuvers in the most critical section while riding the wave (Mendez-Villanueva & Bishop, 2005), to accomplish this lower-body strength and power may be crucial . Despite some knowledge about the Lower Body Power (LBP) of surfers, there is limited published research examining the influence of LBP and performance level.

METHODS

Thirty-seven elite junior athletes of the national surfing team (15.22years; 53.55kg; 162.3cm) and fifteen regional competitors (14.93years; 52,46kg; 160.63cm) were assessed through the Squat and Countermovement Jump to measure LBP. The T test for independent samples was applied, to compare LBP between both groups, using the SPSS software (version 25.0) for a statistical significance at 0.05.

RESULTS

Means and standard deviations between elite and regional surfers are showed in Table 1. When tested the lower body power, statistically relevant differences were found for both Jumps on Jump height (JH), initial velocity (IV) and flying time (FT). JH, (p=0.013); IV, (p=0.031); FT, (p=0.015) for SJ and JH, (p=0.045); IV, (p=0.041); FT, (p=0.041) for CMJ respectively. When comparing the values of the SJ with the CMJ, there was no increment of twenty percent in any of the indicators.

Table 1

Lower Body Power Performance (mean ± standard deviation) between Elite and Regional Surfers

		Squat Jump	Countermovement Jump
Flying Time	Elite (N= 37)	0.47 ± 0.04*	0.48 ± 0.042*
	Regional (N= 15)	0.44 ± 0.03*	0.45 ± 0.043*
Jump Height	Elite (N= 37)	26.92 ± 4.71*	28.58 ± 4.99*
	Regional (N= 15)	23.94 ± 3.22*	25.47 ± 4.77*
Power	Elite (N= 37)	603.22 ± 158.15	626.98 ± 161.87
	Regional (N= 15)	557.10 ± 108.81	573.71 ± 120.25
Initial Velocity	Elite (N= 37)	2.29 ± 0.2*	2.36 ± 0.21*
	Regional (N= 15)	2.16 ± 0.15*	2.23 ± 0.21*

**: Significantly different as p <0.05*

CONCLUSIONS

Proper Lower Body Power is a key component to perform surfing maneuvers and higher-level surfers tend to have higher Lower Body Power. This relationship is a performance level differentiating factor in under 18 athletes regarding flying time, initial velocity and jump height. None of the groups reach a difference of at least twenty percent regarding any indicator between SJ and CMJ performance.

Acknowledgments

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References.

Mendez-Villanueva, A., & Bishop, D. (2005). Physiological aspects of surfboard riding performance. *Sports Medicine*, *35*(1), 55–70. https://doi.org/10.2165/00007256-200535010-00005

Tran, T. T., Lundgren, L., Secomb, J., Farley, O. R. L., Haff, G. G., Seitz, L. B., … Sheppard, J. M. (2015). Comparison of physical capacities between nonselected and selected elite male competitive surfers for the national junior team. *International Journal of Sports Physiology and Performance*, *10*(2), 178–182. https://doi.org/10.1123/ijspp.2014-0222

O29. Elite Orienteering athletes have a better Useful Field of Vision than non-elite

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INTRODUCTION

Ball and Owsley (1993) UFOV Test is a computer-based screen test that allows to determinate the speed of visual processing under ever-increasing task requirements.

Allahyari et al. (2007), when comparing subjects involved and not involved in accidents on a simulated driving session, showed that in the peripheral tasks with divided and selective attention conditions, there were significant differences between the two groups. According to the authors, the results emphasise the important role of peripheral vision on safety and driving performance. In sports, in another complex situation like driving, UFOV has also shown to be a parameter that separates experts from non-experts, namely at visual search strategies (parallel and sequential, respectively).

In this study, we wanted to verify if assessment of elite and non-elite orienteering athletes' UFOV would also reveal significant differences between both groups, since orienteering requires a good capacity of dividing attention between several central and peripheral stimuli, such as maps, terrain clues and trail obstacles (slippery slopes, loose stones, etc.).

METHODS

Twenty-eight adults (18 men and 10 women, 31,8±12,01 years-old;), all orienteering practitioners (12 of elite level, 16 non-elite) were tested on UFOV Test, just before an orienteering training session.

RESULTS

Elite athletes had better UFOV results (the less milliseconds – msec – the best) than non-elite athletes (table 1). Those differences reached statistical significance on divided attention (UFOV2), selective attention (UFOV3) and, overall, on general UFOV result (UFOVTOTAL), as it can be seen by the Mann-Whitney Test results on table 2.

Table 1.

Mean values and sd of Elite and Non-elite' UFOV' results

	Elite/Non-Elite	N	Mean (msec)	sd (msec)
UFOV1	Non-Elite	16	19,2062	5,51331
	Elite	12	16,7000	,00000
UFOV2	Non-Elite	16	59,6438	70,98870
	Elite	12	18,9250	5,91979
UFOV3	Non-Elite	16	132,7375	77,03970
	Elite	12	60,5917	30,32828
UFOVTOTAL	Non-Elite	16	211,5875	143,38510
	Elite	12	96,2167	34,68235

Table 2.

Comparison between Elite and Non-Elite Orienteering Athletes on UFOV (Mann-Whitney Test)

	UFOV1	UFOV2	UFOV3	UFOVTOTAL
U de Mann-Whitney	72,000	35,500	30,000	26,000
Z	-1,830	-3,003	-3,067	-3,254
Sig. (bilateral)	,067	,003	,002	,001

CONCLUSIONS

Elite orienteering athletes revealed to be better on UFOV Test than non-athletes. This result gives support to previous studies that showed higher peripheral vision and divided attention' capacities of expert drivers and sport players, compared with beginners or less experienced ones. Thus, to be an expert or an elite player seems to imply, beyond motor, cognitive, technical and tactical aspects, further perceptual features, such as peripheral vision use and divided and selective attention, as revealed in this study.

References.

Allahyari, T., Nasl Saraji, G., Adl, J., Hosseini, M., Younesian, M., & Iravani, M. (2007). Useful field of view and risk of accident in simulated car driving. *Iranian Journal of Environmental Health Science & Engineering, 4*(2), 133-138.

Ball, K., & Owsley, C. (1993). The useful field of view test: A new technique for evaluating age-related declines in visual function. Journal of the American Optometric Association, 64, 71-79.

O30. Analysis of Deceleration Profiles in Multi-Directional Sport Athletes in Comparison with Resistance Trained Athletes

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INTRODUCTION

The deceleration ability of an athletes is a critical performance parameter in every multi-directional sport: Deceleration is included in every change of direction (COD) and the act of reducing velocity as quickly as possible with appropriate running mechanics is essential for high short sprint performance (Jeffreys, 2013). Nevertheless, the analysis of an athletes' deceleration ability has not been investigated so far, especially when the deceleration run is excluded from any COD.

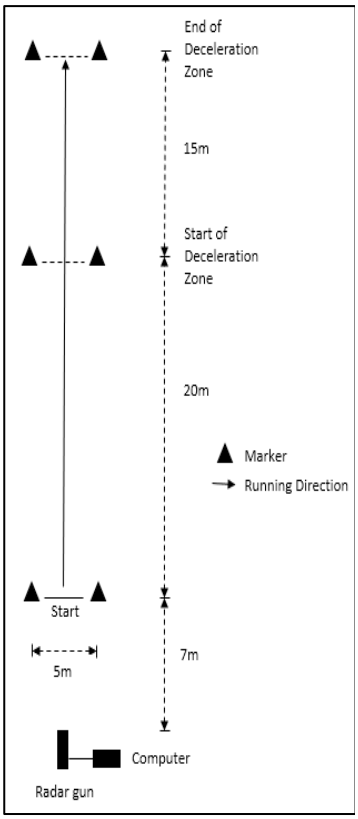


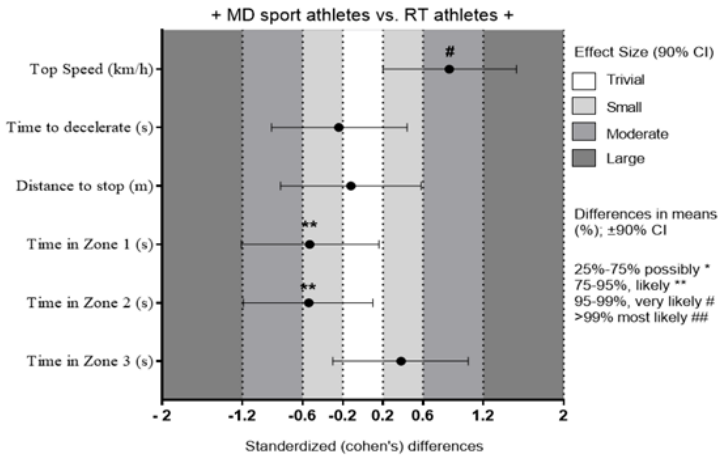
Figure 1. A plan view on the experimental set-up for the deceleration task

METHODS

The purpose of this cross-sectional study was to analyse the deceleration profiles in multi-directional (MD) sport athletes in comparison with resistance trained (RT) athletes. Twenty-six trained male athletes were assigned in a MD (n = 18) and RT cohort (n = 8) according to their sport background and performed a 20m sprint followed by a maximal deceleration to standstill within a 15m deceleration zone. Sprint performance data were derived from speed-time relationships measured with a radar gun and were compared using magnitude-based inferences.

RESULTS

The results presented a tendency of better deceleration-related values in all variables in MD athletes compared to RT athletes. MD athletes showed likely lower times spent in deceleration zone 1 (ES = -0.53, 90% CI = -1.21; 0.16), zone 2 (ES = -0.54, 90% CI = -1.19; 0.10) and a very likely higher top speed (ES = 0.86, 90% CI = 0.20; 1.53) before entering the deceleration run in comparison to RT athletes.



CONCLUSION

These findings emphasise the importance of an athletes' deceleration profile and accompanied physical abilities during deceleration. Overall, MD athletes presented a more proficient deceleration profile to safely and abruptly decelerate than RT athletes. Deceleration was made for the first time quantifiable and it seem that a maximal deceleration run resembles a polynomial speed-time slope pattern. From a practical perspective, condition programs for MD athletes should incorporate more deceleration-oriented exercises and effectively monitor an athletes' training adaption with the usage of the methodology explained here.

References.

Jeffreys, I. (Ed.). (2013). *Developing speed.* Human Kinetics.

O31. Linking action and cognition through variability: short-memory, kinematic and physiological regularity in different running environments of training

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INTRODUCTION

Physical activity affects brain plasticity, influencing cognition and well-being (Mandolesi et al., 2018), but variability holds it all together (Woollett & Maguire, 2011). Variability, thus, became a hot topic in health and sports sciences, although the relationship between action regulation and performance outcomes has not been fully explained. This study aimed to identify how training routes with different degrees of familiarity and sensorimotor stimuli affects the regularity in speed, heart rate (HR), and short-memory.

METHODS

Twelve amateur runners accomplished three 45-min running trials in their usual and unusual routes, and in a standard 400-m track wearing GPS and a HR belt. We calculated sample entropy (SampEn) over speed and HR, and HR complexity index (CI) from multiscale entropy. Routes altitude was also assessed and the coefficient of variation (CV) was calculated. Pre and post each trial, participants performed the Backward Digit Span task for cognitive assessment. Statistics were performed through magnitude-based inferences and precision of estimation. SampEn and CI across routes were compared through post-only crossover spreadsheet and possible decrease/increase effects on the cognitive measures were analysed with pre-post crossover trial.

RESULTS

Altitude mean CV was low for usual and unusual (3.3% ± 1.4% and 4.6% ± 2.7%, respectively), and negligible for 400 m (0.2%). Usual routes increased (moderate effect) speed SampEn, but decreased HR CI when compared to unusual. Thus, contexts of practice may contribute to changes predictability from single to the multiple timescales, which are part of the body complexity (Costa, Goldberger, & Peng, 2002).

We found higher entropies for the 400 m when compared to usual and unusual. This may be related to the monotony, thus, higher degree of unpredictability affects familiarity over a task, such as continuous running in flat and repetitive ground (Scerbo, 1998). Variability in the speed control can be influenced by the cognitive workload being experienced as an attempt to increase arousal levels (Fuller, 2005). We found strong effects of overall short-memory performance for usual and unusual, indicating a positive relation to attentional control mechanisms (St Clair-Thompson, 2010). It seemed ineffective at the 400 m task, once participants showed moderate chances (66%) in decreasing short-memory test performance.

CONCLUSIONS

Considering time structuring issues as habituation of training routes brings novel meaning and important information to the long-term process of training. HR variability is key for load control and prescription, and especially useful for its accessibility and feedback.

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References.

Costa, M., Goldberger, A. L., & Peng, C. K. (2002). Multiscale entropy analysis of complex physiologic time series. *Physical Review Letters, 89*(6), 068102. doi: 10.1103/PhysRevLett.89.068102

Fuller, R. (2005). Towards a general theory of driver behaviour. *Accident Analysis and Prevention, 37*(3), 461-472. doi: 10.1016/j.aap.2004.11.003

Mandolesi, L., Polverino, A., Montuori, S., Foti, F., Ferraioli, G., Sorrentino, P., & Sorrentino, G. (2018). Effects of Physical Exercise on Cognitive Functioning and Wellbeing: Biological and Psychological Benefits. *Frontiers in Psychology, 9*, 509. doi: 10.3389/fpsyg.2018.00509

Scerbo, M. W. (1998). What's so boring about vigilance? *Viewing psychology as a whole: The integrative science of William N. Dember*. (pp. 145-166). Washington, DC, US: American Psychological Association.

St Clair-Thompson, H. L. (2010). Backwards digit recall: A measure of short-term memory or working memory? *European Journal of Cognitive Psychology, 22*(2), 286-296. doi: 10.1080/09541440902771299

Woollett, K., & Maguire, E. A. (2011). Acquiring "the Knowledge" of London's layout drives structural brain changes. *Curr Biol, 21*(24), 2109-2114. doi: 10.1016/j.cub.2011.11.018

O32. Individual sleep and nocturnal heart rate variability profiles in elite female soccer players during an international tournament

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INTRODUCTION

Individual sleep and heart rate variability (HRV) responses may underpin how athletes tolerate training and match loads (Buchheit, 2014; Nedelec, Dawson, & Dupont, 2018). Moreover, fatigued athletes may get overlooked when evaluating team-averaged data reports (Halson, 2014). Therefore, this study aimed to describe the sleeping quantity and nocturnal HRV profiles of elite female soccer players during an international tournament.

METHODS

Twenty elite female soccer players (aged 25.2±3.1 years) wore wrist actigraph units and heart rate monitors during night-sleep throughout 9 consecutive days (6 training days [start ranged between 11:00AM–17:30 PM], 2 day-time matches [both started at 3:00 PM] and 1 night-time match [started at 6:00 PM]) of an international tournament. Training load was quantified by session rating of perceived exertion (sRPE) and total distance covered (TDist).

RESULTS

The duration of sessions ranged between training days (34±11 to 71±20 min) and between matches (63±27 to 79±23 min). sRPE and TDist during training ranged between 131.3±101.9 to 360.1±186.0 AU and 2201±768 to 4284±102 m, respectively. During matches, sRPE and TDist ranged between 503.5±275.4 to 601.7±218.5 AU and 7012±2343 to 7746±2179 m, respectively. As a group, players accumulated adequate sleep (³ 7h), i.e., total sleep time ranged between 7:41±0:44 to 8:26±0:41 hours during all training-days and both day-time matches of the tournament. However, a decreased duration of total sleep time (1 hour; $p<0.001$) was observed after the night-time match (6:49±1:00 hours) compared with day-time matches (7:49±0:56 hours). Individually, eight players slept less than 7 hours (at least 2 out of 9 days) throughout the tournament (independently of being a training or match day). In fact, these same players presented the highest coefficient of variation for total sleep time (11.1 to 18.7%) compared with the other players (3.0 to 9.2%). As a group, nocturnal log-transformed HRV (lnRMSSD) was not affected during the tournament (lnRMSSD ranged between 4.19±0.88 to 4.54±0.42 ln[ms]; $p>0.05$). Nevertheless, two players presented higher coefficient of variation (11.4 to 11.5%) compared with the other athletes (3.0 to 9.0%). Interestingly, only one player presented high coefficient of variation for both TST and HRV (12.5% and 11.4%, respectively) during the tournament.

CONCLUSIONS

The high intra-individual variability in sleep quantity and nocturnal HRV indicates the need for individualised sleep education strategies and interventions to promote appropriate sleep, recovery and load in elite female soccer players.

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References.

Buchheit, M. (2014). Monitoring training status with HR measures: do all roads lead to Rome? *Front Physiol, 5*, 73. doi:10.3389/fphys.2014.00073

Halson, S. L. (2014). Sleep in elite athletes and nutritional interventions to enhance sleep. *Sports Med, 44 Suppl 1*, S13-23. doi:10.1007/s40279-014-0147-0

Nedelec, M., Dawson, B., & Dupont, G. (2018). Influence of Night Soccer Matches on Sleep in Elite Players. *J Strength Cond Res*. doi:10.1519/JSC.0000000000002906

O33. Variations of internal load between normal and congested weeks in elite roller hockey players

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INTRODUCTION

Monitoring the training load in team sports allows to control the impact of training stimulus on the players and objectively quantify the individual responses. This process is increasingly used with the aim of improving the athletes' and the team's performance and ensure the adjusted stimulus to the player's needs. Among the different variables, like internal load, fitness and wellness seem to play a major role. There are many works conducted in football or basketball, however no study, in the best of our knowledge, characterised the training load in roller hockey, which is an acyclic sport that requires intermittent exercises with short actions of different intensities. Based on that, the aim of this study was to analyse the variations of internal load during regular and congested weeks in professional hockey players and to analyse the variations between training days within weeks.

METHODS

Ten professional roller hockey players from the Portuguese premier league participated in this study (29.3 ± 4.8 years; 178.3 ± 6.4 cm; 78.0 ± 3.9 kg). The 10-point scale of effort was used every single training to monitor the exertion perception of players and the rates were multiplied by the time of training session in minutes to provide an indicator of internal training load. The weeks were classified in regular (matches interspaced by more than 4 days) and congested (matches interspaced by 3 days or less). The days of the week were classified based on the distance to the next match, as for example one day before match (MD-1). The within-days variations and comparisons between regular and congested weeks were tested by using the standardised differences of effect size (ES) with a 90% CI. For the interpretation of Es was used: <0.2 = trivial; 0.2–0.6 = small; 0.6–1.2 = moderate; >1.2 = large. Qualitative probabilistic mechanistic inferences about the true effects were made using these probabilities. The scale for qualitative probabilities was as follows: 25–75% = possible; 75–95% = likely; 95–99% = very likely; >99% = almost certain.

RESULTS

While comparing normal weeks to the congested weeks, the evidence shows that on day MD-1, volume [2.52 (2.31; 2.73)] had most likely large increases. On day MD-2 it was revealed a most likely large decrease in the internal load [- 4.22 (-4.75; - 3.68)] in normal weeks. Also on MD-3 it was found a most likely large decrease on internal load [- 8.61 (-10.47;-6.76)] in normal weeks. By analysing the standardised differences it was shown in the congested weeks a very likely large decrease in the Internal Load on MD-3 vs MD-2 (90% IC; ES: - 2.24 [- 3.48; - 1.00]). Normal weeks had greater internal loads than regular weeks.

CONCLUSIONS

Usually, MD-3 was the day with higher load but on congested weeks the higher load was imposed on MD-2. Coaches should periodize congested and normal weeks in different ways and consider to adjust faster recovery strategies to optimize the training sessions in congested weeks.

O34. The reproducibility of salivary steroid hormone responses to an exercise stress test to highlight hormonal dysfunction during overreaching

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INTRODUCTION

Athletes overload the body physically by intensifying training stress. This can lead to a physical performance decrement for a limited period but following sufficient recovery (days to weeks) a "supercompensatory" effect may occur with the athlete exhibiting an enhanced performance when compared to baseline levels (termed "functional overreaching" (FOR)) (Meeusen et al., 2013). Recognising FOR is therefore important for the athletic community. Blunted exercise-induced salivary cortisol (by 72%) and testosterone (by ~34%) responses to a short duration (30 min), high-intensity cycle bout (the 55/80) have been reported during FOR (Hough et al., 2013, Hough et al., 2015). The 55/80 has been prematurely suggested as a tool to survey and highlight hormonal alteration during FOR (Hough et al., 2015). To support the use of this tool to highlight hormonal alterations during FOR the reproducibility of salivary cortisol and testosterone responses to the 55/80 must be confirmed.

METHODS

A repeated measures, cross-over design saw participants (n = 22) completed 3 main experimental trials. During each experimental trial a 55/80 bout (30 min, alternating 1 min at 55% maximum workrate (W_{max}) and 4 min at 80% W_{max}) was completed. Pre-exercise urine osmolality and stress questionnaire responses were measured with saliva samples collected pre, post, and 30 min post the 55/80 for cortisol and testosterone assessment.

RESULTS

Euhydration was confirmed and well-being stable in all trials ($p > 0.05$). Salivary cortisol and testosterone 55/80 responses were similar over the 3 trial days ($p > 0.05$). Standard Error Measurements (SEM) of 2.52 $nmol.L^{-1}$ (cortisol) and 102 $pmol.L^{-1}$ (testosterone) (pre-exercise) and 4.11 $nmol.L^{-1}$ (cortisol) and 180 $pmol.L^{-1}$ (testosterone) (post-exercise) were found.

CONCLUSIONS

The 55/80 induces robust, reproducible elevations of salivary cortisol and testosterone supporting it as a surveillance tool of salivary hormones during intensified training periods. The variability for salivary cortisol (~30%) and testosterone concentrations (~17%) reported needs to be accounted for but is lower than reported exercise-induced adaptations in these hormones following intensified training periods.

References.

Meeusen, R., Duclos, M., Forster, C., Fry, A., Gleeson, M., Nieman, D., Urhausen, A. (2013) Prevention, diagnosis, and treatment of the overtraining syndrome: Joint consensus statement of the European College of Sport Science and the American College of Sports Medicine. *Medicine & Science in Sports & Exercise*; Jan; 45(1): 186-205.

Hough, J., Corney, R., Kouris, A., Gleeson, M. (2013) Salivary cortisol and testosterone responses to high-intensity cycling before and after an 11-day intensified training period. *Journal of Sports Science*; 31 (14): 1614-1623.

Hough, J., Robertson, C., Gleeson, M. (2015) A 10-day Training Camp Blunts Exercise-Induced Salivary Testosterone in Elite Level Triathletes. *International Journal of Sports Physiology and Performance*; Oct; 10(7): 935-938.

O35. In-season training load quantification of one-, two- and three-game week schedules in a top European professional soccer team

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INTRODUCTION

Top European soccer teams that play in UEFA competitions often participate in one, two- or three-games per week. Therefore, it is necessary to ensure optimal match-day performance and full recovery. The aim of this study was to quantify internal and external TLs within five microcycles: M1 and M2 – one-game weeks; M3 and M4 – two-game weeks; M5 – three-game week).

METHODS

Thirteen elite soccer players participated in this study. A global positioning system (GPS) was used to measure the total distance covered and distances of different exercise training zones (1-5), the session ratings of perceived exertion (s-RPE) scores and the amount of creatine kinase (CK) created during daily training sessions for the 2015-2016 in-season period. The data were analysed with respect to the number of days prior to a given match.

RESULTS

The main results indicate a significant difference in training intensity for zone 1 between M2 and M4 (4010.2±103.5 and 4507.6±133.0 m, respectively); a significant difference in training intensity for zone 3 between M1 and M5 (686.1±42.8 and 801.2±61.2 m, respectively); a significant difference in the duration of the training sessions and matches between M2 and M5 (69.2±2.1 and 79.6±2.3) and M3 and M5 (69.7±1.0 and 79.6±2.3); and finally, there was a significant difference in CK between M3 and M2 (325.5±155.0 and 194.4±48.9). Moreover, there was a significant decrease in TL in the last day prior to a match, for all microcycles and all variables. There was no significant difference with respect to s-RPE.

CONCLUSIONS

This study provides the first report of daily external and internal TLs and weekly accumulated load (training sessions and match demands) during one, two, and three-game week schedules in a group of elite soccer players. Expected significant differences are found in daily and accumulated loads for within- and between-game schedules. A similar pattern is exhibited for one- and two-game week microcycles regarding the day before the match, which exhibits a decrease in all variables. Despite the different number of games played per week, TL remain similar between microcycles for zone 2 and 5, plus s-RPE.

Acknowledgments

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O36. Prescription and monitoring of internal and external load in SSG's: A comparison between the continuous method and fractional method

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INTRODUCTION

The manipulation of exercise intensity in team sports constraints players and teams' technical, physical, and tactical behaviour (Fanchini et al., 2011). According to that, the manipulation of the duration and the number of repetitions (i.e., using a continuous or a fractional method) of an exercise should constraint the overall exercise intensity and consequently its physical, technical and tactical demands. Thus, the aim of this study was to identify the effects of the use of a continuous or fractional method in external and internal load of players in football.

METHODS

Twelve male soccer players at the national level were tested in 4 different game forms (1x24', 2x12', 4x6', 6x4') for the same exercise GK + 5 x 5 + Gr in a field of 30mx20m. A repeated measures ANOVA were used for comparison between game forms. The level of significance was set at $p<0.05$. All statistical analyses were computed using SPSS 21.0.

RESULTS

Results revealed that total distance, explosive distance and total accelerations change between game forms ($F(3, 6) = 44{,}4$; $p < 0{,}001$; $\eta 2 \geq 0.14$), ($F(3,6) = 12{,}7$); $p < 0{,}001$; $\eta 2 \geq 0{,}14$), ($F(3, 6) = 61{,}8$; $p < 0{,}001$; $\eta 2 \geq 0{,}06$) respectively. Changes in the game forms did not affect max speed ($F(3, 6) = 1{,}02$; $p \geq 0.05$; $\eta 2 \leq 0{,}06$), avr HR ($F(3, 6) = 0{,}47$; $p \geq 0.05$; $\eta 2 \geq 0{,}06$) and max HR ($F(3, 6) = 0{,}22$; $p \geq 0.05$; $\eta 2 \leq 0{,}06$).

CONCLUSIONS

The results show that the manipulation of the duration and the number of repetitions, using a continuous or a fractional method constraints external load of players. It means that coaches can constraint the time or the number of repetitions of the exercise according to the external load demands required for the training session.

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BID Santander Totta

References.

Fanchini, M., Azzalin, A., Castagna, C., Schena, F., McCall, A., & Impellizzeri, F. M. (2011). Effect of bout duration on exercise intensity and technical performance of small-sided games in soccer. *J Strength Cond Res, 25*(2), 453-458. doi:10.1519/JSC.0b013e3181c1f8a2

P47. Dissociation Between Backward & Forward Dynamic Balance

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INTRODUCTION

Body Coordination Test for Children (KTK), can be used both in regular and special physical education to diagnose children with problems, verify the development and acquisition of global motor skills (Gorla, Araújo, Luiz Rodrigues & Rodrigues, 2015), in children aged between 5 and 14 years (Araújo, 2014). The walking backwards subtest is performed on a balance beam of different widths and emphasises the motor capacity of dynamic balance. However, the question whether performance in motor actions is affected by walking orientation on the beam is yet to be known. Thus, the aim of this study was to analyse the association between backwards and forward walking on the beam.

METHODS

Twenty nine young soccer players aged 11,7±1,09 (9,7-13,7) composed the sample. Each one of the participants performed the Backwards Walking subtest in both orientations (forward and backwards). In order to reduce learning effects, half of the participants were instructed to first perform the test walking forward and the other half walking backwards.

Wilcoxon test was used on inferential analysis for repeated measures. The effect size was calculated by dividing the z value by the square root of N (Fritz, Morris & Richler, 2012). Spearman correlation was used to analyse performances association between different tests. Significance level was kept at 5%.

RESULTS

Independently of starting walking backwards or forward on the beam, a better dynamic balance is obtained walking forward (MQforward=68.2±4.87 vs. MQbackward=53.0±10.28; $p<0.001$; r=1,34). In order to assess the association between performances in the two walking orientations, a Spearman correlation was performed, which, surprisingly, showed to be non significant (ro=-0.014; n.s.). In fact, we expected subjects who would perform better walking backwards would also perform better on walking forward, which was not the case. Chronological age was also not associated with performance for both forward (ro =-0.23, n.s.) and backwards walking (ro =0.01; n.s.).

CONCLUSIONS

Balance is significantly better during forward walking orientation on the beam. Walking forward performance is not associated with walking backwards performance.

This lack of association between walking orientations on the beam should emphasise the fact that the quality of performance in one orientation will not predict the performance on the opposite orientation. Hence, it would be important to share this information with the Portuguese National Assessment Management Team (IAVE) responsible for the external assessment tests in Schools.

References

Gorla, J. I. & Araújo, P.F. (2014). *Avaliação Motora em Educação Física: teste KTK* (3rd Ed.). São Paulo: Phorte Editora.

Irineu Gorla, José & Araújo, P. F., & Luiz Rodrigues, J. & Rodrigues, V. (2015). O teste KTK em estudos da coordenação motora. *Conexões*, 1, 29-38. 10.20396/conex.v1i1.8640804.

Fritz, C. O., Morris, P. E., & Richler, J. J. (2012). Effect size estimates: Current use, calculations, and interpretation. *Journal of Experimental Psychology: General*, 141(1), 2-18. http://dx.doi.org/10.1037/a0024338

P48. Tethered swimming force and swimming velocity of Para swimmers

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INTRODUCTION

Reference values of force and velocity for para swimming Portuguese national team are unknown, hindering its comparison with able-bodied swimmers and inhibiting the preparation of the para swimmers to high-level international ranking placements.

Although tethered para swimming force was already measured by Lee, Sanders, and Payton (2014), their purpose was to contribute to an improvement of para swimmers classification system. The aim of the current study was to define force and velocity references for para swimmers and compare it to able-bodied swimmers of the same competitive level.

METHODS

Eleven para swimmers of the national Portuguese para swimming team (22.00±4.96 years, 61.65±12.44kg and 172.64±12.87cm; diverse disabilities), seven junior (16.50±1.10 years, 64.27±12.00kg and 174.00±10.18cm) and eight senior (21.13±3.60 years, 69.88±7.77kg and 176.75±7.32cm) swimmers of the national Portuguese swimming team performed a 30s all-out tethered swimming test (Globus, Italy) and a 25 m all-out swimming test attached to an electromechanical speedometer (Lima, 2006), using their preferred technique, while being videotaped. Maximum and mean force and velocity values, fatigue indexes and number of stroke cycles were registered at 50Hz. Groups were compared using an One-Way ANOVA.

RESULTS

Mean force of para swimmers (69.05±28.91) presented lower values than junior (108.28±31.38) and senior swimmers (115.21±29.01). The number of stroke cycles needed to complete the test was higher for para swimmers (13.55±5.13) than junior (8.86±1.60) and senior swimmers (7.07±1.13).

CONCLUSIONS

Values registered in the current study must be considered carefully, once para swimmers' group was very heterogeneous concerning disabilities. When para swimmers were compared with able-bodied swimmers, larger differences than the pointed ones were expected, suggesting that para swimmers should be separated by functional classification or by disability and not as a whole group.

References

Lee, C. J., Sanders, R. H., & Payton, C. (2014). Changes in force production and stroke parameters of trained able-bodied and unilateral arm-amputee female swimmers during a 30 s tethered front-crawl swim. *Journal of Sports Sciences, 2014*(2014). doi:10.1080/02640414.2014.915420

Lima, A. B. (2006). Cocepção, desenvolvimento de resultados e eficiência no treino da técnica em natação. PhD Thesis. FCDEF-UP, Porto.

P49. Effect of different visual constraints on standing long jump' intra-variability

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INTRODUCTION

Adolph, Cole, and Vereijken (2015) give a very sharp picture of the different meanings and features of intraindividual variability in the development of motor skills in childhood. Nevertheless, and despite researchers' long-term consideration of intraindividual variability as a trace of motor development, when dealing and presenting normative data, this intraindividual variability and dispersion on quantitative results remains particularly hidden and overlooked. In this study, we aimed to verify if different visual constraints would have different effects of upon standing long jump' variability of second grade children.

METHODS

Thirty-four children (18 girls and 16 boys, 7.5±0.6 years-old; 124.9±5.6 cm of height; 25.8±3.81 kg of body mass), jumped for horizontal distance from a standing position, with two different visual constraints (adapted swimming goggles with restrictions for peripheral or central vision).

RESULTS

Only on the condition of Peripheral Vision – PV - unique availability (central vision occluded) a significant (negative) correlation was found between mean jumping result (out of 3 trials) and coefficient of variation of those 3 jumps ($r = -0.341$, $p = 0.049$). Besides, tables 1 and 2 show us that these children were significantly more variable on their jumps when they could not use Peripheral Vision.

Table 1
Mean values and sd of PV and CV' coefficient of variation

	N	Média (%)	sd (%)
coefficient of variation PV	34	4,32	2,74
coefficient of variation PV	34	7,23	5,14

Table 2
Differences between PV and CV' coefficient of variation (Wilcoxon Test)

Z	-3,252
Sig. (bilateral)	,001

CONCLUSIONS

When jumping on peripheral vision condition, the higher the mean jumping performance the lower the coefficient of correlation. Besides, absence of peripheral vision availability led to significantly higher intra-variability (higher coefficient of variation), when compared with the situation of absence of central vision. This means that, when peripheral vision is restricted, jumping performance becomes less consistent, revealing more adverse effects.

References

Adolph, K. E., Cole, W. G., & Vereijken, B. (2015). Intra-individual variability in the development of motor skills in childhood. In M. Diehl, K. Hooker, & M. Sliwinski (Eds.), *Handbook of Intra-individual Variability Across the Lifespan*. New York: Routledge/Taylor & Francis Group, pp. 59-83.

P50. Functional Movement Screen®: Comparative study between gender

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INTRODUCTION

The screening of functional movement patterns in athletes may contribute to the quality of exercise prescription and sports performance (Warren, Lininger, Chimera & Smith, 2018). Functional Movement Screen® (FMS®) has been used by strength and conditioning professionals (Marques, Medeiros, Stigger, Nakamura & Baroni, 2017) as it enables to identify movement dysfunction in those at risk, but not currently experiencing signs or symptoms of musculoskeletal injury (Cook, Burton & Hoogenboom, 2014). However, the specific differences of functional movement patterns between gender remain unclear (Magyari et al., 2017). Therefore, the aim of this cross-sectional study was to evaluate and compare functional movement patterns between gender using FMS®.

METHODS

One hundred ninety-one subjects capable of performing the seven-test battery FMS® were included in this study. One hundred thirty-three were male (22.22 ± 7.9 years old) and fifty-eight were female (19.12 ± 5.1 years old). Subjects performed each movement (Deep Squat, Hurdle Step, Inline Lunge, Shoulder Mobility, Active Straight Leg Raise, Trunk Push Up, Rotary Stability) three times, and they were accessed in a scale of 0 to 3. FMS® composite score and individual test scores were considered for analysis, and comparisons between gender were performed.

RESULTS

Concerning Total Score, no significant differences were found between gender (male: 14.65 ± 2.152 points; female: 14.90 ± 2.337 points ; $p = .848$). Female subjects scored significantly lower on Trunk Push Up ($p = .000$, $d = -1.48$). Male subjects scored significantly lower on Right Shoulder Mobility ($p = .049$, $d = -0.33$), Left Shoulder Mobility ($p = .03$, $d = -0.37$) and Left Active Straight Leg Raise ($p = .005$, $d = -1.38$).

CONCLUSIONS

Our results suggest that female subjects have important deficits in tasks involving trunk stability. Moreover, male subjects seem to have relevant handicaps in tasks involving shoulder and leg mobility. Strength and conditioning professionals should be aware that female and male subjects seem to have differences on functional movement patterns, which contributes to the need of an individualised intervention.

References

Cook, G., Burton, L., Hoogenboom, B. J., & Voight, M. (2014). Functional Movement Screening: The use of fundamental movements as an assessment of function – Part I. *International Journal of Sports Physical Therapy, 9*(3), 396-410. PMID: 24944860.

Magyari, N., Szakacs, V., Bartha, C., Szilagyi, B., Galamb, K., Magyar, M., & Negyesi, J. (2017). Gender may have an influence on the relationship between Functional Movement Screen scores and gait parameters in elite junior athletes - A pilot study. *Physiology international, 104*(3), 258-269. doi: 10.1556/2060.104.2017.3.1.

Marques, V. B., Medeiros, T. M., Stigger, F. S., Nakamura, F. Y., & Baroni, B. M. (2017). The Functional Movement Screen (FMS®) in elite young soccer players between 14 and 20 years: composite score, individual-test scores and asymmetries. *International Journal of Sports Physical Therapy, 12*(6), 977-985. doi: 10.16603/ijspt20170977.

Warren, M., Lininger, M. R., Chimera, N. J., & Smith, C. A. (2018). Utility of FMS to understand injury incidence in sports: current perspectives. *Open Access Journal of Sports Medicine, 9,* 171-182. doi: 10.2147/OAJSM.S1

P51. A costless and simple test to evaluate swimmers' inefficiency

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INTRODUCTION

Simple and easy to apply strategies to evaluate swimmers are a constant demand by coaches. The aim of the present study was to evaluate the possible conception of a swimming test that allows coaches to easily monitor swimmers' inefficiency.

METHODS

Twelve male swimmers (15.2±0.9 years old; 1.73±0.07 m of height; 64.8±2.1 cm of upper limb length; 82.5±3.6 cm of lower limb length; 61.8±7.1 kg of body mass; 11.7±3.1 % of body fat; 59.5±2.0 s of 100-m freestyle Personal best), with a minimum of 5 years of experience in competitive swimming, volunteered for the experiments. On separate days, the swimmers performed: a) 3x25-m front crawl and b) 3x30-s fully tethered swimming tests. Each trial was performed in a randomised order and was separated by at least 20 minutes of active recovery. In one trial, no constrains were applied so that participants could use their whole body. For the other two trials, upper or lower limbs' actions were restricted. Preceding each test, a 1000-m moderate intensity warm-up (400-m swim, 100-m pull, 100-m kick, 4×50-m at increasing speed, and 200-m easy swim) took place in a 50-m indoor swimming pool (water temperature of 26–27°C). For the 25-m trials, an underwater start was used and swimmers were advised to reduce glide; time to perform the 25-m was measured. For the tethered trials, a load-cell was used as previously described (Morouço et al., 2015). Main outcomes were derived from force-time curves.

RESULTS

Without restrictions swimmers were able to swim faster and exert higher forces than using only their arm stroke or leg kicking. The sum of arm stroke and leg kicking mean velocities and forces was higher than the whole-body mean force for all subjects. Relative contributions of arm stroke and leg kicking were higher when estimated from velocities (94.2% vs. 62%) than force (70.3% vs. 29.7%). Considering the sum of arm stroke and leg kicking mean forces as 100%, the velocities and forces exerted using the whole body were 63.4±7.8% and 84.4±6.8%, respectively. This corresponded to velocity and force deficits of 36.4% and 15.6%, respectively. There was a very strong correlation between contributions ($0.93<r<0,97$; $p<0.001$) and deficits ($r=0.96$; $p<0.001$).

CONCLUSIONS

The proposed test (3x25-m), using only a stopwatch may be a useful tool to infer about a swimmer inefficiency, as the required strength that the swimmer must apply with the upper limbs and lower limbs may be of great relevance to the training prescription. It can be a useful procedure to identify lack of strength and/or coordination.

Acknowledgments

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References

Morouço, P.G., Marinho, D., Izquierdo, M., Neiva, H., & Marques, M. (2015). Relative contribution of arms and legs in 30 s fully-tethered front crawl swimming. BioMed Research International 2015, Article ID 563206.

P52. Butterfly arm stroke symmetry: two-dimensional analysis simply using the mobile phone

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INTRODUCTION

The aim of this study was to analyse the butterfly swimming technique, namely the arm stroke symmetry, using an ecological methodology. Nowadays, it is possible to reduce the lab – field gap, by using simple, affordable and reliable smart phones and free apps for motion analysis. Swimming coaches can easily use technology to empower their swimmers and to make them understand the importance of a good swimming technique. As a simultaneous technique, symmetry is very important to prevent lateral misalignment of the body (Maglisho, 2003; Saders et al., 2011). In this case, we use an iPhone 6+ and the Kinovea® program to analyse the symmetry of two different moments of a butterfly non-breathing arm stroke, both out and under the water.

METHODS

The sample comprises 10 swimmers (5 female and 5 male) belonging to the juvenile age group category (13 ± 1.58 years old). Each swimmer performed a 200m butterfly maximum effort, simulating competition, with final lactate and heart rate measures. As mentioned, we collect images of two different moments of a butterfly non-breathing arm stroke, using two iPhone 6+. The images were collected from the first 25m of every 50m split; specifically, the last non-breathing arm stroke before entry the final 5m to the wall (before turns). Firstly, we collected frontal images from the highest point of the hands during the recovery (out of the water), because it's when they prepare for the entry of the hands in the water. The underwater images were collected through an underwater window. Secondly, we collected images of the finish of the insweep (under the water), because it's when swimmers place the arms to press water back under the body for the succeeding upsweep, the most propulsive phase of the arm stroke. The swimmers and their guardians provided written assent/consent prior to participation.

All images were analysed with Kinovea® two-dimensional to compare the dominant arm (e.g. right arm/left arm) and the opposite arm (e.g. left arm/right arm): i) under the water - coplanar angles between arm and forearm, and ii) out of the water - angles between the water line and the highest point of the hand

RESULTS

Constraints due to inter and intra observer reliability did not allow timely results of this study. Although, we expect to observe asymmetries between the dominant and opposite arms along the 4 splits of 50m, namely in the insweep. We also expect to observe lower recovery.

References

Maglisho, E. (2003). *Swimming Fastest*. Canada: Human Kinetics. ISBN: 0-7360-3180-4

Marinho, D. A., Barbosa, T. M., & Neiva, H. P. (2013). Swimming, running, cycling and triathlon. In *Routledge Handbook of Sports Performance Analysis* (pp. 454-481). Routledge

Sanders, R. H., Thow, J., & Fairweather, M. (2011). Asymmetries in swimming: Where do they come from. *Journal of Swimming Science*, *18*, 1-11.

P53. Reliability of the 3D Underwater Motion Analysis

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INTRODUCTION

Reliable biomechanical analysis of sports movements is expensive, so making analyses cannot yet be seen as a day-to-day event for athletes. It's a particularly difficult task when the object of examination is the swimming movement, where the water environment makes it even more difficult to achieve the intended purpose. Due to the fast development of the technology, sports cameras become available at affordable prices and also free download of motion analysis softwares with good accuracy. Nowadays the analysis of underwater movements can also be used regularly to support swimmers to increase the efficiency of technique, to carry out research in this field. The aim of this study was to determine the reliability of the 3D underwater motion analysis using SJ4000 sports cameras and SkillSpector.

METHODS

A compiled and applied low-cost and easy-to-operate motion analysis system which consists of the following parts: three pieces of SJ 4000 waterproof sports cameras, 4 x 2.5x1m 3D calibration frame and the free downloadable SkillSpector for 3D motion analysis program.

The cameras were positioned 0.5 m deep and aligned perpendicular to the axes of the calibration frame. The two horizontal sides of the calibration frame were spaced from a distance of 2.5 m apart, 6-6-1m long vertically positioned columns with 0.5 m marks at 1-1m apart.

Synchronised records were taken at 60 Hz and digitised. Based on the three views, 2DLT transformation were performed and the data series was copied to the MS Excel program to perform further calculations. In order to determine the suitability of the system a test frame was created (1x1x1m) and recorded over the entire length of the calibration space, the data extracted from the program was analysed from frontal (ZY), page (XY) and top (ZX) views. The data series was normalised to mean, and then the standard deviation of the data points was calculated.

RESULTS

In all the three planes we have obtained +/- 0.01 m to 0.05 m standard deviation from the calibration value. The visualised motion patterns are also consistent with all the three views and similar to the motion patterns available in the literature.

CONCLUSIONS

It can be concluded that the system used in this study is suitable for the practical 3D analysis of swimmer movement, further experiments are needed to establish error limits at different points of the system and to make them fit for definitive scientific evaluations.

P54. A characterisation of reception and its relation to winning in female young volleyball players

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INTRODUCTION

Volleyball includes multiple competitive demands, and the efficacy of the game actions is influenced by age and sex (Palao, Manzanares, & Ortega, 2009). Considering this information, reception is the starting point of an offensive action (González, Ureña, Santos, Llop, & Navarro, 2001), its quality will determine the set and efficacy of the attack. Indeed, although previous studies point out that the quality of the attack is the most important action to win (e.g. Marcelino, Mesquita, Castro, & Sampaio, 2008), some studies highlight reception as a determinant factor (Hughes & Daniel, 2003). Since there is a lack of studies regarding technical analysis in young female players, the aim of this study was to characterise the quality and importance of reception during the volleyball match.

METHODS

A total of 12 games, including 41 sets (29 won and 12 lost sets) of a Portuguese young (13.9 ± 0.3 years of age) female team were analysed. The 612 receptions evaluated, were classified following Hurst et al. (2016). Mean and standard deviation of the reception (in percentage) were calculated and, afterwards, a pared sample t-test was conducted between the individual quality of reception (A, B C and Error) in sets won and lost. Standardised differences of Cohen were calculated to test the effect size (ES) of the comparisons.

RESULTS

In won sets, the quality of reception was higher (A = 19.1 vs. 12.3% and B = 35.5 vs. 17.2% in won and lost sets, respectively) than in lost sets, followed by more errors in the latter (C = 26.2 vs. 35.2% and Errors = 19.1 vs 35.3%, in won and lost sets, respectively). When comparing individual performances, meaningful differences were registered between the two condition sets (A: $p = 0.01$, ES = 0.58, moderate effect; B: $p = 0.00$, ES = 1.67, large effect; C = 0.01, ES = 1.14, moderate effect and Error: $p = 0.00$, ES = 1.05, moderate effect).

CONCLUSIONS

Reception in young female volleyball players seems to be preponderant to win the game. In fact, a high-quality reception enables better conditions for the attack, favouring the attack tempo (Mesquita, Manso, & Palao, 2007). In adults (Marcelino, Mesquita, Sampaio, & Moraes, 2010), it was not found a great amount of excellent receptions, but the major difference seems to be the less errors in won sets. Nevertheless, in opposition to adults, the reason should be related to the less quality of the receptions instead of the service efficacy of the opponent team.

References

González, C., Ureña, A., Santos, J., Llop, F., & Navarro, F. (2001). Características del juego del voleibol tras los nuevos cambios en el reglamento. *Lecturas de Educación Física y Deportes, 7*, 42.

Hughes, M., & Daniel, R. (2003). Playing patterns of elite and non-elite volleyball. *International Journal of Performance Analysis in Sport, 3*(1), 50-56.

Hurst, M., Loureiro, M., Valongo, B., Laporta, L., Nikolaidis, T. P., & Afonso, J. (2016). Systemic mapping of high-level women's volleyball using social network analysis: The case of serve (K0), side-out (KI), side-out transition (KII) and transition (KIII). *International Journal of Performance Analysis in Sport, 16*(2), 695-710.

Marcelino, R., Mesquita, I., Castro, J., & Sampaio, J. (2008). Sequential analysis in volleyball attack performance: A log-linear analysis. *Journal of Sports Sciences, 26*(2), 83-84.

Marcelino, R., Mesquita, I., Sampaio, J., & Moraes, J. C. (2010). Estudo dos indicadores de rendimento em voleibol em função do resultado do set. *Revista Brasileira de Educação Física e Esporte, 24*(1), 69-78.

Mesquita, I., Manso, F., & Palao, J. (2007). Defensive participation and efficacy of the libero in volleyball. *Journal of Human Movement Studies (JHMS), 52*(2), 95.

Palao, J., Manzanares, P., & Ortega, E. (2009). Techniques used and efficacy of volleyball skills in relation to gender. *International Journal of Performance Analysis in Sport, 9*(2), 281-293.

P55. Dynamic Balance in Elite and Regional Portuguese Surfers

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INTRODUCTION

When competing, surfers must perform a variety of innovative and progressive maneuvers, with a high degree of difficulty and commitment (Mendez-Villanueva & Bishop, 2005) while maintaining power, speed and flow of the surfboard (Secomb et al., 2015). The dynamic environment where surf takes place (Barlow, Gresty, Findlay, Cooke, & Davidson, 2014) requires an amount of relative lower-body strength in combination with skill and dynamic postural balance (Tran et al., 2015). Proper dynamic balance (DB) is demanded for a surfer to perform high-risk maneuvers and related to competition level of surfers (Paillard, Margnes, Portet, & Breucq, 2011).

METHODS

Thirty-seven elite junior athletes of the national surfing team (15.22years; 53.55kg; 162.3cm) and fifteen regional competitors (14.93years; 52,46kg; 160.63cm) were assessed through the y balance test to measure dynamic balance. The T test for independent samples was applied to assess whether there is significant difference between the two groups using the SPSS software (version 25.0), for a statistical significance at 0.05.

RESULTS

Means and standard deviations regarding Y balance test are showed in Table 1. When the Dynamic Balance is tested, the elite group score is higher in every plane of motion, statistically relevant differences were found on posterior medial (p=0.000), and posterior lateral (p=0.000) executions for both right and left legs.

Table 1
Y Balance Test Performance (mean ± standard deviation) between Elite and Regional Surfers

	Ant.Right	Med.Right	Lat.Right	Ant.Left	Med.Left	Lat.Left
Elite Group	76.70 ± 8.42	129.67 ± 10.30*	127.98 ± 10.09*	75.64 ± 6.15	127.76 ± 9.75*	125.67 ± 12.43*
Regional Group	62.26 ± 3.9	105.38 ± 5.91*	98.32 ± 6.72 *	60.78 ± 3.83	105.25 ± 7.29*	98.21 ± 7.26*

Ant.right: Anterior Right; Med.Right: Posterior Medial Right Lat.Right: Posterior Lateral Right; Ant.Left: Anterior Left; Med.Left: Posterior Medial Left; Lat.Left; Posterior Lateral Left; * Significantly different as p =0.000

CONCLUSIONS

Proper Dynamic Balance is a key component to perform surfing maneuvers and higher-level surfers present higher scores. This relationship is a performance level differentiating factor in under 18 athletes regarding posterior medial and posterior lateral executions.

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References

Barlow, M. J., Gresty, K., Findlay, M., Cooke, C., & Davidson, M. (2014). The effect of wave conditions and surfer ability on performance and the physiological response of recreational surfers. *Journal of Strength and Conditioning Research*, *28*(10), 2946–2953.

Mendez-Villanueva, A., & Bishop, D. (2005). Physiological aspects of surfboard riding performance. *Sports Medicine*, *35*(1), 55–70. https://doi.org/10.2165/00007256-200535010-00005

Paillard, T., Margnes, E., Portet, M., & Breucq, A. (2011). Postural ability reflects the athletic skill level of surfers. *European Journal of Applied Physiology*, *111*(8), 1619–1623. https://doi.org/10.1007/s00421-010-1782-2

Secomb, J. L., Farley, O. R. L., Lundgren, L., Tran, T. T., King, A., Sheppard, J. M., … Beach, C. (2015). Associations Between the Performance of Scoring Manoeuvres and Lower-Body Strength and Power in Elite Surfers, *10*(5), 911–919.

Tran, T. T., Lundgren, L., Secomb, J., Farley, O. R. L., Haff, G. G., Seitz, L. B., … Sheppard, J. M. (2015). Comparison of physical capacities between nonselected and selected elite male competitive surfers for the national junior team. *International Journal of Sports Physiology and Performance*, *10*(2), 178–182. https://doi.org/10.1123/ijspp.2014-0222

P56. Ranking positioning and determinant performance factors in bodyboarding

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INTRODUCTION

Bodyboard is an aquatic sport where athletes must surf waves. Despite being a well-known sport, there is a lack of evidence trying to clarify how raking positioning is defined. Thus, the aim of the present research was to understand the physical demands of the sport and analyse the effects of several domains in ranking positioning.

METHODS

Nine competitive male bodyboarders (mean±sd, body mass: 64,6±8,6kg; height: 172,0±5,8cm; age: 21,3±5,0yr; years of surfing: 7,3±4,5yr) participated in this study. The subjects performed a specific swimming-pool test of a 400-m (V400) individual time trial in a 50-m indoor heated swimming pool (26-27˚). The subjects paddled on their own bodyboard using fins. Heart rate was continuously monitored with a Polar® device (RCX5 with H2 sensor). After testing, ear-lobe capillary blood lactate was measured every minute until levelling-off with an Accutrend Plus® device. Dry land tests consisted in handgrip isometric strength test (HGR and HGL) (JAMAR, Lafayette, USA); squat (SJ) and counter movement jump (CMJ) (GLOBUS, Italy); and Functional Movement Screen (FMS). Bodyboarders were then divided in two groups considering the V400 into fast and slower cohort. One way ANOVA with factor group was computed. Spearman's rank correlation coefficient was also used to find associations between variables. Alpha was set at $p \leq 0.05$.

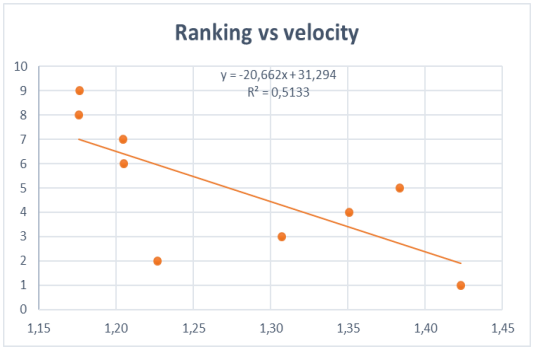

Figure 1. Relation between V400 and Performance ranking

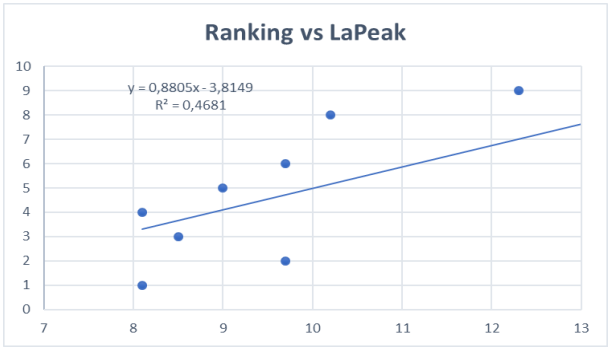

Figure 2. Relation between Performance ranking and LaPeak

RESULTS

No differences were found in the majority of variables: Peak HR (176,0±10,12 vs 187,20±1,20; p=0,253), Mean HR (164,18±11,17 vs 175,23±2,40; p=0,314), HGR (46,51±2,12 vs 44,12±5,09; p=0,705), HGL (42,29±0,76 vs 43,42±3,80; p=0,802), SJ (0,28±0,01 vs 0,26±0,03; p=0,676), CMJ (0,32±0,03 vs 0,30±0,04; p=0,671) and FMS (14,75±0,25 vs 12,0±1,48; p=0,149). The faster group scored best in all variables except HGL. The groups were different regarding V400 (1,36±0,23 vs 1,19±0,01; p=0,00) and LaPeak (8,42±0,021 vs 11,28±0,93; p=0,036). Also, strong correlations were found between V400 and LaPeak and the competitors ranking (Figure 1 and 2).

CONCLUSIONS

Our results suggest that faster bodyboarders have the best rank position, as well as a lower LaPeak value. The faster group had better results in all variables except HGL. Further research should focus on understanding which and how physical attributes can better explain performance in bodyboarding.

Acknowledgments

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References

Ferreira da Silva, B. A., Clemente, F. M., & Lourenço Martins, F. M. (2017). Associations between Functional Movement Screen scores and performance variables in surf athletes. *The Journal of Sports Medicine and Physical Fitness*. https://doi.org/10.23736/S0022-4707.17.07154-7

Reis, V. M., Ribeiro, P., Costa, A., Marinho, D. A., Costa, M. J., Guerra, A., … Garrido, N. D. (2017). Reliability of wearable heart rate measurement in a specific swimming-pool test for bodyboarders. Em *Book of Proceedings o the 8th Asia-Pacific conference on Exercise ans Sports Science 2017 and 7th International Conference on Sport and Exercise Science* (p. 63). Bangkok: Kasertsart iversity.

Tran, T. T., Lundgren, L., Secomb, J., Farley, O. R. L., Haff, G. G., Seitz, L. B., … Sheppard, J. M. (2015). Comparison of physical capacities between nonselected and selected elite male competitive surfers for the National Junior Team. *International Journal of Sports Physiology and Performance*, *10*(2), 178–182. https://doi.org/10.1123/ijspp.2014-0222

P57. Training profile of trail running athletes: An exploratory study

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INTRODUCTION

Trail running is characterised by a mountain run (Fornasiero et al., 2017), with different slopes and uneven terrain (Bean, Schwartz, Albertus, Prins, & Tam, 2017). These specific characteristics become crucial for trail running athletes' training because they are exposed to several factors, internal and external, and thus it's necessary for them to be physical and psychological robust (Petronela & Lorand, 2015). Some investigations have been carried out, however, trail running is a recent sport in Portugal and the literature is scarce about training. Therefore, the purpose of this study is to identify the training typology of Portuguese athletes.

METHODS

A total of 719 athletes (529 males and 190 females) with the average age of 38.01 ± 7.78, mostly Portuguese and distributed throughout the continent and the islands. The data was collected using a web-based questionnaire and self-reported by each athlete, with information of the last 12 months.

RESULTS

The data shows the mode is 3 (min: 1; max: 7) weekly training sessions for the Portuguese trail running athletes, with duration of 74.94 [73.04; 76.84] minutes for a training session. The training typology shows that these athletes do 97.6% of running (mean 3.37 [3.26; 3.47]), 36.9% of bicycle (mean 1.46 [1.37; 1.55]), 52.2% of gymnasium (mean 2.36 [2.23; 2.48]) and 13.4% of swimming (mean 1.61 [1.43; 1.79]). When questioned about trail running races and distances, 12.7% do not perform any type of races, 42.1% do only races until 42km, 1.4% only race between 42km - 99km, 0.1% only race more than 100km, 27.4% do races until 42km and races between 42km - 99km, 1.4% perform races until 42km and races more than 100km, 1% race between 42km - 99km and more than 100km and 13.9% perform all races. About the warm-up, 52.3% perform it, 35.9% perform it sometimes and 11.8% don't perform it. Regarding stretching, 67.1% perform it, 27.1% perform it sometimes and 5.8% don't perform it.

CONCLUSIONS

In conclusion, the Portuguese trail running athletes train 3 times a week, with an average of 75 minutes per training session. With these athletes, there was a preference for aerobic training when compared to anaerobic. However, working simultaneously in a mesocycle, aerobic and anaerobic training, can improve the athletes' performance (Berryman et al., 2018). This study allows to identify the training profile and thus to analyse factors that can be improved in training process.

References

Bean, R. C. R., Schwartz, G., Albertus, Y., Prins, D., & Tam, N. (2017). Risk of injury in trail running: a preliminary study. *35th Conference of the International Society of Biomechanics in Sports*, 552–555.

Berryman, N., Mujika, I., Arvisais, D., Roubeix, M., Binet, C., & Bosquet, L. (2018). Strength Training for Middle- and Long-Distance Performance: A Meta-Analysis. *International Journal of Sports Physiology and Performance*, *13*(1), 57–63. doi.org/10.1123/ijspp.2017-0032

Fornasiero, A., Savoldelli, A., Fruet, D., Boccia, G., Pellegrini, B., & Schena, F. (2017). Physiological intensity profile, exercise load and performance predictors of a 65-km mountain ultra-marathon. *Journal of Sports Sciences*, *36*(11), 1287–1295. doi.org/10.1080/02640414.2017.1374707

Petronela, M., & Lorand, B. (2015). The rate for kinetoprofilactic and recovery measures of effort capacity in the sports training process at trail running. *GYMNASIUM Scientific Journal of Education, Sports, and Health*, *XVI*(1), 63–85.

P58. Comparison between training and match demands in professional soccer players

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INTRODUCTION

Among the complexities involved in the development of elite athletes, the need to employ training strategies that replicate competition performance demands is well established (Roberts, Trewartha, Higgitt, El-Abd, & Stokes, 2008; Smith, 2003). In this sense, applying training programs that are designed to simulate match demands by replicating the physiological and decision-making requirements of actual competition are crucial (Djaoui, Haddad, Chamari, & Dellal, 2017). With the inclusion of GPS technology, sport scientists and conditioning coaches are able to compare training and match demands. The purpose of this study is to compare the external load of training vs match of a professional team participating in the LedMan Liga Pro Portugal

METHODS

Eight LedMan Liga Pro Portugal matches and forty training sessions were monitored in 23 sub-elite soccer players (26.65 ± 4.56yr, 71.35 ± 7.37kg e 1.79 ± 0.06m), over an 8-week period during the mid-phase of the competitive season. The typical microcyle included 1 match per week with 5 training sessions before match day (MD). The players involved within the study were grouped into their following positional roles: Full Backs (FB) n=4, Central Defenders (CD) n=4, Central Midfielders (CM) n=7, Wide Forwards (WF) n=4, Center Forwards (CF) n=4. Time-motion variables were collected using a 10 HZ GPS (JOHAN Sports, Noordwijk, Netherlands): walking (0-7 Km/h), jogging (7.1-14 Km/h), running (14.1-20 Km/h), sprint (20.1-25 Km/h) and high intensity sprint (>25 Km/h) distance, total distance, number of sprints and high intensity sprints and player load. Statistical procedures (mean□SD) were performed using Tableau Desktop v10.4.

RESULTS

The CF presented the highest similarity between training sessions and match external load (Total, Walking, Running and Sprint Distance, Number of Sprints and Player Load). On the other hand, the highest dissimilarity was found for WF (Total, Jogging, Running, Sprint and High Intensity Sprint Distance, Number of Sprints and High Intensity Sprints and Player Load). CF covered more total distance in the three first training sessions of the week than what they performed in the match. In general, the training sessions MD-5, -3 and -2 presented higher similarity to the match.

CONCLUSIONS

The external load disparity between training and match is more evident for WF than remaining positions. It was verified a fluctuation of intensity representing a tapering approach. A load approximation should be done taking into account the match performance and the specific positional needs.

References

Djaoui, L., Haddad, M., Chamari, K., & Dellal, A. (2017). Monitoring training load and fatigue in soccer players with physiological markers. *Physiology and Behavior*, *181*, 86–94.

Roberts, S. P., Trewartha, G., Higgitt, R. J., El-Abd, J., & Stokes, K. A. (2008). The physical demands of elite English rugby union. *Journal of Sports Sciences*, *26*(8), 825–833.

Smith, D. J. (2003). A framework for understanding the training process leading to elite performance. *Sports Medicine (Auckland, N.Z.)*, *33*(15), 1103–1126.

P59. Metabolic characteristics and energy expenditure indicators, measured and estimated from heart rate during exercise sessions of 3B Bum Bum Brazil

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INTRODUCTION

This study aimed to characterise metabolic and energy expenditure indicators, measured and estimated from heart rate during exercise sessions of 3B Bum Bum Brazil, a type of circuit training group exercise class.

METHODS

Twenty women aged 23-60 years were evaluated for the present study. On average, the sample had the following characteristics: 42.3 ± 11.1 years of age; 63.2 ± 11.2 kg of body mass, and 158.5 ± 4.9 cm of height and 25.2 ± 4.7 kg.m-2 of body mass index. During 3B Bum Bum Brazil exercise sessions', participants' heart rates (HR, in bpm) were measured using Polar Team² (Polar Electro, Inc., Kempele, Finland). Maximal Heart Rate (HRmax) estimated for age was calculated using Tanaka's equation (Tanaka, Monahan, & Seals, 2001), which was also used to calculate percentages of HRmax attained during exercise sessions. For each participant, the absolute and relative total time in specific HR zones of exercise intensity were calculated using the cut-off points established for the relative intensity according to cardiorespiratory endurance (Garber et al., 2011): very light zone (< 57% HRmax.), light zone (57-63% HRmax.); moderate zone (64-76% HRmax); vigorous zone (77-95% HRmax); sub-maximum / maximum zone (≥ 96% HRmax). From the HR values measured during the exercise session, energy expenditure was estimated by equation (Keytel et al., 2005). All data was organised and treated in Microsoft Excel 2016 and in SPSS 21 for Mac OS X. Descriptive values were calculated as mean ± standard deviation, minimum and maximum.

RESULTS

The maximum heart rate attained during the 3B Bum Bum Brazil session was 159.7 ± 20.7 bpm; and the percentage of the maximum heart rate estimated for age was 89.7 ± 12.9%. For the total 30 minutes of the class, energy expenditure was 189.5 ± 47.0 kcal. For the 24 effective minutes in physical exercise, excluding pauses and transitions between the exercises, energy expenditure was 156.3 ± 38.7 kcal.

CONCLUSIONS

In a 30-minute session of 3B Bum Bum Brazil, approximately 50% of the session is characterised by exercises of moderate to maximum intensity. It was deduced that, for the two weekly sessions, participants accumulated at least 30 minutes of moderate to vigorous physical activities, therefore contributing to the compliance of 20% of the international physical activity recommendations of 150 minutes per week (Wold Health Organisation, 2010).

Funding

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References

Garber, C. E., Blissmer, B., Deschenes, M. R., Franklin, B. A., Lamonte, M. J., Lee, I. M., … Swain, D. P. (2011). Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: Guidance for prescribing exercise. *Medicine and Science in Sports and Exercise*, *43*(7), 1334–1359. https://doi.org/10.1249/MSS.0b013e318213fefb

Keytel, L. R., Goedecke, J. H., Noakes, T. D., Hiiloskorpi, H., Laukkanen, R., van der Merwe, L., & Lambert, E. V. (2005). Prediction of energy expenditure from heart rate monitoring during submaximal exercise. *Journal of Sports Sciences*, *23*(3), 289–297. https://doi.org/10.1080/02640410470001730089

Tanaka, H., Monahan, K. D., & Seals, D. R. (2001). Age-predicted maximal heart rate revisited. *Journal of the American College of Cardiology*, *37*(1), 153–156. https://doi.org/10.1016/S0735-1097(00)01054-8

Wold Health Organization. (2010). *Global recommendations on physical activity for health*. Geneva, Switzerland: World Health Organization Press.

P6o. Acute effects of concurrent training with whole-body electrostimulation with regards to biochemical parameters

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INTRODUCTION

Several studies reveal that whole-body electrostimulation (WB-EMS) training has positive effects on performance (Billot et al., 2010; Babault et al., 2007). However, the effects of this type of training on biochemical parameters has been little researched. In this line, it has been established that WB-EMS could increase CK (Kemmler et al., 2015) and LDH (Moreau et al., 1995) enzymes. Thus, the aim of the present study was to identify the effects of an acute session of simultaneous concurrent training (whole body electrostimulation + HIIT) and consecutive concurrent training (weightlifting + HIIT) on biochemical parameters.

METHOD

22 recreationally trained subject (Age 20.08 ± 2.08 years, Weight 72.49 ± 5.20 kg, BMI 22.23 ± 2.47 kg/m2) were randomised in 3 groups: Concurrent Consecutive (CC), Concurrent Simultaneous (CS) and Control Group (C). Both groups performed a single acute session. CC training group performed a strength circuit training of 4 exercises (bench press, front pull down, back squat and femoral curl) executing 4 x 8 reps 60% 1RM, followed by HIIT (4 x 4 min 90-95% maximal aerobic power (VO2max) with 3 min of recovery at 40-50% VO2max) on a cycle ergometer. CS training group performed the same HIIT combined with whole body electrostimulation (WiemsPro, USA). All participants were evaluated with a blood test through which different biochemical parameters were obtained (BUN, LDH, CK, Bilirubin, GOT, GTP) before initiation of the training protocol (PRE) and 24 hours after training (24H); ammonia before (PRE) and after (POST) training; and lactate between sets. Statistical analysis was performed using two-way ANOVA with repeated measures.

RESULTS

Both groups increased ammonia values in POST (CC 62.37±39.33 μmol/L vs 228.75±41.77 μmol/L, $p<0.001$; CS 72.44±50.34 μmol/L vs 217.33±76.09 μmol/L, $p<0.01$). Bilirubin only increased in CC group (0.80±0.46 mg/dL vs 1.00±0.47 mg/dL, $p<0.05$). CS group increased BUN (12.56±2.74 mg/dL vs 15.56±2.76 mg/dL, $p<0.01$) and LDH (202.33±25.36 IU/L vs 250.00±52.02 IU/L, $p<0.05$). CK increased more in CS group than CC group (CS 155.25±59.20 vs 1056.63±601.8 IU/L, $p<0.01$; CC 87.13±27.49 IU/L vs 283.50±208.23 IU/L, $p<0.05$). Both groups increased GOT (CC 15.13±2.85 IU/L vs 21.25±6.67 IU/L, $p<0.05$; CS 18.00±4.12 IU/L vs 30.22±13.93 IU/L, $p<0.05$). However, no differences were found on GTP and lactate.

CONCLUSIONS

Simultaneous concurrent training induced higher muscular damage and fatigue than consecutive concurrent training. Therefore, coaches should have this information in consideration for athletes through this modality.

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References

Babault, N., Cometti, G., Bernardin, M., Pousson, M., & Chatard, J. C. (2007). Effects of electromyostimulation training on muscle strength and power of elite rugby players. *The Journal of Strength & Conditioning Research*, *21*(2), 431-437. DOI: 10.1519/R-19365.1

Billot, M., Martin, A., Paizis, C., Cometti, C., & Babault, N. (2010). Effects of an electrostimulation training program on strength, jumping, and kicking capacities in soccer players. *The Journal of Strength & Conditioning Research*, *24*(5), 1407-1413. DOI: 10.1519/JSC.0b013e3181d43790

Kemmler, W., Teschler, M., & Bebenek, M. (2015). (Very) high Creatinkinase concentration after exertional whole-body electromyostimulation application: health risks and longitudinal adaptations. Wiener medizinische Wochenschrift (1946), 165(21-22), 427-435. doi: 10.1007/s10354-015-0394-1

Moreau, D., Dubots, P., Boggio, V., Guilland, J. C., & Cometti, G. (1995). Effects of electromyostimulation and strength training on muscle soreness, muscle damage and sympathetic activation. Journal of sports sciences, 13(2), 95-100. doi: 10.1080/02640419508732216

P61. An occlusal splint affects running oxygen uptake?

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INTRODUCTION

Many sports practitioners, with or without dental occlusal changes, have used occlusal splints as a jaw repositioning devices with a purpose to maximize performance. The evaluation of oxygen uptake (VO2) is frequently considered to demonstrate the effect of changes of mandibular position in aerobic capacity. As the mandibular position can be changed, the literature has described that a forward mandibular positioning can improve the upper airway dimension. Furthermore, a jaw protruding device can create an open mouth breathing and improve gas exchange during various intensities of exercise. The purpose of our study was to observe the effect of a jaw repositioning device in VO2 during an incremental running protocol.

METHODS

Nine football players performed two testing sessions of a continuous incremental protocol of 7 x 4 min (1 km/h increments) in a treadmill (H/P/ Cosmos Quasar 4.0, Nussdorf, Germany) until exhaustion, once with a placebo and another with a jaw repositioning device. Each device was made individually for mandibular arch and adapted for each participant. The repositioning device changed the jaw to a forward position in a total of 25% of the maximum individual protrusion and to transport this value to produce the repositioning devices was used a George Gauge® Bite Registration Kit (Scheu-Dental, Deutschland). The VO2 was determined breath-by-breath using a portable telemetric gas analyser (Cosmed K4 b2, Cosmed, Italy) for both experimental conditions in low to moderate, heavy and severe exercise intensities domains.

RESULTS

The values of absolute and relative VO2 were higher when a jaw repositioning device was used comparing with a placebo device (3021.39±210.34 vs 2674.18±319.12 mL · min−1 and 42.00±3.92 vs 37.03±5.44 mL · kg−1 · min-1, respectively) but only at the severe running intensity. At low to moderate and heavy domains no significant changes were observed.

CONCLUSIONS

Our study shows an increased VO2 when a jaw repositioning device was used during high intensity running. Future studies on the benefits of this kind of devices in sports performance should be carried out combining physiologic with biomechanical variables.

References

Allen, C. R., Dabbs, N. C., Zachary, C. S., & Garner, J. C. (2014). The acute effect of a commercial bite-aligning mouthpiece on strength and power in recreationally trained men. *J Strength Cond Res, 28*(2), 499-503. doi:10.1519/JSC.0b013e3182a95250

Bailey, S. P., Willauer, T. J., Balilionis, G., Wilson, L. E., Salley, J. T., Bailey, E. K., & Strickland, T. L. (2015). Effects of an over-the-counter vented mouthguard on cardiorespiratory responses to exercise and physical agility. *J Strength Cond Res, 29*(3), 678-684. doi:10.1519/jsc.0000000000000668

de Jesus, K., Sousa, A., de Jesus, K., Ribeiro, J., Machado, L., Rodriguez, F., . . . Fernandes, R. J. (2015). The effects of intensity on VO2 kinetics during incremental free swimming. *Appl Physiol Nutr Metab, 40*(9), 918-923. doi:10.1139/apnm-2015-0029

Fransson, A. M., Tegelberg, A., Svenson, B. A., Wenneberg, B., & Isacsson, G. (2003). Validation of measurements of mandibular protrusion in the treatment ofobstructive sleep apnoea and snoring with a mandibular protruding device. *Eur J Orthod, 25*(4), 377-383.

Garner, D. P., Dudgeon, W. D., Scheett, T. P., & McDivitt, E. J. (2011). The effects of mouthpiece use on gas exchange parameters during steady-state exercise in college-aged men and women. *J Am Dent Assoc, 142*(9), 1041-1047.

Garner., D. P. (2016). A Comparative Study and Review of Research Related to Oral Appliances and Athletic Performance: Understanding the Physiological Impacts. *J J Sport Med., 3(4): 025.*

Gunepin, M., Derache, F., Blatteau, J.-É., Trousselard, M., Castagna, O., & Risso, J.-J. (2017). Intérêt des protège-dents pour l'amélioration des performances physiques et sportives : revue de 50 ans de recherche médicale. *Med Buccale Chir Buccale, 23*(1), 21-31.

Piero, M., Simone, U., Jonathan, M., Maria, S., Giulio, G., Francesco, T., . . . Giovanni, G. (2015). Influence of a custom-made maxillary mouthguard on gas exchange parameters during incremental exercise in amateur road cyclists. *J Strength Cond Res, 29*(3), 672-677. doi:10.1519/jsc.0000000000000695

P62. Combining resistance and aerobic training intensities: practical remarks

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INTRODUCTION

A combination of resistance and aerobic regimens, usually named as concurrent training (CT), has attracted strong attention from the scientific community in recent years due to its potential to simultaneously induce cardiorespiratory and neuromuscular gains (Joo, 2018). However, there is a lack of research consensus on this subject, and more specifically when related to some interreference effect that exist when combining different resistance and aerobic intensities (Cadore et al., 2012; Cadore et al., 2014; García-Pallarés & Izquierdo, 2011). Thus, our aim was to provide a practical suggestion to improve athletes' performance on different sports by using a CT program design.

METHODS

A literature research was carried out using several databases (Web of Science, PubMed, ScienceDirect, Scholar Google, and Scopus) from January 1980 to September 2018, to identify studies related to CT with different intensities in young adults. The search was performed containing key terms such as "concurrent training", "intensities", and "young adults". The initial search identified 2469 initial studies. For the qualitative analysis, a total of 7 studies were considered relevant for a detailed analysis.

RESULTS

According to the existing literature, we suggest a CT program for 8 weeks, performed twice a week, including full squat (FS), counter-movement jump (CMJ), sprint and aerobic exercitation. FS training should consist on 3 sets of 5-8 repetitions with external loads from 70 to 85% of maximal repetition (1RM) with 3 minutes of rest between sets. After FS training, CMJs can be performed in a platform of 50 to 60 cm high (3 to 4 sets of 4 to 5 repetitions), to complete the resistance training (RT). Each RT session should last about 20 min, including the warm-up period. After the RT program and some rest (15min), an aerobic workout should be performed. This training component should be simple to evaluate and control in a real-context, perhaps consisting of 16-20 minutes of 20 m shuttle run exercise at 80% of maximal individual speed. Maximal aerobic speed should be previously evaluated during a 20m multistage shuttle run test.

CONCLUSIONS

CT have been shown beneficial effects on athletes' performance, once properly combined. The intensity of RT and/or AT seems to play an essential role for higher gains, with some major gains when combining higher RT intensities with lower AT intensities. Considering the literature findings, it was possible to suggest a CT program for 8-weeks duration to obtain maximal cardiorespiratory and strength gains.

Acknowledgments

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References

Cadore, E.L., Izquierdo, M., Alberton, C.L., Pinto, R.S., Conceição, M., Cunha, G., Radaelli, R., Bottaro, M., Trindade, G.T., & Kruel, L.F. (2012). Strength prior to endurance intra-session exercise sequence optimizes neuromuscular and cardiovascular gains in elderly men. *Experimental Gerontololy, 47*, 164–169.

Cadore, E.L., Pinto, R.S., Bottaro, M., & Izquierdo, M. (2014). Strength and endurance training prescription in healthy and frail elderly. *Aging and Disease, 5*(3), 183–195.

García-Pallarés, J., & Izquierdo, M. (2011). Strategies to optimize concurrent training of strength and aerobic fitness for rowing and canoeing. *Sports Medicine, 41*, 329–343.

Joo, C.H. (2018). The effects of a short term detraining and retraining on physical fitness in elite soccer players. *PLoS One, 13*(5) e0196212.

P63. Comparison of acute physiological responses between different fitness classes: Zumba® vs Strong by Zumba™

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INTRODUCTION

New fitness trends are growing in the market as an attempt to respond to people's motivations and economic needs. This implies a reflection about the prescription paradigm in terms of program designing and planning. In fact, there is a lack of evidence about the real effects of new trends such as the Strong by Zumba™ in comparison to other classes. The aim of this study was to analyse and compare the physiological acute response between two fitness classes: Zumba® vs Strong by Zumba™.

METHOD

Nine female participants (age: 42.56 ± 4.13 years, body mass: 65.08 ± 5.69 kg, height: 1.65 ± 0.05 m; resting heart rate: 69.0 ± 12.45 bpm) were asked to participate in the fundamental part of each session in separated days. For the physiological acute response was determined: (i) the rating of perceived exertion (RPE) according to the modified Borg scale; (ii) the mean heart rate (HRmean) and respiratory rate (RR) using a compact cardiac monitoring system (ZEPHYR, Anápolis, US.) (iii) the percentage of intensity based on HRmax (%HRmax), the net heart rate (NetHR), the metabolic equivalent of activity (MET), the oxygen uptake (VO2) and the total energy expenditure (Etot) that were estimated afterwards as proposed by Bragada et al. (2009). Differences between trends were analysed with the Wilcoxon Signed-Rank Test.

RESULTS

Higher values were found in Zumba for the RPE (RPEZumba = 4.89 ± 1.76; RPEStrong = 7.00 ± 2.0, $p = 0.02$), HRmean (HRmeanZumba = 159.99 ± 12.34 bpm; HRmeanStrong = 149.46 ± 12.12 bpm, $p = 0.03$), RR (RRZumba = 32.86 ± 3.19 cycles/min; RRStrong = 28.38 ± 2.96 cycles/min, $p < 0.01$), %HRmax (%HRmaxZumba = 89.81 ± 7.30 %; %HRmaxStrong = 83.88 ± 6.84 %, $p = 0.03$), NetHR (NetHRZumba = 90.99 ± 14.62 bpm; NetHRStrong = 80.46 ± 16.93 bpm, $p = 0.03$) and in the VO2 (VO2 Zumba = 39.30 ± 5.60ml/kg/min; VO2 Strong = 35.26 ± 6.49 ml/kg/min, $p = 0.03$). There were no differences in the metabolic equivalent of activity (METZumba = 11.23 ± 1.60; METStrong =10.07 ± 1.85, $p = 0.06$) neither in the total energy expenditure (EtotZumba = 433.75 ± 63.23 kcal; EtotStrong = 410.80 ± 71.31 kcal, $p = 0.31$).

CONCLUSIONS

It can be concluded that there are different acute physiological responses between these two fitness classes where the Zumba® seems to elicit a more intense response compared to the Strong by Zumba™ when analysing the fundamental part in total.

References

Bragada, J.; Magalhães, P.; Vasques, C.; Barbosa, T. e Lopes, V. (2009). Net heart rate to prescribe physical activity in middle-aged to older active adults. *Journal of Sports Science and Medicine*, 8: 616-621.

P64. In-season internal and external training load quantification of an elite European soccer team

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INTRODUCTION

Elite soccer teams that participate in European competitions often have a difficult schedule, involving weeks in which they play up to three matches, which leads to acute and transient subjective, biochemical, metabolic and physical disturbances in players over the subsequent hours and days. Inadequate time recovery between matches can expose players to the risk of training and competing whilst not fully recovered. Controlling the level of effort and fatigue of players to reach higher performances during the matches is therefore critical. Therefore, the aim of the current study was to provide the first report of seasonal internal and external training load (TL) that included Hooper Index (HI) scores in elite soccer players during an in-season period.

METHODS

Sixteen elite soccer players were sampled, using global position system, session rating of perceived exertion (s-RPE) and HI scores during the daily training sessions throughout the 2015-2016 in-season period. Data were analysed across ten mesocycles (M: 1 to 10) and collected according to the number of days prior to a match.

RESULTS

Total daily distance covered was higher at the start (M1 and M3) compared to the final mesocycle (M10) of the season. M1 (5589m) reached a greater distance than M5 (4473m) (ES = 9.33 [12.70, 5.95]) and M10 (4545m) (ES = 9.84 [13.39, 6.29]). M3 (5691m) reached a greater distance than M5 (ES = 9.07 [12.36, 5.78]), M7 (ES = 6.13 [8.48, 3.79]) and M10 (ES = 9.37 [12.76, 5.98]). High-speed running distance was greater in M1 (227m), than M5 (92m) (ES = 27.95 [37.68, 18.22]) and M10 (138m) (ES = 8.46 [11.55, 5.37]). Interestingly, the s-RPE response was higher in M1 (331au) in comparison to the last mesocycle (M10, 239au). HI showed minor variations across mesocycles and in days prior to the match. Every day prior to a match, all internal and external TL variables expressed significant lower values to other days prior to a match ($p<0.01$). In general, there were no differences between player positions.

CONCLUSIONS

Our results reveal that despite the existence of some significant differences between mesocycles, there were minor changes across the in-season period for the internal and external TL variables used. Furthermore, it was observed that periodisation of external TL was typically reduced until MD-1 (regardless of mesocycle) while internal TL variables did not have the same record.

Acknowledgments

The authors would like to thank the team's coaches and players for their cooperation during all data collection procedures.

P65. Pacing and turn times profiles during the 1500/800m freestyle competition

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INTRODUCTION

Performance in swimming competition depends on a complex interaction of many factors. For young swimmers, growing as an athlete involves this understanding and the importance of synergies between training and competition (Maglisho, 2003). Pacing strategies and chronometric variables, such as turning time, can determine a competition outcome (Pyne et al., 2004). Therefore, looking for the finest technique and the optimal pacing strategy for the 1500/800m races are important goals to achieve for young swimmers. The aim of this study was to analyse and characterise turns time and splits time each 50m, during the 1500/800m freestyle (male/female young swimmers) during an official competition (25m pool).

METHODS

17 swimmers belonging to the juvenile age group category (13 to 15 years old) performed 1500m (8 male) and 800m (9 female), during a regional official competition. The swimmers and their guardians provided written assent/consent prior to participation.

Images were collected with two Sony Handycam DCR-SX65. These cameras were located laterally to the pool in the spectators' stand at a level approximately 5,75m above the pool and at a horizontal distance of 10m from the near lateral side of the pool. Each camera recorded turns executed at each end of the 25m pool at a nominal filming rate of 25 Hz. Velocity was calculated every 50m from the printed output of the automatic timing device. The turning time was measured from the records during 15m, from the head passage of the last 7.5m until the head passage of the first 7.5m. For this study we considered only the turns each 50m.

RESULTS

Both split and turning times of the 1500m and the 800m were similar, showing boys and girls with good regularity during long races.

Table 1

Results of the split times and turning times 1500/800m

	Split times (50m) (s)		Turning time (s)	
	E ± SD	COV	E ± SD	COV
1500m	38,13±,82	,0215	11,10±,25	,0222
800m	38,78±,76	,0195	11,49±,29	,0255

CONCLUSIONS

Both male and female swimmers showed low coefficient of variation in the pacing times and in the turning times.

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References

Maglisho, E. (2003). *Swimming Fastest*. Canada: Human Kinetics. ISBN: 0-7360-3180-4

Pyne, D. B., Trewin, C. B., & Hopkins, W. G. (2004). Progression and variability of competitive performance of Olympic swimmers. *Journal of sports sciences*, *22*(7), 613-620.

P66. Relationship between strength, stroke efficiency and front crawl swimming performance

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INTRODUCTION

Swimming is a highly specified sport in which it is essential to achieve the highest swimming speed. Knowing that drag increases with speed (e.g. Ribeiro et al., 2015), in short races swimmers have to apply a greater force to overcome water resistance. Indeed, the relationship between strength and speed has already been found in the fastest races (Morouço, Marinho, Keskinen, Badillo, & Marques, 2014) even in young swimmers (Morouço, Vilas-Boas, & Fernandes, 2012). Nevertheless, the exerted force should also be efficient, evidencing a correct technique (Toussaint, 1992). However, as young swimmers are still in the learning process, the relationship between technique, force production capacity and performance may not be as evident. This study aims to analyse the association between strength, efficiency and swimming speed (performance) in young swimmers.

METHODS

Twenty-two male swimmers (15.7 ± 0.8 years of age, 173.7 ± 7.5 cm of height and 62.9 ± 9.3 kg of body mass) performed in front crawl at maximal speed: (i) 50-m free swimming; (ii) 30-s tethered swimming; and (iii) 2 x 25-m with only upper-limbs (in free swimming and on the MAD-System). Swimming performance was considered as the mean speed obtained during the 50-m. Maximal force (Fmax), mean force (Fmean) and index of fatigue (IF) were calculated as proposed by Morouço et al. (2012) and propelling efficiency (ep) assessed through the equation: ep = v3free/ v3MAD (Seifert et al., 2015). Pearson correlation coefficient was used to determine the relationships between variables.

RESULTS

Only positive and strong correlations between performance (speed) and Fmax and Fmean (0.58 and 0.63, respectively, $p < 0.01$) were found. Efficiency showed no correlations neither with performance nor with Fmax or Fmean.

CONCLUSIONS

Force production clearly showed to be preponderant to achieve better performances at young ages, evidencing that young male swimmers improved strength (neglecting swimming efficiency) to achieve better performances in front crawl sprinting. It seems that those swimmers are still in the learning process, since performance showed no correlation with ep (better swimming technique).

Funding

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References

Morouço, P. G., Marinho, D. A., Keskinen, K. L., Badillo, J. J., & Marques, M. C. (2014). Tethered swimming can be used to evaluate force contribution for short-distance swimming performance. *The Journal of Strength & Conditioning Research, 28*(11), 3093-3099.

Morouço, P. G., Vilas-Boas, J. P., & Fernandes, R. J. (2012). Evaluation of adolescent swimmers through a 30-s tethered test. *Pediatric Exercise Science, 24*(2), 312-321.

Ribeiro, J., Figueiredo, P., Guidetti, L., Alves, F., Toussaint, H., Vilas-Boas, J. P., . . . Fernandes, R. J. (2015). AquaTrainer® Snorkel does not Increase Hydrodynamic Drag but Influences Turning Time. *International Journal of Sports Medicine*.

Seifert, L., Schnitzler, C., Bideault, G., Alberty, M., Chollet, D., & Toussaint, H. (2015). Relationships between coordination, active drag and propelling efficiency in crawl. *Human Movement Science, 39*, 55-64.

Toussaint, H. (1992). *Performance determining factors in front crawl swimming*. London: E & Fn Spon.

P67. Swimming And Dry-Land Performance After 12 Weeks Of Training In Master Swimmers

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INTRODUCTION

Master competitions are no longer an extension of recreational sports as in the past, although, physiological and muscular changes are underlying reasons that can explain that swimming performance declines with age (Espada et al., 2016). The aim of this study was to analyse the effect of 12 weeks of training in master swimmers and the relationship to swimming performance.

METHODS

Thirteen master swimmers (39.8±5.5 years of age, 174.2±0.10 m in height and 74.5±14.2 kg in body weight), nine males and four females, were evaluated with 12 weeks of difference between pre and post-test. Swimmers trained 3 times a week, mean 7.5 km swim training session with no dry-land specific training. A contact mat (Ergojump Digitime 1000; Digitest, Jyvaskyla, Finland) was used to assess the maximum height (Hmax, cm) obtained in countermovement jump (CMJ). For the upper body power measure, the swimmers completed a 3 kg medicine ball throwing test (MBT). Water tests were performed in a 25 m indoor swimming pool. After a 600 m of low intensity warm-up, each subject completed a 50 m maximal front crawl swimming test (T50) from a push off start in the wall on the surface level (to eliminate the influence of the dive). Performance at 15 and 25 m (T15 and T25) was determined by two expert researchers with a chronometer (Seiko S140, Japan). Statistical significance was set at $p<0.05$. Pearson correlation coefficients were determined.

RESULTS

Improvements in dry-land tests were observed between pre and post-test, no significant statistical differences were verified, namely in CMJ (28.5±3.6 vs 29.5±6.1 cm) and MBT (4.2±0.9 vs 4.5±0.9 m). Contrarily, in T15, T25, and T50 the differences were significant. T15 and T25 (10.8±1.4 vs 9.5±1.4 sec and 19.7±2.7 vs 17.9±2.5 sec; both $p<0.001$) and T50 (38.4±6.2 vs 36.7±4.9 sec; $p<0.02$). In the post-test, T15 was correlated to CMJ ($r=-0.71$, $p<0.01$) and MBT ($r=0-.82$, $p<0.01$). Also T25 was correlated to CMJ ($r=-0.69$, $p<0.01$) and MBT ($r=-0.85$, $p<0.01$) and T50 to CMJ ($r=-0.72$, $p<0.01$) and MBT ($r=0.88$, $p<0.01$).

CONCLUSIONS

In master swimmers, 12 weeks of training improve swimming performance and strength, although the last one was not statistically significant which indicates that a specific dry-land strength training intervention program in master swimmers should be considered once the correlation between swimming performance and dry-land strength variables is evident.

References

Espada, M.C., Costa, M.J., Costa, A.M., Silva, A.J., Barbosa, T.M., Pereira, A.F. (2016). Relationship between performance, dry-land power and kinematics in master swimmers. *Acta of Bioengineering and Biomechanics*, 18(2), 145-51.

P68. A velocity resistance training program in elite futsal players

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INTRODUCTION

Resistance training (RT) based on light-loads and maximal velocity seems to be an optimal strategy to increase specific physical performance of athletes (Gonzalez-Badillo et al., 2015), including futsal players (Torres-Torrelo, Rodriguez-Rosell, & Gonzalez-Badillo, 2017). Nevertheless, to our best knowledge, few studies have been conducted in order to increase and to control the effects of RT on neuromuscular performance of futsal players during the in-season. Thus, the purpose of this study was twofold: a) to examine the effects of an 8-week in-season velocity RT program on physical performance of elite futsal players; and b) to provide a practical RT monitoring approach in order to control training fatigue.

METHODS

Ten elite futsal players (24.8±7.4 years old) participated in an 8-week RT program twice a week, which included the full squat (2-3 sets of 3-6 repetitions at 45-65% of one-repetition maximum (1RM)), plyometric and core exercises. Before every training session, players were monitored in the total quality recovery (TQR) and countermovement jump (CMJ) height. After each training session, the rate of perceived exertion (RPE) was assessed. Before and after 8-weeks, CMJ height, the sprint time in 10 (T10), 10-20 (T10-20) and 20-m (T20), 1RM and mean propulsive velocity (MPV) in a progressive full squat test were assessed.

RESULTS

After 8-weeks, significant differences in T10 (-3.3%; effect size [ES] = 0.97), CMJ (6.9%; ES = 0.67) (Figure 1), 1RM (15.6%; ES = 0.74) and MPV (-4.3%; ES = 1.30) were observed. At baseline, no significant correlations between variables were found. However, after 8-weeks, a significant negative correlation between CMJ and T20 (r = -0.72), as well as a significant positive correlation between CMJ and 1RM (r = 0.64) were observed. Regarding monitoring analysis, the average TQR was 15.1±1.6 (good recovery) and the CMJ was 37.1±0.6. After sessions, the average RPE was 12.4±1.4 (fairly light). A significant positive correlation between TQR and CMJ (r = 0.75) (Figure 2), as well as a significant negative correlation between CMJ and RPE (r = -0.55), and TQR and RPE (r = -0.58) were found.

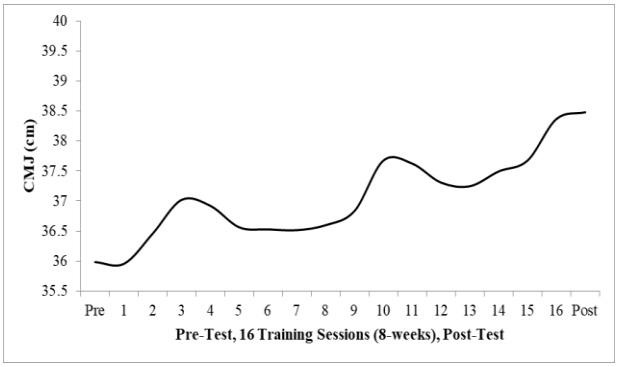

Figure 1. CMJ height over 8-weeks

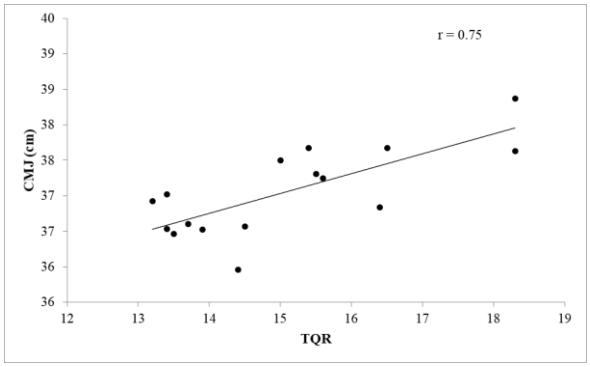

Figure 2. Positive correlation between CMJ and TQR

CONCLUSIONS

The results of this study demonstrate that a light-load high velocity RT program can improve significantly the neuromuscular performance of elite futsal players during in-season, without induce a high level of fatigue.

Acknowledgments

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References

Gonzalez-Badillo, J. J., Pareja-Blanco, F., Rodriguez-Rosell, D., Abad-Herencia, J. L., Del Ojo-Lopez, J. J., & Sanchez-Medina, L. (2015). Effects of velocity-based resistance training on young soccer players of different ages. *J Strength Cond Res, 29*(5), 1329-1338. doi:10.1519/JSC.0000000000000764

Torres-Torrelo, J., Rodriguez-Rosell, D., & Gonzalez-Badillo, J. J. (2017). Light-load maximal lifting velocity full squat training program improves important physical and skill characteristics in futsal players. *J Sports Sci, 35*(10), 967-975. doi:10.1080/02640414.2016.1206663

P69. Autonomic and neuromuscular responses during a Crossfit® competition: a case report

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INTRODUCTION

Crossfit® is a modality characterised by high-intensity functional exercises, which has been attracting an increasing number of adepts due to its highly competitive nature (Claudino et al., 2018). In this sense, it is important to monitor the effects of workload, to maintain performance and prevent non-functional overreaching (Gabbett et al., 2017). Therefore, the aim of our study was to evaluate the effects of a Crossfit® competition on neuromuscular function and the cardiac autonomic nervous system (ANS) of two amateur practitioners.

METHODS

This case study was conducted during a Crossfit® competition with the participation of two amateur practitioners (female: A = 24 years old, 1.64 m, 61.4 kg; and male: B = 31 years old, 1.75 m, 81.6 kg). Competition was composed of three exercise blocks. Neuromuscular function was assessed by countermovement jump (CMJ) in an Optical Jump System (Cefise, Brazil). The participants performed three trials jumps before start of competition (pre) and after each exercise block (post 1, 2 and 3). The highest value among the trials was used for the analyses. Cardiac ANS activity was evaluated through heart rate variability, through the ithete™ app accompanied by an inserted finger sensor on the smartphone (HRV Fit Ltd Southamton, UK). Data was obtained after 1 min of recording, which was transformed in lnRMSSD. We used the percent delta (%Δ) to quantify the differences between the moments.

RESULTS

Absolute values for CMJ and lnRMSSD of each practitioner are described in Table 1. Figure 1 shows the delta (Δ%) variation of performance in the variables throughout the competition for practitioners A and B, respectively. Both subjects presented a decrease in CMJ and lnRMSSD from the pre-start of competition (pre) to the post (post 3) moment.

Table 1

Absolute values for CMJ and lnRMSSD of the two subjects

	A		B	
	CMJ (cm)	lnRMSSD (ms)	CMJ (cm)	lnRMSSD (ms)
Pre	41.2	1.9	56.8	1.8
Post 1	44.2 (↑)	N/A	53.4 (↓)	N/A
Post 2	35.9 (↓)	N/A	51.5 (↓)	N/A
Post 3	34.4 (↓)	1.7 (↓)	52.9 (↓)	1.6 (↓)

CMJ = Countermovement Jump, lnRMSSD = natural log of the root-mean-square difference of successive normal RR intervals, N/A = Variable wasn't recorded in this time, (↓) = decrease, (↑) increase.

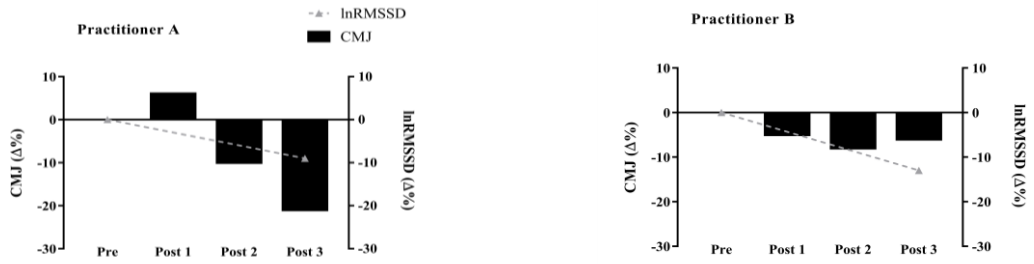

Figure 1. Differences between the moments for the CMJ and lnRMSSD variables of two practitioners

CONCLUSIONS

A Crossfit® competition acutely decreases neuromuscular function and negatively affects the cardiac ANS of practitioners.

Acknowledgments

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References

Claudino, J. G., Gabbett, T. J., Bourgeois, F., Souza, H. S., Miranda, R. C., Mezencio, B., . . . Serrao, J. C. (2018). CrossFit Overview: Systematic Review and Meta-analysis. *Sports Med Open, 4*(1), 11. doi:10.1186/s40798-018-0124-5

Gabbett, T. J., Nassis, G. P., Oetter, E., Pretorius, J., Johnston, N., Medina, D., . . . Ryan, A. (2017). The athlete monitoring cycle: a practical guide to interpreting and applying training monitoring data. *British Journal of Sports Medicine, 51*(20), 1451-1452. doi:10.1136/bjsports-2016-097298

P70. Autonomic and neuromuscular responses of beach volleyball athletes during a period before the South American Championship: a case study

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INTRODUCTION

In beach volleyball as in other sports, the volume training decreases at the end of the preparation period before competition to improve technical-tactical aspects (Nakamura, Pereira, Abad, Franchini, & Loturco, 2016). Therefore, coaches focus on monitoring the training dose-response to quantify fatigue levels that might affect athletes' performance.

METHODS

Two elite athletes, defender (24 years, 84.0 kg, 1.74 m) and blocker (20 years, 87.0 kg, 1.94 m) participated in the study. Monitoring was performed for two weeks, preceding the South American Championship (2018) in Nova Viçosa, Bahia. The total weekly training load (TWTL) was calculated from the sum of the session rating of perceive exertion of each training day and expressed in arbitrary units. Autonomic responses were assessed through heart rate variability (HRV), during one min in the morning, using photoplethysmography in HRV4 training® application. Neuromuscular responses were evaluated in the afternoon, through six attempts using vertical countermovement jump (CMJ). Delta percentage (Δ%) and coefficient of variation (CV) were used to verify the differences between the two weeks. Additionally, effect sizes (ES) were used (Cohen, 1988) to determine the magnitude of the differences.

RESULTS

Table 1 shows defender's and blocker's differences in HRV, TWTL and CMJ performance. Defender presented decrease in neuromuscular performance, in spite of the reduction in internal load. Both athletes suffered reduction in autonomic responses.

Table 1

Differences in HRV, TWTL and CMJ over two weeks of training

		Blocker			Defender		
		HRV (ms)	TWTL (AU)	CMJ (cm)	HRV (ms)	TWTL (AU)	CMJ (cm)
Weeks	1st	8.8 ± 0.3	3590.0 ± 216.6	36.5 ± 2.0	8.2 ± 0.3	3332.0 ± 218,1	43.3 ± 3.6
	2nd	8.0 ± 1.7	3508.0 ± 279.5	38.4 ± 1.0	7.7 ± 0.6	2878.0 ± 153.9	40.7 ± 0.7
Δ%		-9.0	2.3	5.1	-6.0	-13.6	-6.1
CV%		4.4	13.1	2.5	3.0	7.0	3.1
ES		0.8 (large)	0.3 (small)	1.3 (very large)	1.1 (large)	2.4 (very large)	1.2 (large)

CONCLUSIONS

The athletes presented indicators of fatigue using the autonomic responses. Furthermore, the defender showed a reduction in neuromuscular performance. Moreover, athletes demonstrated specific demands according to the player's position.

Acknowledgments

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References

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*, 2nd Edition. Hillsdale: Lawrence Erlbaum.

Nakamura, F. Y., Pereira, L. A., Abad, C. C. C., Franchini, E., & Loturco, I. (2016). Cardiac autonomic and neuromuscular responses during a karate training camp before the 2015 pan american games: A case study with the brazilian national team. *International Journal of Sports Physiology and Performance, 11*(6), 833 -837.

P71. Different intensities of warm up: effects on strength training

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INTRODUCTION

Warm-up is considered an essential part of the exercise and training performance, preventing injuries and optimising physical activity performances (Fradkin, Zazryn & Smolig, 2010). Not much is known about the effects of preparation activities on muscle performance, and, more specifically, on strength training performance (McGowan, Pyne, Thompson & Rattray, 2015). The current study aimed to verify the effect of two different intensities of specific warm-up in a full-squat training set.

METHODS

The full-squat exercise was evaluated regarding the mechanical responses, such as the mean propulsive velocity (MPV), mechanical power (MP) and velocity loss (VL). The physiological and psychophysiological responses (heart rate, tympanic temperature, blood lactate concentration and subjective perception of effort) were also recorded. Fourteen male subjects, aged between 19 and 35 years old (mean ± SD: 24.43 ± 3.98 years-old, 77.71 ± 10.35 kg of body mass, 1.75 ± 0.07 m of height), performed a low-intensity (6 repetitions of 40% of training load) and a high-intensity warm-up (6 repetitions of 80% of training load). Then, after 5min of passive rest, they performed a training set comprising 3x6 repetitions of 80% of 1 repetition maximum (1RM) with 3min of rest.

RESULTS

Differences were found in MPV during the 2nd set (0.61 ± 0.09 vs. 0.66 ± 0.05 m.s-1; $p = 0.01$, $d = 0.79$) and in the 3rd set (0.60 ± 0.08 vs. 0.64 ± 0.07 m.s-1; $p = 0.04$, $d = 0.59$) with higher values for the high-intensity warm-up. Also, higher MP values were found during the 2nd (2696 ± 577 vs. 2938 ± 554 W; $p = 0.03$, $d = 0.67$) and the 3rd training sets (2683 ± 577 vs. 2880 ± 598 W; $p = 0.04$, $d = 0.61$) when high-intensity warm-up was used. Moreover, the maximal MP values were obtained in warm-up with higher intensities ($p = 0.01$, $d = 0.58$, respectively). These results could be caused by the increased tympanic temperature (35.94 ± 0.45 vs. 36.47 ± 0.54 ºC; $p = 0.04$, $d = 0.62$) and lactate values (1.96 ± 0.70 vs. 2.59 ± 0.56 mmol.l-1; $p = 0.01$, $d = 0.88$) recorded after the high-intensity warm-up procedure.

CONCLUSIONS

The results showed that specific warm-up with 80% of training load resulted in better performance in a full-squat training set. It seems that higher intensities of warm-up may be more effective for strength training optimisation.

Acknowledgments

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References

Fradkin, A.J., Zazryn, T.R., & Smoliga, J.M. (2010). Effects of warming-up on physical performance: a systematic review with meta-analysis. *The Journal of Strength and Conditioning Research, 24(1), 140-148*. doi: 10.1519/JSC.0b013e3181c643a0

McGowan, C. J., Pyne, D. B., Thompson, K. G., & Rattray, B. (2015). Warm-up strategies for sport and exercise: mechanisms and applications. *Sports Medicine, 45(11), 1523-1546*. doi: 10.1007/s40279-015-0376-x

P72. Effects of a program of strength training in functional physical capabilities of 12-13 year-old basketball players

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INTRODUCTION

Studies focusing on basketball performance have become increasingly present in sports training. This is basically due to the growing physical demands of the game, to the existing regulatory changes and the increased complexity of tactics. The aim of this study was to analyse the effects induced by additional sessions of strength training in adolescent basketball players. The effects of two training programs (one based on the theory of integrated and other integrated practice plus a complementary work of strength training with body weight) on the level of physical fitness of under-14 basketball players were compared.

METHODS

The sample consisted of 12 volunteer players. The sample was divided into 2 homogenous groups: 1) the experimental group (EG) added a complementary strength training, using the body weight as resistance, for 8 weeks; 2) the control group (CG), only performed the basketball training. Data collection was carried out in the same location, by the same members of the research team and, on the same period of the day after a 10-min. warm-up. and consisted of: (i) a 2kgs medicine ball throw; (ii) vertical countermovement jump without upper limb mobilisation; (iii) and with upper limb mobilisation; (iv) 22 m sprint; (v) agility without the ball; (vi) and with the ball.

RESULTS

The results indicate that the EG significantly improved upper limb strength, assessed by the medicine ball throw. The use of the 6 selected exercises, through the increment of volume every two weeks, promoted in just eight weeks significant improvements that were approximately 10%, larger than the initial test. Eight weeks of complementary work were not enough to induce significant increments on the agility with the ball. However, the EG players improved their agility without the ball, demonstrating a higher skill in changing direction and lateral and rear displacement, compared to the initial level. There were no differences between groups in the lower force level and speed parameters. Whenever upper limbs could be used to balance the body, yield improvements were observed in the EG.

CONCLUSIONS

The differences obtained between the groups strengthen the importance of supplementary strength training in teenage basketball players. Coaches working with these age groups should include multifunctional programs in their practice planning, thus targeting an appropriate physical fitness for basketball playing.

P73. Effects Of A Strength And Conditioning Training Program In The Improvement Of The Physical Fitness In Secondary School Students

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INTRODUCTION

School has a great responsibility for the development of the Physical Fitness in young people. It is a universal institution; with generally good facilities, equipment and a highly qualified academic staff. However, there is evidence that it has not fulfilled this mission. Observations revealed that the quality and time available for physical activities are not enough to develop the physical fitness necessary for students.

The purpose of the present study was to develop and apply a well-designed strength and conditioning training program that is capable of inducing benefits in the physical fitness of secondary school students and compare the effect obtained by the two genders.

METHODS

In this study, 46 students participated, 18 boys and 27 girls, from the 11th Grade at Eça de Queirós Secondary School in Póvoa de Varzim. The Evaluation Processes we used were the "FitEscola" tests. The program took place twice a week in PE classes and lasted about 20' of the 50-minute class. This integrative program (warm-up + strength and conditioning training) consisted of the following phases: (i) 4´ of cardiovascular activation; (ii) 3´ of stretching; (iii) 10' of neuromuscular development (strength, power and muscular endurance) and (iv) 3´ of plyometric and agility exercises. It took place in the 2nd trimester (Christmas and Easter - 11 weeks).

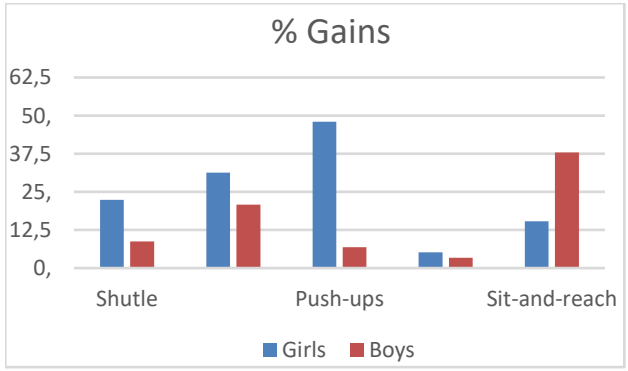

Figure 1. Percentage of gains obtained by secondary students (girls vs boys) after the application of strength and conditioning training program

RESULTS

The analysis of the results showed there were gains between the 1st and the 2nd moments of evaluation in all tests of FitEscola. In figure 1, we can see these positive effects, which were the following: in the shuttle test 22,34 vs 8,76; curl-ups 31,28 vs 20,81; push-ups 47,96 vs 6,86; horizontal jump 5,19 vs 3,35 and sit-and-reach 15,35 vs 37,93, girls and boys respectively. Regarding the female students, the gains were statistically significant in all tests (p≤,000). However, concerning the male students there were only significant results in curl-ups (p=,023), horizontal jump (p=,038) and sit-and-reach (p=,000). When we compare the gains between girls and boys, we did not find significant differences.

CONCLUSION

This study shows that introducing a strength and conditioning program can improve the physical fitness of all students; this was much more evident in girls, probably because they started at lower fitness levels. These findings suggest the need to integrate more fitness activities into PE lessons.

References

Sallis, J. F., & McKenzie, T. L. (1991). Physical education's role in public health. *Res Q Exerc Sport, 62*, 124-137.

Siegel, J. A., & Manfredi, T. G. (1984). Effects of a ten-month fitness program on children. *Physician Sportsmed, 12*, 91-97

P74. Effects Of A Warm-Up And Strength And Conditioning Training Programs In The Improvement Of The Physical Fitness In Athletes Versus Non-Athlete Female Students

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INTRODUCTION

We can generically divide young people into two categories: (i) inactive young people who are, most and desperately, in need of physical activity to strengthen their muscles, increase their cardiovascular capacities and improve their motor skills and (ii) young athletes who need to increase their fitness capacities to safeguard their integrity and fundamentally to improve their athletic performance. The main aim of this study was to compare the physical capacity gains obtained by two groups of female students at a secondary school, one who practised a certain sport and another who did not, when submitted to an innovative warming and an integrated strength and conditioning training programs.

METHODOLOGY

In this study 46 female students participated, 18 non-athletes and 27 athletes, from the 11th Grade at Eça de Queirós Secondary School in Póvoa de Varzim. The Evaluation Processes we used were the "FitEscola" tests. The program took place twice a week in PE classes and lasted about 20' of the 50-minute class. This integrative program (warm-up + strength and conditioning training) consisted of the following phases: (i) 4´ of cardiovascular activation; (ii) 3´ of stretching; (iii) 10' of neuromuscular development and (iv) 3 of plyometric and agility exercises. It took place in the 2nd trimester (11 weeks).

RESULTS

The analysis of the results showed that all tests of Fitescola revealed statistically significant gains when comparing the values between the 1st and the 2nd moments of evaluation ($p \leq ,002$). When we compared the gains achieved by athletes versus non-athletes' students, we obtained the following results: in the abdominal test, the athletes gained 13,2%, while the non-athletes obtained only 9,7%. In regard to the flexion test, the non-trained improved in 44,7% versus the athletes' 45,2%, in the lower strength the athletes showed gains of 4,5% and the non-athletes of 4,6%. In the shuttle test, non-athletes gained 17,7% versus the athletes' 30,2%. In the sit-and-reach test, the improvement of the non-athletes was 14% and in the athlete students' was 17,4%.

CONCLUSION

This study shows that introducing an optimised warm-up and including integrated strength and conditioning training programs can improve the physical fitness in all female students. It should be noted that these benefits are essential for students who do not practice any institutionalised sport and seem to be complementary to athletes, hence the importance of its implementation in a school context.

References

Carvalho, C.; Dias, I.; Sá, P.; Duarte, A. M.; Gonçalves & F. Vieira, L. (2016). Treino da Força em Jovens Adolescentes no contexto Escolar. In Serra, N., Vila-Chã, C., Casanova, N., Esteves, P. & Costa, M. (Eds.) Livro de Abstracts do XIII SIEFLAS (Seminário Internacional de Educação Física, Lazer & Saúde) Instituto Politécnico da Guarda, julho (ISBN: 978-972-8681-70-8, Deposito Legal 428616/17), 83

Faigenbaum (2007). Resistance training for children and adolescents: Are there health outcomes? *American Journal Lifestyle Medicine, 1*(190), 190-200

Faigenbaum, A, Farrell, A, Fabiano, M, Radler, T, Naclerio, F, Ratamess, N, Kang, J, and Myer, G. (2011). Effects of integrated neuromuscular training on fitness performance in children. *Pediatr Exerc Sci* 23: 573–584.

P75. Effects of plyometric training programs in SSC

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INTRODUCTION

Plyometric training is a commonly used method to maximize strength production and performance, based on the use of the stretching-shortening cycle (SSC) (Bosco & komi, 1979; Cavagna et al., 1968; Häkkinen et al., 1984). This type of training is seen as the bridge between strength and power.

METHODS

This study aimed to observe the effects of three different plyometric training programs with a duration of 11 weeks, 3 of evaluation and 8 of training on jump height, speed of takeoff and flight time. Twenty-four students of the Sports Faculty of the University of Porto were involved in the study divided into 4 groups: Assisted Group (AG), Plyometric Group (PG), traditional group (TG) and control group (CG). Kruskal Wallis and Friedman test were used to observe significant differences ($p \leq 0.05$) between groups and the different repeated measures respectively. When the differences were detected the Mann-Whitney U test was used to determine between which groups there were significant differences, as Wilcoxon test was used for the repeated measures.

RESULTS

The results show that the three training programs have achieved significant improvements in the jump height and flight time variables. At the speed of takeoff, only the PG has achieved significant differences. The subjects expressing higher significant differences in the jump height and flight time were those of the GP and GT, $p < 0.001$ for both groups, when comparing the initial and final moments of evaluation, $p < 0.05$ for the GA. In the post test all groups improved significantly when compared with GC (jump height: GA and GP $p < 0.05$; GP and GC $p < 0.01$; GT and GC $p < 0.01$. Flight time: GA and GC $p < 0.05$; GP and GC $p < 0.01$; GT and GC $p < 0.01$. Vel Takeoff: GT and GC $p < 0.01$).

CONCLUSION

Assisted and traditional groups improve the jump height and flight time; plyometric training group improves all variables studied. It was concluded that traditional training method enhance jump heights and flight times higher than assisted training.

References

Bosco, C., & komi, P. V. (1979). Potentiation of the mechanical behavior of the human skeletal muscle through prestretching. *Acta Physiologica Scandinavica, 106*(4), 467-472.

Cavagna, G. A., Dusman, B., & Margaria, R. (1968). Positive work done by a previously stretched muscle. *Journal of applied physiology, 24*(1), 21-32.

Häkkinen, K., Alen, M., & Komi, P. (1984). Neuromuscular, anaerobic, and aerobic performance characteristics of elite power athletes. *European journal of applied physiology and occupational physiology, 53*(2), 97-105.

P76. Muscle Activity Relationship Between Bicycle Geometric Parameters

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INTRODUCTION

Different factors and their interactions, all dependent to a greater or lesser extent on the neuromuscular system and its efficiency, have been proposed as determinants of endurance cycling performance: muscle fibre type, pedalling cadence and technique, or muscle fatigue (Castronovo et al., 2013). Geometric factors like handlebar height and bicycle frame length are generally adjusted to optimize the biking seating position. The aim of this study was to analyse the effects of different exercise conditions on muscular activity in 30-sec maximal cycling exercise.

METHODS

Nine male recreational cyclists participated in this study (21.6±1.9 years; 75.3±5.8 kg; 1.8±0.1 m; crotch height: 9.5±26.1 m; seat height: 0.7±0.0 m; saddle distance from the handlebar_ high: 0.6±0.0 m; saddle distance from the handlebar low: 0.5±0.0 m). Each subject performed: i) five minutes warm-up and ii) 30 seconds at maximal intensity in a specifics conditions: a) handlebar height (high and low) and in a b) specific bicycle frame length (long and short), according to the previous measures of each subjects. Using a wireless signal acquisition system (bioPlux research, Portugal), surface EMG was collected in 4 muscles trapezius descendens (upper) (TD), latissimus dorsi (LD), gluteus maximus (GM) and deltoid anterior (DA). EMG analysis were conducted with a MATLAB routine. The average amplitude of EMG of each active phase was estimated using the average rectified value (ARV) and plotted as a function of time. Statistical difference was set at $p<0.05$.

RESULTS

In the 30-sec at maximal cycling intensity in the 4 different exercise conditions (handlebar_high “C1” and low “C2” and frame length_long “C3” and short “C4”) no statistical differences were observed in ARV in TD and LD muscles. Regarding GM muscle, statistical differences in ARV were observed in relation to handlebar low with long and short bicycle frame, namely C2 and C4 ($p<0.05$) and C1 and C4 ($p<0.01$). Also, in DA muscle, ARV was statistically different in C3 relatively to C1 and C2 ($p<0.01$).

CONCLUSIONS

This study revealed that exercise conditions in cycling influence muscle activity, namely lower body gluteus maximus and deltoid anterior muscles, both in relation to bicycle frame and handlebar height. These evidences should be considered in daily training basis and in competition moments.

References

Castronovo, A. M., Conforto, S., Schmid, M., Bibbo, D., D’Alessio, T. (2013). How to assess performance in cycling: The multivariate nature of influencing factors and related indicators. *Frontiers in Physiology*; 21; 4: 116: doi:10.3389/fphys.2013.00116.

P77. The effect of maturation on adaptations to strength and power training considering basketball-specific skills in youth basketball

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INTRODUCTION

Despite the benefits of strength and power training approach considering specific technical skills (Schelling & Torres-Ronda, 2016), the scientific examination of the effects of this training approach in young athletes, particularly considering the maturational status, is still scarce. The aim of this study was to assess changes in high-intensity actions, neuromuscular, aerobic fitness and shooting performance after a training program focused on strength and power development, according to maturation status.

METHODS

Twelve under-16 regional level basketball players (height = 175.9±8.7 cm; weight = 68.2±12.1 kg) participated in this study. Participants were grouped according to their maturity offset (MO), in more mature (n=5; MO = 2.2±0.8 y) and less mature (n=7; MO = 0.6±0.3 y). All subjects completed a 15-week on-field strength and power training program. The 3 exercise sequences with general and directed orientation level exercises (I, 0-, II, and 0- levels in each sequence) were adopted. Prior and after the training program, maximal strength (1RM Back Squat and Bench Press), aerobic fitness (YO-YO IR1), jumping ability (SJ, CMJ and Abalakov jump), reactive strength (30cm drop jump), (Ballistic Push-Up), agility (V-cut and T-tests), sprinting (0-10, 10-20 and 0-20m split times), 2-point after dribble and 3-point shooting were assessed. Also, lower limb asymmetry index (ASI) was calculated. Specifically-designed spreadsheets were used to analyse within- and between-group changes using magnitude-based inferences.

RESULTS

Within-group analysis showed moderate improvements in 1RM Back Squat, RSI, T-test, 0-10 and 0-20m split times in both groups. The less mature presented moderate improvements in ASI and 3-point shooting, while more mature moderate improved Ballistic Push-Up. Between-group analysis (Figure 1) it showed better results in maximal strength indicators and jumping abilities, after training period in the more mature group. In contrast, the less mature group showed larger improvements in aerobic fitness, and shooting performance.

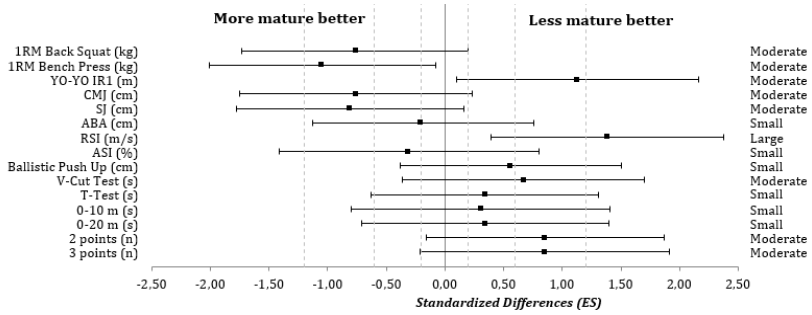

Figure 1. Effects of strength and power training program on various performance indices

CONCLUSION

The strength and power training considering basketball-specific skills was beneficial to develop physical conditioning in young basketball players. However, the benefits of this training approach are variable according to the maturational status.

References

Schelling, X., & Torres-Ronda, L. (2016). An Integrative Approach to Strength and Neuromuscular Power Training for Basketball. *Strength and Conditioning Journal*, *38*(3), 72–80.https://doi.org/10.1519/SSC.0000000000000219

P78. The effect of warm-up for maximal strength performance: brief review

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INTRODUCTION

Warm-up is used with the purpose to progressively adapt physically and psychologically for the main activity. The main aim is to increase the performance and to decrease the risk of injuries (Neiva et al, 2014; Silva et al, 2018). To the best of our knowledge, no detailed studies have comprehensively examined the literature regarding the effects of different warm-up designs on 1RM performance. Therefore, the purpose of this study was to analyse the effects of different strategies of specific warm-ups on 1RM performance, thus contributing for increased knowledge to coaches and researchers on the warm-up design for resistance training.

METHODS

Databases (Web of Science, Scopus, PubMed, and ScienceDirect) were searched for original research articles published until 2017 (key-words: "warm-up", "1RM", "general warm-up", "specific warm-up" and" no-warm-up"). A total of 18 studies were considered for further analysis.

RESULTS

The results found that general warm-up followed by a specific exercise when compared with only a specific warm-up, does not reveal consensual results. There were studies that revealed significant positive results when the subjects use only the specific warm-up (e.g. Ribeiro et al, 2014; Gil et al., 2015) and only one study revealed the opposite (Endlich et al., 2009). Some studies suggest that when the specific warm-up is performed at loads close to the maximum, the ability to produce strength can be positively affected (Junior et al, 2014). However, other studies verified the efficacy of the specific warm-up and no significant results were found (Abbud et al, 2013).

CONCLUSIONS

The results about the influence of warm-up on strength performance showed ambiguous results, perhaps caused by the different procedures and methods of evaluation. It seems that specific warm-up is the one that most affect strength performance, revealing its importance for resistance training. However, it was shown that some specific tasks, such as stretching and light loads, can negatively affect the strength performance.

Acknowledgments

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References

Ribeiro, A., Romanzini, M., Schoenfeld, B., Avelar, A., Souza, M., & Cyrino, E. (2014). Effect of different warm-up procedures on the performance of resistance training exercises. Perceptual & Motor Skills: Motor Skills & Ergonomics. 119, 1, 133-145.

Junior, D., … Marchetti P. (2014). Diferentes aquecimentos no desempenho de repetições máximas na musculação. Rev Bras Med Esporte – Vol. 20, Nº 6.

Endlich, P., Farina, G., Dambroz, C., Gonçalves, W., Moysés, M., Mill, J., & Abreu, G. (2009) Efeitos Agudos do Alongamento Estático no Desempenho da Força Dinâmica em Homens Jovens. Rev Bras Med Esporte – Vol. 15, Nº 3.

Neiva, H.P., Marques, M.C., Barbosa, T., Izquierdo, M., & Marinho, D.A. (2014) Warm-Up and Performance in Competitive Swimming. Sports Med 44:319–330. doi: 10.1007/s40279-013-0117-y. Published online: 1 November 2013. Springer International Publishing Switzerland 2013.

Silva, L.M., Neiva, H.P., Marques, M.C., Izquierdo, M., & Marinho, D.A. (2018) Effects of Warm-Up, Post-Warm-Up, and Re-Warm-Up Strategies on Explosive Efforts in Team Sports: A Systematic Review. Send to Sports Med; 48(10):2285-2299. doi: 10.1007/s40279-018-0958-5.

Abbud, N., Tabet, J., & Dias, M. (2013) Efeito do aquecimento específico em um teste de repetições máximas no exercício de supino reto. Revista Eletrônica da Faculdade Metodista Granbery http://re.granbery.edu.br.

Gil, S., Roschel, H., & Barroso, R. (2015). O efeito do aquecimento geral no desempenho da força máxima de membros superiores e inferiores. Revista Brasileira de Prescrição e Fisiologia do Exercício, São Paulo. v.9. n.55. p.493-498. ISSN 1981-9900.

P79. The effects of post-warm-up strategies in team sports performance: a qualitative review

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INTRODUCTION

In team sports, it is known that the warm-up improves acute explosive performance. However, the time delay between the warm-up and the start of the match (post-warm-up) could reduce the positive metabolic effects of the warm-up. Usually, it takes approximately 12 min of transition time (McGowan et al. 2015). Knowing that after 6 min following the warm-up, the core temperature significantly decreases, and heart rate and muscle temperature returns to baseline values (Crowther et al., 2017), the transition interval could negatively influence the performance. The analysis of the research carried out in this context may provide valuable knowledge to maintain optimised athletes' performance at this vulnerable stage. The aim of this qualitative review is to synthesise and analyse scientific evidences on the effects of post-warm-up strategies highlighting the best methodologies.

METHODS

Databases (Web of Science, Scopus, PubMed, and ScienceDirect) were searched for original research articles published until August 2017. A total of 5 articles fulfilled the inclusion criteria for analysis. Results were all recalculated to determine effect sizes.

RESULTS

It was identified in research that inactivity during the post-warm-up interval would lead to losses in explosive performance. Therefore, studies tend to recommend the use of heated garments, resulting in better outcomes than simple rest (−0.89%, d = 0.39) (Kilduff et al., 2013). Still, if the transition is longer than 15 min, it can lead to a loss of 15,4% in explosive performance (Crowther et al., 2017). Therefore, before entering the match, performing a re-warm-up with short-term explosive tasks to reactivate is the most effective approach (−1.97%, d = −0.86) (West et al., 2016).

CONCLUSIONS

It was verified that post-warm-up strategies are fundamental for maintaining the athletes' performance during the transitions, however empirical research is scarce to support the theory and propose practical recommendations.

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References

Crowther, R.G., Leicht, A.S., Pohlmann, J.M., Jessica M., & Shakespear-Druery, J. (2017). Influence of rest on players' performance and physiological responses during basketball play. *Sports*. 5(27):1–6.

Kilduff, L.P., West, D.J., Williams, N., Cook, C.J. (2013). The influence of passive heat maintenance on lower body power output and repeated sprint performance in professional rugby league players. *J Sci Med Sport*. 5:482–6.

McGowan, C.J., Pyne, D.B., Thompson, K.G., Rattray, B. (2015). Warm-up strategies for sport and exercise: mechanisms and applications. *Sports Med*. 45:1523–46.

West, D.J., Russell, M., Bracken, R.M., Cook, C.J., Giroud, T., Kilduff, L.P. (2016). Post-warmup strategies to maintain body temperature and physical performance in professional rugby union players. *J Sports Sci.* 34(2):110–5.

P8o. The effects of strength training followed by detraining in swimming

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INTRODUCTION

The propulsive force is considered essential for swimming performance (Morouço et al., 2011). There is a general belief that strength training could be used to improve force development and performance (Haycraft & Robertson, 2015). However, the scientific evidences are still not clear on the better training program and its efficacy. The present study aims to verify the effects of a strength training program for 8 weeks followed by a 4-week detraining period in swimming performance.

METHODS

Eight competitive swimmers of national level volunteered to participate in the current study (16.00 ± 0.53 years old; 545 ± 70 FINA points). The strength training program lasted for 8 weeks (3 sessions per week) and consisted on medicine ball throwing, vertical jumps, push-ups, and lat pulldown. Each exercise was performed at maximal concentric velocity (2-4 sets of 4-10 repetitions), with 3min of rest between repetitions. After 8 weeks, the strength training was ceased. The swimmers were evaluated before and after the strength training and after a detraining period of 4 weeks. Strength performance was assessed by the countermovement jump (CMJ), 3kg medicine ball throwing, maximal number of push-ups, and maximal load in lat pulldown exercise (1RM). A time-trial of 100 m freestyle was assessed to determine swimming performance. The stroke frequency (SF), distance per stroke (DPS), and stroke index (SI) were also assessed.

RESULTS

A significant improvement in the 100m swimming performance was found after the strength training (0.8%, CI95% 0.28, 1.33%; $p = 0.02$), mainly because of the increased stroke efficiency verified in the second part of the time trial (3.71 ± 0.36 vs. 3.88 ± 0.43 m2 c-1 s-1, $p = 0.05$). Strength variables showed increased performances after training period (ES > 0.5). After the strength training cessation, the 1RM lat pulldown showed some gains (ES =0.59), while CMJ decreased significantly (ES = 0.80). Despite a tendency for decreased performance, no significant changes were found in swimming performance after detraining.

CONCLUSIONS

Eight weeks of strength training, with low loads and high-velocity movements, increased upper and lower-body muscular strength and improved 100m swimming performance, mainly because of the better swimming efficiency in the second part of the race.

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References

Haycraft, J., & Robertson, S. (2015). The effects of concurrent aerobic training and maximal strength, power and swim-specific dry-land training methods on swim performance: a review. *Journal of Australian Strength and Conditioning, 23* (2), 91-99.

Morouço, P., Keskinen, K. L., Vilas-Boas, J. P., & Fernandes, R. J. (2011). Relationship between tethered forces and the four swimming techniques performance. *Journal of Applied Biomechanics*, *27*(2), 161-169.

P81. The effects of warm-up in 10om repeated sprints

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INTRODUCTION

The warm-up has been used by athletes before training and competition (Silva, Neiva, Marques, Izquierdo & Marinho, 2018). Nevertheless, little is known about the ideal design and structure to maximize the performance (Fradkin, Zazryn & Smoliga, 2010). So, the aim of the present study was to analyse the acute effects of different warm-up procedures in 100m repeated sprint performances.

METHODS

Eleven physically active subjects (mean ± SD: 27.18 ± 9.67 years-old, 1.76 ± 0.08m of height, 78.21 ± 8.59kg of body mass) participated in the study. Three warm-ups were randomly performed by each participant (no warm-up: NWU, typical warm-up: TWU, and warm-up using post-activation potentiation: PAP). After 5min of passive rest, two repetitions of 100m running time-trials were performed, with 10min of interval between. Physiological variables (heart rate: HR, tympanic temperature, blood lactate concentrations) and kinematics (sprint time, stride frequency (SF) and stride length (SL) were assessed in both trials.

RESULTS

The total time of both sprints showed to be lower when the subjects performed the warm-up (NWU: 15.86 ± 1.01s; TWU: 14.68 ± 1.23s; PAP: 14.66 ± 1.52s), with significant differences between NWU and TWU ($p = 0.006$, ES = 0.97) and between NWU and PAP ($p = 0.007$, ES = 0.86). These differences could result from the increased SF (NWU: 1.75 ± 0.22Hz; TWU: 1.90 ± 0.12Hz; PAP: 1.91 ± 0.10Hz) and increased SL (NWU: 3.37 ± 0.32m; TWU: 3.47 ± 0.42m; PAP: 3.47 ± 0.42m) in the second part of the 100m trial. The warm-ups increased the HR, the tympanic temperatures and blood lactate concentrations before the first trial, possibly influencing the running kinematics and performance. In the second 100m trial, no significant differences were found between procedures (NWU: 14.89 ± 1.11s; TWU: 14.77 ± 1.29s; PAP: 14.75 ± 1.52s). However, there was an improvement of 6.03% from the 1st to the 2nd sprint time in those who did not perform warm-up, and no differences existed between the remaining conditions.

CONCLUSIONS

Our results suggest that warm-up is beneficial to sprint running performance, with relevant changes in physiological and kinematics variables. In addition, it seems that a short warm-up using just only one sprint might be as effective as a typical warm-up protocol and could be used as alternative when no time is available to warm-up properly.

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References

Fradkin, A.J., Zazryn, T.R., & Smoliga, J.M. (2010). Effects of warming-up on physical performance: A systematic review with meta-analysis. *Journal of Strength and Conditioning Research, 24*(1), 140-148. doi: 10.1519/JSC.0b013e3181c643a0

Silva, L.M., Neiva, H.P., Marques, M.C., Izquierdo, M., & Marinho, D.A. (2018). Effects of warm-up, post-warm-up, and re-warm-up strategies on explosive efforts in team sports: a systematic review. *Sports Medicine, 48*(10), 2285-2299. doi: 10.1007/s40279-018-0958-5

P82. The use of minimal equipment to elicit post-activation potentiation over a warm-up routine in competitive swimming

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INTRODUCTION

Warming-up is paramount to deliver good performances in sports (Neiva et al., 2014). Recently there has been an increased interest in determining whether post-activation potentiation (PAP) included in a warm-up routine can improve performances. The aim of the study was to investigate if the use of minimal, light and portable equipment, such as resistance bands, would induce PAP and result in a performance enhancement in an all-out bout in swimming. The hypothesis under testing was that this equipment would induce PAP and result in better performance.

METHODS

Eleven swimmers enrolled in a national high-performance programme and racing on regular basis at national and international competitions (including regional games medallists) were recruited. Participants performed an all-out 50-m front-crawl swim 8min after two warm-up routine (random crossover): (i) a warm-up featuring a set of upper-body PAP conditioning (UPAP) which was performed by doing resistance band pulls and; (ii) a warm-up with no PAP conditioning (SWU). The time trials were clocked by an official timing system (Wylas Timing System, Colorado Timing Systems, US) synchronised with touch pads (OCP5, Omega, Switzerland). Split times (15m, 25m, 35m, 45m and 50m) and stroke mechanics per splits (stroke rate, stroke length) were recorded (f=50Hz; Photonfocus, 2048 GigE, Switzerland) and then measured on a video analysis software (Dartfish Analysis, TeamPro Data v.9, Switzerland). The anaerobic alactic power (ATP-PCr) was also estimated over each trial (Figueiredo et al., 2011). Paired T-test ($p<0.05$) and Cohen's d were selected to compare mean differences.

RESULTS

Seven out of 11 participants had a faster UPAP time trial, one had the same time and, four had slower trials. The start showed trivial-moderate changes ($0.17<d<0.22$) being the flight time significantly faster in the UPAP ($p=0.02$). The split times in the first half of the trial were significantly better in the UPAP condition, yielding moderate effect sizes ($0.001<p<0.03$; $0.26<d<0.35$). Over the second half, the changes were trivial ($0.13<p<0.43$; $0.11<d<0.17$). The SR was moderately slower ($p=0.14$; $d=0.51$) and SL strongly longer ($p=0.09$; $d=0.60$) in the UPAP; conversely, in the 35-45m split SR was faster ($p=0.29$; $d=0.34$) and SL shorter ($p=0.34$; $d=0.18$) in the UPAP. The ATP-PCr power was significant and moderate larger in the first 25m in UPAP ($0.001<p<0.03$; $0.25<d<0.35$).

CONCLUSIONS

The UPAP effect fades out over the 50m trial. UPAP changed the SR-SL combination and enhanced the ATP-PCr power in the first half of the trial. Altogether, the UPAP elicited by minimal, light and portable equipment is likely beneficial.

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References

Figueiredo, P., Zamparo, P., Sousa, A., Vilas-Boas, J. P., & Fernandes, R. J. (2011). An energy balance of the 200 m front crawl race. *European Journal of Applied Physiology*, *111*(5), 767-777. doi: 10.1007/s00421-010-1696-z

Neiva, H. P., Marques, M. C., Barbosa, T. M., Izquierdo, M., & Marinho, D. A. (2014). Warm-up and performance in competitive swimming. *Sports Medicine, 44(3)*, 319-330. doi: 10.1007/s40279-013-0117-y

P83. Warm up and psychological related effects - a systematic review

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INTRODUCTION

Typically, a sport training session starts with a warm-up routine. There are a lot of studies that explain this phenomenon, mainly on its physiological impacts (Silva, Neiva, Marques, Izquierdo, & Marinho, 2018), with a strong injury prevention focus. However, the warm-up psychological factors don't seem to be solid on literature. The purpose of this study is to systematically review the scientific research that focus on the psychological related effects of the warm-up.

METHODS

An initial process of identification was conducted in three databases (Web of science, PubMed, and SportDiscus). All articles were manually screened by abstract, then by full text reading. Relevant cited articles in the screened articles were added. PRISMA (Preferred Reporting Items for Systematic reviews and Meta- Analyses) guidelines led this review (see Fig. 1).

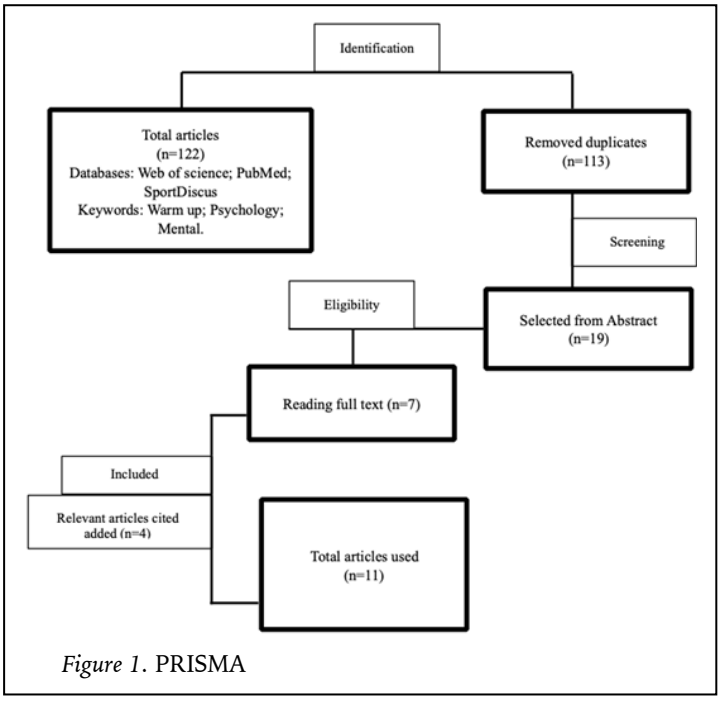

Figure 1. PRISMA

RESULTS

The use of hypnosis to control the psychological influence on performance has shown that the psychological aspects could be determining factors for warming-up (Massey, Johnson, & Kramer, 1961). Withal temperature-related mechanisms seem to have a lot of impact on performance, yet the investigation conducted to psychological effects is scarce (Bishop, 2003). Trained cross-country runners didn't increase by warming up mental and physical parameters associated with VO2max (Weise, Jansa, Williams, King, & Southall, 2011). Curiously the most successful Olympian athletes shown a greater use of certain performance strategies (self-talk, emotional control, automatic imagery,…), some of those before competition. Furthermore a well-oriented warm-up can be an opportunity to increase motivation and enjoyment, even with limited sample (n=76), athletes (students) that are used to warming-up suggeste greater levels on both (Ladwig, 2013). A study with semi-professional football players showed that warm-up increased readiness sensation, but showed no positive improve on physical performance (Pardeiro & Yanci, 2017). Regarding team sports issue, after warming-up players (handball) perception of stress decreased, furthermore warming-up duration influenced mentally and physically. (Romaratezabala, Nakamura, Castillo, Gorostegi-Anduaga, & Yanci, 2018). Standardised warming-up time must be 10 and 15 min (Silva et al., 2018). We should consider that its purpose varies with each practice, recognising athletes psychological feedback as indispensable.

CONCLUSIONS

Warm-up needs an evolution that transcends physical aspects for a certain task and open space for specific psychological issues. Future research should consider the mental impact of each warm-up exercise.

References

Bishop, D. (2003). Warm up I: Potential mechanisms and the effects of passive warm up on exercise performance. *Sports Medicine*. https://doi.org/10.2165/00007256-200333060-00005

Ladwig, M. A. (2013). The psychological effects of a pre-workout warm-up : An exploratory study. *Journal of Multidisciplinary Research*, *5*(3), 79–87.

Massey, B. H., Johnson, W. R., & Kramer, G. F. (1961). Effect of Warm-Up Exercise upon Muscular Performance Using Hypnosis to Control the Psychological Variable. *Research Quarterly. American Association for Health, Physical Education and Recreation*, *32*(1), 63–71. https://doi.org/10.1080/10671188.1961.10762072

Pardeiro, M., & Yanci, J. (2017). Efectos del calentamiento en el rendimiento físico y en la percepción psicológica en jugadores semi profesionales de fútbol. [Warm-up effects on physical performance and psychological perception in semi professional soccer players]. *RICYDE. Revista Internacional de Ciencias Del Deporte*, *13*(48), 104–116. https://doi.org/10.5232/ricyde2017.04802

Romaratezabala, E., Nakamura, F. Y., Castillo, D., Gorostegi-Anduaga, I., & Yanci, J. (2018). Influence of warm-up duration on physical performance and psychological perceptions in handball players. *Research in Sports Medicine*, *26*(2), 230–243. https://doi.org/10.1080/15438627.2018.1431536

Silva, L. M., Neiva, H. P., Marques, M. C., Izquierdo, M., & Marinho, D. A. (2018). Effects of Warm-Up, Post-Warm-Up, and Re-Warm-Up Strategies on Explosive Efforts in Team Sports: A Systematic Review. *Sports Medicine*, *48*(10), 2285–2299. https://doi.org/10.1007/s40279-018-0958-5

Weise, S., Jansa, C., Williams, R., King, A., & Southall, S. (2011). Effect Of Warm-up On Physiological And Psychological Components in Trained Distance Runners With VO2max Testing. *Medicine & Science in Sports & Exercise*, *43*(Suppl 1), 864. https://doi.org/10.1249/01.MSS.0000402410.83270.a9

O37. The statistics which qualified Portugal for the European Volleyball Championship 2019

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INTRODUCTION

One of the factors that increases a team's performance is related to the knowledge of tactical procedures that coaches have on opponent teams, as well as their athletes both individually and collectively. *Match analysis* is perhaps one of the most *important* tools for analysing games and extracting valuable information in order to understand the coaches' performance strategy (João et al., 2010). The aim of this study was to determine which skills (block, service, and attack) and playing positions are factors in predicting a team's classification and success in Volleyball.

METHODS

The study sample was composed by eight senior national teams, both male and female who played during a six-month period for the qualification to the 2018 European Volleyball Championship. The data recording and analysis were performed by Data Volley Software Version 4.0). The discriminating function analysis was used to identify variables that contribute the most to establish the maximum difference between wins and losses; values of linear composites $|SC| \geq .30$. The statistical procedures were performed within the SPSS software package, version 24.0 (IBM, Corporation, USA) and statistical significance was set at $< .05$.

RESULTS

The variables which contributed the most for the discrimination between the skills that dictated victory and defeat were, in men' teams, attack point (SC=.68), ace serve (SC=.47), block point (SC=.44), and service error (SC= -.36); whereas in women' were ace point (SC=-.42), attack point (SC=.40), service error (SC= -.36), and reception error (SC=-.34). The players who scored the most (effectiveness) were the outside hitters. The liberos presented a percentage of success (%) in reception. Previously in service effectiveness, the outside hitters and setters have been quite successful. In relation to block action, this effectiveness has been attributed to the middle blockers.

Table 1.

Discriminant function structure coefficients and tests of statistical significance.

Variables	SC	Variables	SC
	Men´s		Women's
Attack Point	.68*	Ace Point	.42*
Ace Serve	.47*	Attack point	.40*
Block point	.44*	Serve error	-.36*
Serve error	-.36*	Reception Error	-.34*

*$|SC| \geq .30$

CONCLUSIONS

Attack, service and block point variables showed the strongest relationships to performance, whereas service error was the variable that needed to be improved. These results suggest that, in high-level volleyball matches, it is more important to take more risks in the attack in an effort to score more, and maintain a good strategy in block organisation. In women' competitions reception needs an improvement throughout training. In conclusion, the most effective players: in the offence are the outside hitters; in the service it is the setter; in reception, the libero has a fundamental role in the offensive organisation; and, the middle blocker is the key to the block's organisation.

Acknowledgments

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References

João P V, Leite, N, Mesquita I, Sampaio J. (2010). Sex differences in discriminative power of volleyball game-related statistics. *Perceptual and Motor Skills*, 111, 3, 893-900. doi: 10.2466/05.11.25.PMS.111.6.893-900

Natalia Valladares, J. Vicente García-Tormo and Paulo Vicente João (2016) Analysis of variables affecting performance in senior female volleyball world Championship 2014. *International Journal of Performance Analysis in Sport*, 16(1), 401-410. doi: 10.1080/24748668.2016.11868895

O38. Pitch-Size constraint in Futsal Learning

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INTRODUCTION

Small-sided games (SSG) have been used as a reliable method to improve learning in team sports, since it allows the simultaneous development of technical, tactical and physical capacities of players through the manipulation of tasks constraints (Davids, Araújo, Correia, & Vilar, 2013; Hill-Haas, Dawson, Impellizzeri, & Coutts, 2011). However, it is important to design appropriate learning environments according to different ages or levels of practice (Travassos, Coutinho, Gonçalves, Pedroso, & Sampaio, 2018). Thus, this study evaluated the effects of a training program sustained in the manipulation of the pitch size in the learning of the futsal game by young players.

METHODS

The sample was composed by 17 players from the U13 age group (11.5±0.52 years) and 16 from the U15 (13.8±0.45 years). Each team was divided into two groups, that simultaneously performed the same exercise (3vs3+Gk) during twelve training sessions in which the pitch size was manipulated. That is, while one of the groups performed the exercise in a small space (20 x 10m), the other group performed it in a large space (30x15m). The participants were tested using a randomised pretest to posttest design, using a Gk+4vs4+Gk. The technical actions of players during the pretest and posttest were recorded using a notational analysis. Statistical treatment was performed using inferences based on magnitude of effects.

RESULTS/DISCUSSION

In the U13, there was a decrease in the number of dribbles (very large effects) and in changes of direction (moderate effects) after the intervention in the group who trained in small pitch sizes. In contrast, there was an increase in the number of dribbles (very large effect) after the intervention of the U15 group who trained in shorter spaces. Finally, it was also found an increase in the number of passes (very large effects) after the intervention for the U15 group that trained in large pitch sizes.

CONCLUSIONS

The lower number of dribbles following the intervention in the U13 group who practiced in shorter pitches suggest that this age group may not possess sufficient technical-tactical and perceptual skills that allows them to use the dribble. In turn, in the U15, decreasing the pitch size seems to emphasise information related to the dribble, while increased spaces seem to highlight information related to the pass. The results found in this study revealed that the pitch size seems to be a key constraint to be considered by the coaches.

References.

Davids, K., Araújo, D., Correia, V., & Vilar, L. (2013). The science of team games: How small-sided games enhance acquisition of movement and decision-making skills. *Exercise and Sports Science Reviews*(41), 154-161.

Hill-Haas, S., Dawson, B., Impellizzeri, M., & Coutts, J. (2011). Physiology of Small-Sided Games Training in Football: A Systematic Review. *Sports Medicine, 41*(3), 199-220. doi:0112-1642/11/0003-0199

Travassos, B., Coutinho, D., Gonçalves, B., Pedroso, P., & Sampaio, J. (2018). Effects of manipulating the number of targets in U9, U11, U15 and U17 futsal players' tactical behaviour. *Human movement science, 61*, 19-26.

O39. All star players and winning teams in Futsal

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INTRODUCTION

In team sports, some research has been developed with the goal to understand the contextual and situational variables that characterise the winning teams, the best teams or even the all-star players (Castellano, Casamichana, & Lago, 2012; Peñas, Ballesteros, & Rey, 2011; Sampaio, Drinkwater, & Leite, 2010; Sampaio et al., 2015). In futsal, previous research has focused on the analysis of different types of attacking play (Gómez, Moral, & Peñas, 2015; Sarmento et al., 2016) or even the ball possession effectiveness (Vila & Peñas, 2016). However, the available literature in the analysis of task-related situational and contextual variables is limited (Moore, Bullough, Goldsmith, & Edmondson, 2014). Thus, this study aimed to identify performance indicators that discriminate winning teams from losing and drawing teams, and all-star players from non-all-star players in the Euro Cup 2018 of Futsal.

METHODS

Data was obtained from the 20 games disputed in Euro Cup 2018 of Futsal, which was retrieved from InStat Scout website. A binary logistic regression analysis was used. It was considered the dependent binary variable all-star players (n=12) vs non-all-star players (n=75), and winning teams (n=15) vs non-winning teams (n=25). In order to obtain these models, we used the stepwise selection methods. The results were reported by odds ratio (OR) estimates and their 95% confidence intervals. To evaluate the quality of the adjustment it was used the Nagelkerke's R squared, the performance of the model was assessed through the Hosmer-Lemeshow test and the area under the ROC curve (AUC) was used to evaluate the discriminative capacity of the model.

RESULTS

Minutes per game (OR=1.329), goals (OR=13.547) and ball recoveries (OR=2.136) per 20 minutes played were shown as significantly indicators to estimate the probability of a player be considered all-star (R^2=0.561: AUC=0.927). Goals (OR=2.035) and set pieces success (OR=1.076) were shown as significantly indicators to estimate the probability of a winning team (R^2=0.414; AUC=0.832).

CONCLUSIONS

The identified trends help to improve understanding of the game and understand which information is important and which one isn't. Coaches may use this information to better prepare their teams for tournament-type competitions.

References.

Castellano, J., Casamichana, D., & Lago, C. (2012). The use of match statistics that discriminate between successful and unsuccessful soccer teams. *Journal of human kinetics, 31*, 137-147. doi: 10.2478/v10078-012-0015-7

Gómez, M.-Á., Moral, J., & Lago-Peñas, C., (2015). Multivariate analysis of ball possessions effectiveness in elite futsal. *Journal of Sports Sciences, 33*(20), 2173-2181. doi: 10.1080/02640414.2015.1075168

Lago-Peñas, C., Lago-Ballesteros, J., & Rey, E. (2011). Differences in performance indicators between winning and losing teams in the UEFA Champions League. *Journal of Human Kinetics, 27*, 135-146. doi: 10.2478/v10078-011-0011-3

Moore, R., Bullough, S., Goldsmith, S., & Edmondson, L., (2014). A Systematic Review of Futsal Literature. *American Journal of Sports Science and Medicine*, *2*(3), 108-116. doi: 10.12691/ajssm-2-3-8.

Sampaio, J., Drinkwater E. J., & Leite, N. M., (2010). Effects of season period, team quality, and playing time on basketball players' game-related statistics. *European Journal of Sport Science, 10*(2), 141-149. doi: 10.1080/17461390903311935

Sampaio, J., McGarry, T., Calleja-González, J., Jiménez Sáiz, S., Schelling i del Alcázar, X., & Balciunas, M., (2015). Exploring Game Performance in the National Basketball Association Using Player Tracking Data. *PLoS ONE 10*(7): e0132894. doi: 10.1371/journal.pone.0132894

Sarmento, H., Bradley, P., Anguera, T. M., Polido, T., Resende, R., & Campaniço, J., (2016). Quantifying the offensive sequences that result in goals in elite futsal matches. *Journal of Sports Sciences, 34*(7), 621-629. doi: 10.1080/02640414.2015.1066024

Vicente-Vila, P., & Lago-Peñas, C. (2016). The goalkeeper influence on ball possession effectiveness in futsal. *Journal of human kinetics, 51*(1), 217-224. doi: 10.1515/hukin-2015-0185

O40. Effects of rugby specific small-sided games in rugby union players

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INTRODUCTION

Small-sided games (SSGs) are commonly incorporated into the conditioning programs in rugby union and represent an alternative to intermittent training or specific work. However, although several studies have examined the physiological, perceptual, movement demands and skills of SSGs there is relatively little information regarding how SSGs can best be used to improve physical conditioning and technical or tactical skills in rugby union.

METHODS

Fourteen rugby union players (22.4±3.2 years) volunteered to participate in four different rugby SSGs sessions (1 vs 1 and 2 vs 1 evasion skills, 7 vs 7 small sided game and match rugby sevens 7 x 7) with 15-minute duration. The study was carried during the competitive season 2016/2017. All the practice sessions were performed on a natural turf pitch, under similar environmental conditions. A GPS unit (SPI Pro, *GPSports Systems*, and Australia) was used for each player in order to capture movement data at 5Hz during all rugby SSGs sessions. The variables recorded were the total distance covered and distances at different speed zones: zone 1 (0-6.9 Km·h^{-1}), zone 2 (7-9.9 Km·h^{-1}), zone 3 (10-12.9 Km·h^{-1}), zone 4 (13-15.9 Km·h^{-1}), zone 5 (16-17.9 Km·h^{-1}) and zone 6 (≥18.0 Km·h^{-1}). The heart rate (HR) data was recorded continuously with individual monitors (Polar Team System, Polar, FI) and grouped into four zones of %HR max: zone 1 (below 75%), zone 2 (75% - 84.9%), zone 3 (85% - 89.9%) and zone 4 (above 90%).

RESULTS

There was a significant effect of speed zones ($F=598.3$, $p<.001$, $\eta^2=.96$), with pairwise differences between all zones with exception of z2-z3 and z5-z6. In addition, the interaction between speed zones and SSG formats was significant ($F=94.7$, $p<.001$, $\eta^2=.78$). Overall, the SSG 1 presents lower variability across the speed zones, with lower distance performed in the z6. Conversely, compared with SSG 1, 2 and 3, the SSG4 showed higher mean values in z2, z3 and z6.

CONCLUSIONS

The results of this study demonstrate that SSGs with evasion skills (i.e. ability to beat a player, 1 versus 1 and 2 versus 1) showed different levels of physical performance, and skill qualities in rugby union players. These findings suggest that SSGs with fewer players and limited field sizes elicit greater physiological responses and time-motion demands. The differences between SSGs training sessions may provide additional information to coaches and may enhance the training organisation by helping in the development of more adequate conditioning and recovery programs for rugby union players.

References.

Vaz L, Gonçalves B, Figueira B and Garcia G (2016). Influence of different small-sided games on physical and physiological demands in rugby union players. *Sports Science & Coaching, 11*(1), 78–84.doi: 10.1177/1747954115624823.

O41. Are there associations between wellness variables and acute and chronic workload measures? A full-season study in professional volleyball players

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INTRODUCTION

This study aimed to analyse the associations between workload variables (weekly acute load, derived from the sum of daily acute load, weekly chronic load and acute:chronic workload ratio) and wellness variables (stress, fatigue, muscle soreness, sleep quality and Hooper index) in professional volleyball players across a full season.

METHODS

Thirteen professional volleyball players (31.0(5.0) yo; 1.94(0.07) cm; 88.9(7.6) kg) from the Portuguese First League were monitored during a full-season. The 10-point Foster's scale was applied 30 minutes after each training session, to score the players perceived effort about the intensity of the session. The score was multiplied by the time of training (minutes) to calculate the session-RPE (Foster et al., 2001). The weekly acute load (wAL), weekly chronic load (wCL) and the acute:chronic workload ratio (ACWR; 1:4) were calculated based on session-RPE. Players also scored, in the beginning of each day, their perceived level of stress, muscle soreness, sleep quality and fatigue using the adjusted 7-point scale of Hooper (Hooper & Mackinnon, 1995). The Hooper index was calculated using the sum of the categories. Both, session-RPE and Hooper variables were used to calculate the weekly profile of players, but the calculations were only executed after the fourth week of training sessions. The associations between the weekly load and the weekly Hooper categories (pooled sampling of the year) were executed using the Pearson-product test for a 90%CI. The magnitude of correlations was interpreted using the Hopkins proposal.

RESULTS

The wAL was very largely correlated with muscle soreness (r=0.80, [0.66;0.89]), sleep quality (r=0.72, [0.54;0.84] and fatigue (r=0.82, [0.69;0.90]). It was also found large correlations between wAL and Hooper index (r=0.67, [0.47;0.80]) and moderate correlations between wAL and stress (r=0.37, [0.09;0.60]). Moderate correlations were found between wCL and muscle soreness (r=0.42, [0.15;0.63]), sleep quality (r=0.38, [0.10;0.60]), fatigue (=0.42, [0.15;0.63]) and Hooper index (r=0.30, [0.01;0.54]). Correlations between stress and wCL were trivial (r=0.09, [-0.21;0.37]). Finally, negative and moderate correlations were found between ACWR and muscle soreness (r=-0.47, [-0.67;-0.21]), sleep quality (r=-0.43, [-0.64;-0.16]), fatigue (r=-0.47, [-0.67;-0.21]) and Hooper index (r=-0.37, [-0.60;-0.09]). Small and negative correlations were found between ACWR and stress (r=-0.18, [-0.45;0.12]).

CONCLUSIONS

Wellness categories seem to be more sensitive to weekly acute load than with chronic load or ACWR. Interestingly, ACWR was moderately and negatively correlated with wellness categories. Coaches should be aware of the greater sensitiveness of players' well-being status to the weekly acute training than to the chronic load.

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References.

Foster, C., Florhaug, J. A., Franklin, J., Gottschall, L., Hrovatin, L. A., Parker, S., … Dodge, C. (2001). A new approach to monitoring exercise training. *Journal of Strength and Conditioning Research*, *15*(1), 109–115.

Hooper, S. L., & Mackinnon, L. T. (1995). Monitoring Overtraining in Athletes. *Sports Medicine*, *20*(5), 321–327. http://doi.org/10.2165/00007256-199520050-00003

O42. Data-driven visual performance analysis in soccer: an exploratory prototype

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INTRODUCTION

In soccer, understanding of collective tactical behaviour has become an integral part in sports analysis at elite levels. Evolution of technology allows collection of increasingly larger and more specific data sets related to sport activities in cost-effective and accessible manner. All this information is minutely scrutinised by thousands of analysis around the globe in search for answers that can, in the long-term, help increase the performance of individuals or teams in their respective competitions. As the volume of data increases in size, so does the complexity of the problem and the need for suitable tools that leverage the cognitive load involved in the investigation. It is proven that visualisation and computer-vision techniques, correctly applied to the context of a problem, help data analysis focus on the relevant information at each stage of the process, and generally lead to a better understanding of the facts that lie behind the data.

METHODS

We presented a software prototype capable of assisting researchers and performance analysis in their duty of studying group collective behaviour in soccer games and trainings. We used geospatial data acquired from a professional match to demonstrate its capabilities in two different case studies.

RESULTS

We successfully proved the efficiency of the different visualisation techniques implemented in the prototype and demonstrated how visual analysis can effectively improve some of the basic tasks employed by sports experts on their daily work, complementing more traditional approaches.

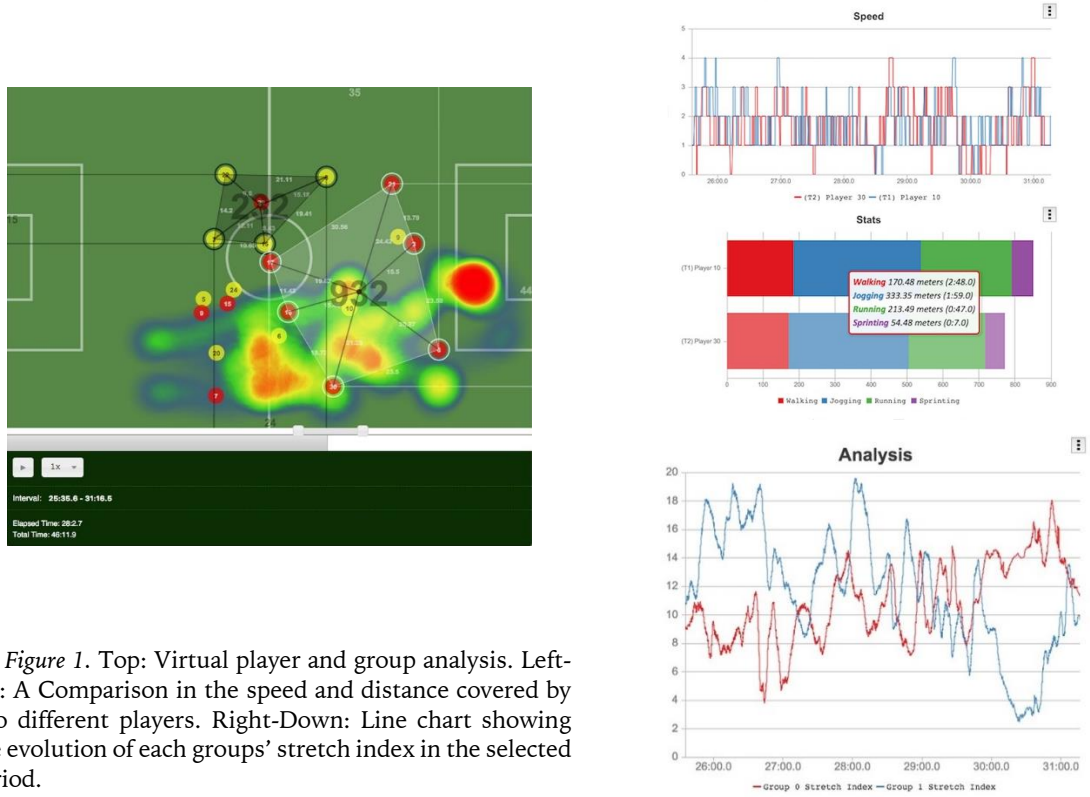

Figure 1. Top: Virtual player and group analysis. Left-Up: A Comparison in the speed and distance covered by two different players. Right-Down: Line chart showing the evolution of each groups' stretch index in the selected period.

CONCLUSIONS

In this study, we demonstrate that including visual analysis techniques in sports group behaviour analysis can produce both high quality results and a satisfactory experience with the computer at the same time. We designed an interactive workflow companion to this tool that effectively captures and accelerates many expert workflows that had to be performed manually or semi-automatically in the past.

Funding

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References.

Folgado, H., Gonçalves, B., & Sampaio, J. (2018). Positional synchronization affects physical and physiological responses to preseason in professional football (soccer). *Research in Sports Medicine*. 26, 51-63. doi: 10.1080/15438627.2017.1393754.

Memmert, D., Lemmink, K., & Sampaio, J. (2016). Current Approaches to Tactical Performance Analyses in Soccer Using Position Data. *Sports Med*. 2016, 47, 1-10. doi: 10.1007/s40279-016-0562-5.

O43. External Load and Technical Actions of Elite Futsal Game

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INTRODUCTION

The analysis of training and match load data allows coaches to optimize training programs and consequently improve performance and reduce the odds of injury incidents. (Fox, Scanlan, & Stanton, 2017; Vanrenterghem, Nedergaard, Robinson, & Drust, 2017). The present study aimed to characterise the physical requirements of elite futsal players, through external load variables and technical requirements during official competitive matches.

METHODS

The current analysis comprises 6 competitive futsal matches in male adult elite teams who played the Final Eight of the Portuguese Futsal Cup (2017-18). External load data (Distance Covered (m), Relative Distance Covered ($m \cdot min^{-1}$), Low Intensity Running (0-6 $km \cdot h^{-1}$) $m \cdot min^{-1}$, Medium Intensity Running (6.1-12 $km \cdot h^{-1}$) $m \cdot min^{-1}$, High Intensity Running (12.1-18 $km \cdot h^{-1}$) $m \cdot min^{-1}$, Maximal Intensity Running (18.1-30 $km \cdot h^{-1}$) $m \cdot min^{-1}$, and number of accelerations (2 to 4 $m \cdot s^{-2}$) and decelerations (-2 to -4 $m \cdot s^{-2}$) were collected through a WIMU PRO™ inertial system (RealTrack Systems, Almeria, Spain). The pass, shot and 1vs1 were registered as offensive technical match-play actions, while the interception, disarm and 1vs1 were recorded as defensive actions. Wilcoxon ranking test was used to compare results from the 1st and 2nd part of the game.

RESULTS

Players covered 3452 m (range 319-3757 m), representing 229 $m \cdot min^{-1}$ (range 319-3757 m) during the match. Overall, the players covered 47% of distance at low intensity (112 $m \cdot min^{-1}$; range 55-410), 33% at medium intensity (73 $m \cdot min^{-1}$; range 8-172), 17% at high intensity (38 $m \cdot min^{-1}$; range 0-127), and 4% (7 $m \cdot min^{-1}$; range 0-73) at maximum intensity, in relation to the total distance covered during the match. Regarding the accelerations profile it was observed 5 accelerations per minute (range 0-12) and 4 (range 0-12) decelerations per minute. In relation to the game offensive technical actions, it was observed 10 passes (range 7-12), 1 shot (range 0,5-1,5) and 0,7 1vs1 (range 0,4-1,2) actions per minute; while in the defensive actions a mean of 1,4 (range 0,5-1,5) interceptions, 0,5 interceptions (range 0,28-1) and 0,7 1vs1 (range 0,4-1,2) per minute were registered. No significant differences were observed between 1st and 2nd parts of the game ($p>0.05$).

CONCLUSIONS

The results presented here revealed that elite futsal matches encompass high exercise demands, as shown by the high relative distance covered by players during the game, coupled with a high frequency of technical actions. Further studies are needed linking the technical requirements of futsal game in combination with external load data to better understand the mechanical efforts required (Vanrenterghem et al., 2017) in futsal.

Acknowledgments

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References.

Fox, J. L., Scanlan, A. T., & Stanton, R. (2017). A review of player monitoring approaches in basketball: Current trends and future directions. *The Journal of Strength & Conditioning Research, 31*(7), 2021-2029.

Vanrenterghem, J., Nedergaard, N. J., Robinson, M. A., & Drust, B. (2017). Training load monitoring in team sports: a novel framework separating physiological and biomechanical load-adaptation pathways. *Sports Medicine, 47*(11), 2135-2142.

O44. The effect of game format and age-group on the positioning and displacement of young players

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The present study aimed to analyse the effect of game format and age-group on positioning and displacement of soccer players (age ranging from 6.94 ± 0.7 to 13.46 ± 0.5 years; height ranging from 125.36 ± 6.04 to 159.16 ± 7.78 cm; weight ranging from 27.16 ± 5.75 to 49.89 ± 8.89 kgf). Positional data were obtained through GPS devices which after being converted into mathematical language, allowed to calculate the variability of the respective spatial distribution on each game format, captured through the Shannon Entropy. The ellipsoidal areas (m^2) representing players´ pitch displacements, centred on the average positional coordinates of the players, were also calculated, with axes corresponding to the standard deviations of the displacements in the longitudinal and lateral directions of the soccer pitches. The data acquisition and processing was done in a Matlab environment. Analysis of variance (ANOVA) was used to assess differences between game formats and age-groups. Results suggest significant effect of the game formats in spatial distribution variability ($\eta^2 = 0.142$, $p < 0.001$) and relative positioning ($\eta^2 = 0.926$; $p < 0.001$) of the players. The variability decreased as game format increased and mean covered area increased as game format increased. There was also significant effect of the age-group in spatial distribution variability ($\eta^2 = 0.120$, $p < 0.001$) and relative positioning ($\eta^2 = 0.405$; $p < 0.001$). The U10 age-group presented significantly higher values than other age-groups ($p < 0.001$). These findings can provide an opportunity for coaches and governmental bodies to maximise the efficiency of the soccer matches conditions.

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O45. Numerical relations and space occupation in football game

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INTRODUCTION

The manipulation of the playing space and the individual area per player that ought to be considered in small sided football games (SSGs) in order to guarantee a bigger transfer of behaviours into the match has raised doubts to both researchers and coaches (Fradua, Zubillaga, Caro, Fernández-García, & Ruiz, 2013). Thus, the aim of this study is to validate a new method that quantifies the occupied playing area of players over the game according to the numerical relation surrounding the ball.

METHODS

For the present explorative study a formal Under 16 match was considered. The game was filmed by using a video camera as the positional data was collected by means of individual GPSs (Catapult Sprint 5.1.7). In order to identify the position of the ball, the temporal record of the ball bearer was captured by using the LongoMatch 1.3.7 notational analysis software to register all of the individual offensive actions (pass, reception and target shot). Subsequently MATLAB was used to synchronise the spatial and temporal data that was collected by the GPSs with the players' actions (Folgado, Bravo, Pereira, & Sampaio, 2018).
The effective playing area and the dimensions, in length and width, of the players closest to the ball were calculated continually to the numerical relations from the 2x2 until the 10x10 considering the fields location.

RESULTS

The analysis of spatial areas according to variations in numerical relations revealed that the width of the team had the tendency to be superior in length in six of the analysed covered spaces. The ratio between the length and the width decreased with the increase of the numerical relation (2x2, M=0.94±0.17 e 10x10, M=0.69±0.10). The effective playing area varied between 11,7 x 12.8 metres in the 2x2 and 35,6 x 51.8 metres in the 10 x 10.

CONCLUSIONS

The results show that the spatial proportionality length x width varies depending on the numerical relation. The width values tend to be superior in almost all the numerical relations. The manipulations of space during practice should reproduce areas of spatial occupation similar to those that exist during matches in order to guarantee a better transfer between training and competition.

References.

Folgado, H., Bravo, J., Pereira, P., & Sampaio, . J. (2018). Towards the use of multidimensional performance indicators in football small-sided games: the effects of pitch orientation. *Journal of Sports Sciences*. doi: 10.1080/02640414.2018.1543834

Fradua, L., Zubillaga, A., Caro, O., Fernández-García, A. , & Ruiz, C. (2013). Designing small-sided games for training tactical aspects in soccer: Extrapolating pitch sizes from full size professional matches. *Journal of Sports Sciences, 31 (6)* 573-581. doi: 10.1080/02640414.2012.746722

O46. Listen to the coach: the effect of spatial coach instructions on tactical behaviour of young soccer players

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INTRODUCTION

The task of the coach is to develop the game skills of the player and support this process (Smith & Cushion, 2006). However, the behaviour of the player depends on three interacting constraints: individual constraints, task constraints and environmental constraints (Newell, 1981). The idea is that when one of these constraints is manipulated, for example a coach instruction (task constraint), the team dynamics change. Previous research showed that a coach can manipulate spatial behaviour of a basketball player during a 1 vs. 1 dribble with neutral, conservative and risk-taking instructions (Cordovil et al., 2009). However, not much research is done if and how a coach instruction can manipulate tactical behaviour of a soccer team. The aim of this study is to investigate the effect of spatial coach instructions on tactical behaviour of young soccer players with the use of spatiotemporal data.

METHODS

Fifteen talented young soccer players (mean +/- SD: weight (41.85 kg +/- 5.48 kg), length (154.1 cm +/- 5.31 cm) playing at the highest competition level in the Netherlands participated in this study. Twelve small-sided games (SSG) were played on an artificial grass field with a dimension of 72 x 48 meter (length x width). On two separate days, two baseline games (no instruction) and four experimental games (two aimed at spatial instructions) were conducted. The team centroid, length, width, length per width ratio (lpwratio), standard deviation of lpwratio, surface area, stretch index and inter-team distance were measured with the Local Position Measurement (LPM) system (Frencken, Lemmink, & Delleman, 2010).

RESULTS

The difference in length, width, inter-team distance and surface area between the teams was significant larger during the spatial instruction games compared to the no instruction games. The mean length and lpwratio within one team during the no instruction games was significant larger compared to the spatial instruction games.

CONCLUSIONS

The present study gained insight in the effect of spatial coach instructions on the tactical behaviour of young soccer players. The soccer players made more use of the width of the pitch and showed more collective behaviour in the attacking and defensive phase during the spatial instruction games compared to the no instruction games. Furthermore, there is less pressure in the length of the pitch during the spatial instruction games compared to the no instruction games. Regarding these results, coaches can influence the tactical behaviour of the soccer players.

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References.

Cordovil, R., Araújo, D., Davids, K., Gouveia, L., Barreiros, J., Fernandes, O., & Serpa, S. (2009). The influence of instructions and body-scaling as constraints on decision-making processes in team sports. *European Journal of Sports Science*, 9(3), 169-179. Doi:10.1080/17461390902763417

Frencken, W. G. P., Lemmink, K. A. P. M., & Delleman, N. (2010). Soccer-specific accuracy and validity of the local position measurement (LPM) system. *Journal of Science and Medicine in Sport, 13*(6), 641-645. Doi: 10.1016/j.jsams.2010.04.003

Newell, K. M. (1981). *Skill learning*. D.M Holding ed. New York: Wiley: Human Skills

Smith, M. & Cushion, C.J. (2006). An investigation of the in-game behaviors of professional, toplevel youth soccer coaches. *Journal of Sports Science*, 24(4), 355-66. Doi:10.1080/02640410500131944

O47. Extracting match informational features to design transferable training tasks in elite football: effects of the opposition's quality

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INTRODUCTION

Recently, tracking technologies allow reliable match performance information by adopting different data-driven approaches. Afterward, to yield relevant knowledge, researchers and sports analytics need to understand the collective behavioural patterns that rely upon the interaction between the position of teammates, opponents, and the ball. Match analyses, thus, may help coaches to plan, design and execute training tasks that represent the competitive environments so practitioners' can experience the same perceptual motor relations landscape (Brunswik, 1956; Travassos, Duarte, Vilar, Davids, & Araujo, 2012). Thus, this study aims to explore how match analysis may be used to extract informational features to design transferable training tasks in elite football, by considering the opposition's quality.

METHODS

Two-dimensional coordinates were collected from 12 elite football matches using TRACAB Optical Image Tracking System™ at 25 Hz. Data included 6 matches of a strong team (Strong) against top opponents (TOP, the 3 top teams in the final ranking) and 6 matches against bottom opponents (BOTTOM, the 3 bottom teams in the final ranking). The Strong team ended the season in top-5 position. A total of 1413 ball possessions were selected, processed and analysed based on the following criteria: minimum ball possession duration of 8 seconds (for nonlinear computations requirements); ball possessions should not involve set pieces. For each ball possession, variables were calculated based on ball position; team space in possession; game space (comprising both teams); position and space at the end of ball possession.

RESULTS

When facing TOP opponents, it was observed trivial to small differences in all variables, however, it changed drastically against BOTTOM opponents. Ball possessions against BOTTOM presented a small increase in duration (higher 13.9%; ±8.0%) and a moderate increase in ball distance covered, speed displacement, and in ball speed unpredictability. Also, there was a moderate decrease in offensive available space against BOTTOM (Strong = 1238.2±856.1m^2 vs BOTTOM = 1960.5±1074.6m^2; Strong = 1517.78±1013.78m^2 vs TOP = 1718.93±996.81m^2). The possessions tended to end closer to the opponents' goal when the team played against BOTTOM (moderate effect, Strong = 86.9±12.3m vs. BOTTOM = 77.2±13.9m) than against TOP (nearly trivial effect, Strong = 83.2±13m vs. TOP = 80.2±13.9m). Finally, there was a small decrease in the number of opponents in offensive space available against BOTTOM (i.e. less defenders in the offensive area).

CONCLUSIONS

The quality of opponents promoted a great variation in ball possession behaviours, which is key information in the design of tactical training tasks.

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References.

Brunswik, E. (1956). *Perception and the Representative Design of Psychological Experiments*: University of California Press.

Travassos, B., Duarte, R., Vilar, L., Davids, K., & Araujo, D. (2012). Practice task design in team sports: representativeness enhanced by increasing opportunities for action. *Journal of Sports Sciences, 30*(13), 1447-1454.

O48. Effects of the goals positioning in the pitch on external load and tactical behaviour from young football players during small-sided games

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INTRODUCTION

The process of learning and training the game of football can be achieved using constraint-led approaches, in a way to promote more functional collective tactical behaviours (Gonçalves, Marcelino, Torres-Ronda, Torrents, & Sampaio, 2016). An example of these constraint during small-sided games situations is the manipulation of environmental scenarios such as, for example, the goals size, number or its position in the pitch. The knowledge about the effects of these manipulations is anecdotal and, therefore, unknown. Thus, the aim of this study was to identify how positioning the goals in different spots on the pitch modified the external training load and the tactical behaviour of young players during small-sided games.

METHODS

Four teams of 5 outfield players and a goalkeeper played six small-sided games of five min duration in three different situations that consisted of 1) control scenario, where goals were placed one in front of the other (CTR); 2) diagonal goals, where goals were placed in the right corner of offensive half-pitch (RGT); 3) goals in diagonal, where goals were placed in the left corner of offensive half-pitch (LFT). The positioning-derived data of each player was collected using 10 Hz GPS units (WIMU PROTM, RealTrack Systems, Almeria, Spain). Data was processed using Matlab® dedicated routines (MathWorks, Inc., Massachusetts, USA) and used to compute the individual variables. A descriptive analysis was performed using mean and standard deviations for each variable. The comparisons of the three scenarios were tested through magnitude based inferences.

RESULTS

Regarding the external load, differences were small/unclear from one situation to another. The distance covered by the players (m), total (CTR = 483.6 ± 53; LFT = 449.5 ± 54.8; RGT = 469 ± 63.5), offensive phase (CTR = 230.6 ± 52.1; LFT = 219.6 ± 50.4; RGT = 22.4 ± 46.8) and defensive phase (CTR = 253 ± 76.9, LFT = 229.9 ± 70.7; RGT = 245 ± 53.8), most likely decreased by comparing CTR and LFT (effect size (ES): -0.81 ± 0.21) and possibly decreased by comparing CTR and RGT (ES: -0.40; ± 0.22). Regarding the tactical variables, the results were also similar, with the exception of the variables related to the width of the team, where values most likely increased, both in the offensive and in the defensive phase, from CTR to LFT (ES: 0.83 ± 0.27; ES: 1.29 ± 0.26, respectively) and from CTR to RGT (ES: 0.91 ± 0.27; ES: 1.61 ± 0.26, respectively). Therefore, the team explored more of the pitch width when the goals were placed in diagonal.

CONCLUSIONS

The results suggested that in young players the modification of the goals positioning causes differences in the use of the width of the field without varying the external load (especially at high-intensity) of the players or the time of possession. It might be suggested that this type of task allows to develop different aspects related to collective behaviour, such as the width of the team, without the external load of the players being affected. Moreover, these conditions may be used to promote environment variability which may lead to increase the players' adaptation to unpredictable contexts.

References.

Gonçalves, B., Marcelino, R., Torres-Ronda, L., Torrents, C., & Sampaio, J. (2016). Effects of emphasising opposition and cooperation on collective movement behaviour during football small-sided games. Journal of Sports Sciences, 34(14), 1346–1354. doi: 10.1080/02640414.2016.1143111

O49. Exploring the effects of pitch-related manipulations in young football players' movement behaviour

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INTRODUCTION

In football, small-sided games (SSG) emerges as a useful training tool to attune players with relevant environmental information for performance (Travassos, Duarte, Vilar, Davids, & Araujo, 2012). However, different tasks manipulations are likely to emphasise different information with consequences on the players and teams' movement behaviour (Goncalves et al., 2017) and further understanding on SSG manipulation is required. Therefore, this study purpose is twofold: a) analyse the impact of different pitch configurations; and b) explore the effects of adding pitch spatial references on the players' movement behaviour.

METHODS

The study 1 sample encompassed 20 players (13.3±0.6years), which were divided into 4 balanced teams that performed a Gk+5vs5+Gk SSG under four conditions: a) regular pitch (regular - same direction of competitive matches); b) sided pitch (sided - goals were changed to width); c) different pitch orientation (≠orientation - performed in side-to-side line compared to competitive matches); and d) dynamic pitch (dynamic - boundaries changed at every 2-min). The second study sample was composed by 12 players (15.9±0.8years). It was performed a Gk+6vs6+Gk under two scenarios: a) without spatial references (control); b) with spatial references (#references - pitch divided into 3 equal sectorial and corridor lines). The longitudinal and lateral synchronisation, as well as the distance covered at different intensity ratios were considered variables. Standardised (Cohen) differences were used to assess the differences between conditions.

RESULTS

From the different pitch configurations, results revealed small to moderate higher values in time spent synchronised for the regular condition compared to sided and ≠orientation. Also, small to large higher distance covered at the different intensity ratios were found in the regular condition. The analysis of the manipulation of pitch spatial references revealed that adding #references promoted a small decrease in the time spent synchronised in the longitudinal direction compared to the control condition. Also, it was found a small increase in the distance covered at the high ratio with the additional spatial references.

CONCLUSIONS

Generally, it was observed that players were more synchronised with higher activity demands in the regular condition, which may be linked with a higher familiarisation of this format. Also, adding spatial references seems to modify the available information (more pitch zone related), impairing the players' interpersonal coordination. Overall, results from both studies highlighted that different movement behaviours emerged as a consequence of pitch-related manipulations. Therefore, coaches should be aware of these effects when designing practice tasks.

Funding

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References.

Goncalves, B., Esteves, P., Folgado, H., Ric, A., Torrents, C., & Sampaio, J. (2017). Effects of Pitch Area-Restrictions on Tactical Behavior, Physical, and Physiological Performances in Soccer Large-Sided Games. *Journal of Strength and Conditioning Research, 31*(9), 2398-2408. doi:10.1519/JSC.0000000000001700

Travassos, B., Duarte, R., Vilar, L., Davids, K., & Araujo, D. (2012). Practice task design in team sports: representativeness enhanced by increasing opportunities for action. *Journal of Sports Sciences, 30*(13), 1447-1454. doi:10.1080/02640414.2012.712716

O50. Functional and physical measures are different according to sports practiced, in Sports Talent Program Athletes?

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INTRODUCTION

Physical and motor characteristics of athletes are different according to the sport practiced (Pion et al., 2015), however the functional assessments are scarcely explored to distinguish considering particular sports. The aim of this study was to assess differences in physical and functional parameters according to sports involvement, in Sports Talent Program Athletes.

METHODS

Thirteen athletes (age = 14.5±1.6 years; height = 166.5±12.4 cm; body mass = 55.2±9.7 kg) integrated in Talentódromo Desportivo de Vila Real participated in this study. Participants were grouped in individual sports (n=4; tennis table, athletics and swimming) and team sports (n=9; football, basketball and handball), according to their sports involvement. Jumping (CMJ and Abalakov jump), sprinting (0-10, and 0-30m split times) and reaction (Batak Pro 30'') capacities were assessed. Functional measures included Lateral Step-Down Test (LSDT), Landing Error Scoring System (LESS), Tuck Jump Assessment, Weight-Bearing Lunge Test (WBLT), and Y Balance Test (YBT) anterior, medial and lateral reach. Bilateral asymmetry (ASI) for WBLT and YBT, as well as Knee to Ankle separation ratio (KASR) were calculated. Specifically-designed spreadsheets were used to analyse between-group differences using magnitude-based inferences (Hopkins, 2007).

RESULTS

Between-group analysis, better results were shown in individual sports subjects in dynamic balance tasks (LSDT and YBT) and ankle mobility (WBLT). In opposition, team-sports athletes presented higher reaction skills (Batak 30''), landing and hopping skills (LESS, KASR and Tuck Jump). Similar results were found for jumping and sprinting tests.

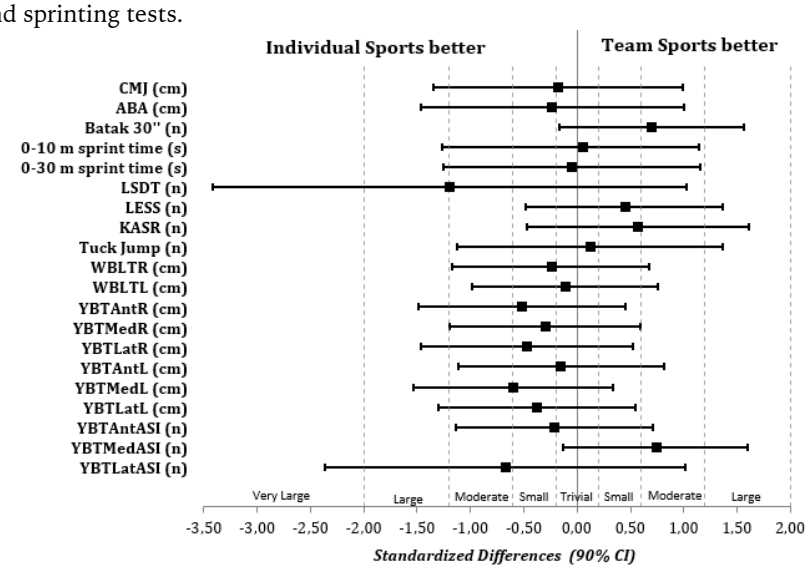

Figure 1. Standardised differences in physical and functional parameters

CONCLUSIONS

Performance in functional and physical tests seems to be related with the type of practiced sport. Professionals may use these findings to evaluate the potential of young athletes, but also to orientate the development of talented individuals, considering their strengths and weaknesses.

References.

Hopkins, W. G. (2007). A spreadsheet to compare means of two groups. Sportscience, 11, 22–23.

Pion, J., Segers, V., Fransen, J., Debuyck, G., Deprez, D., Haerens, L., … Lenoir, M. (2015). Generic anthropometric and performance characteristics among elite adolescent boys in nine different sports. European Journal of Sport Science, 15, 357–366. https://doi.org/10.1080/17461391.2014.944875.

O51. Relative-age effects on talent selection: a case study of Portuguese football national teams

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INTRODUCTION

The impact of relative age on talent selection and development has become a hot topic in sports science for the last years (e.g., Cumming et al., 2018). Relative age effects (RAE) refer to a potential selection bias towards individuals born early in the selection period of a given sport (Barnsley, Thompson, & Legault, 1992). This study sought to analyse the potential impact of birth-date on talent selection of Portuguese football national teams.

METHODS

The sample was composed by 243 athletes of Portuguese football national teams (under 15, under 16, under 17, under 19, under 20, under 21 and senior). Athlete data was retrieved from open-access official Portuguese football federation website (http://fpf.pt) and included name, national team and birth-date. Birth-months of the athletes were recoded to express their birth Quartile (Q) and semester according to a cut-off date used for cohort selection (Q1: January to March; Q2: April to June; Q3: July-September; and Q4: October-December) Chi-square ($\chi 2$) test was implemented to depict a possible effect of birth distribution for all athletes.

RESULTS

Overall, 70.82% of the athletes from youth and senior teams were born in the first semester, while only 29.18% were born in the second semester of the year. We also found a significant relative age effect (c2(18, N = 281) =.3.,35 p < 0.02, fCramer = 20) between teams. The number of athletes born in Q1 for senior team was significantly smaller than would be expected if the birth-date had no effect (Observed = 9; Expected = 17.3; Adjusted residuals = -2). Conversely, the number of athletes born in Q4 for senior team was significantly larger than would be expected if the birth-date had no effect (Observed = 13; Expected = 6.1; Adjusted residuals = 2.8) (Figure 1).

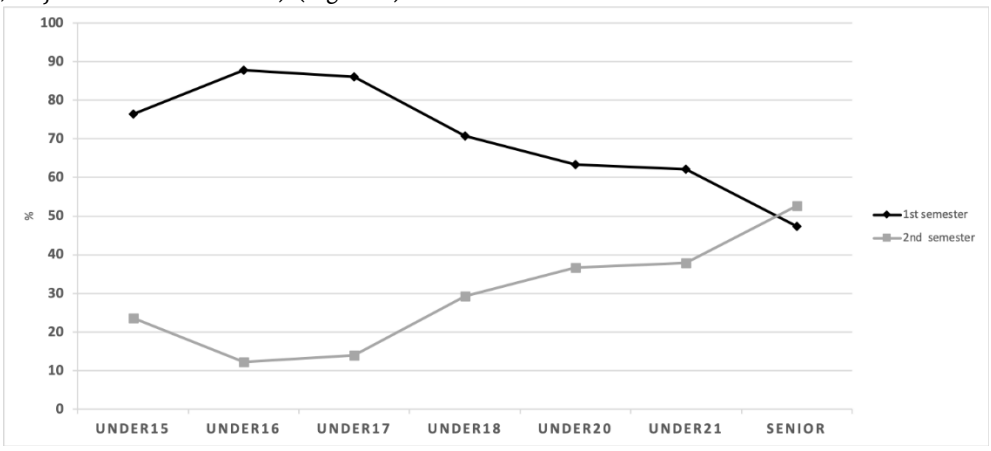

Figure 1. Distribution of athletes drafted to Portuguese football national teams according to their semester of birth.

CONCLUSIONS

This case-study suggests that relative age effects in Portuguese football tend to occur early in the athlete development process and that it extends to later stages, albeit with less emphasis.

References.

Barnsley, R.H., Thompson, A.H, & Legault, P. (1992). Family planning: football style: the relative age effect in football. *International Review for the Sociology of Sport, 27*, 77-87.

Cumming, S. P., Searle, C., Hemsley, J. K., Haswell, F., Edwards, et al., (2018). Biological maturation, relative age and self-regulation in male professional academy soccer players: A test of the underdog hypothesis. *Psychology of Sport & Exercise* doi: 10.1016/j.psychsport.2018.08.007.

O52. The relationship between objective and subjective measures of fatigue and training exertion in talented basketball players

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INTRODUCTION

Objective quantification of fatigue, along with subjective measures (i.e. perceptual) can provide helpful information on the readiness of athletes to practice, which is crucial to stabilise and/or improve performance (Thorpe, Atkinson, Drust, & Gregson, 2017). The aim of this study was to examine the relationship of objective and subjective measures of fatigue and training exertion in talented young basketball players.

METHODS

Three U17 basketball players (height = 192.8±2.4 cm; weight = 86.7±16.6 kg) performed three non-consecutive countermovement jumps (CMJ) using hip-worn Gyko Sport device before and after individual training sessions (n=42) specifically designed and performed under a talent development program - *Talentódromo Desportivo de Vila Real*. In addition, before each training session, the athletes were encouraged to perform 2 sprints on a Wattbike PRO 6-sec Peak Power test with a 1-min active rest. Afterwards and immediately before the training session started, they had to report the level of recovery in a perceived recovery status (PRS) scale; and after the training session, to rate the perceived exertion (RPE) using the Borg CR10 scale. The mean of following CMJ-derived variables was considered for further analysis: jump height, peak velocity, flight time, ratio of flight time to contraction time, eccentric duration, concentric duration and total duration. In addition, the highest power output (i.e. peak power) of the 2 sprints on a Wattbike PRO® was considered for analysis. Spearman's correlation was used to assess the relation between subjective (PRS and RPE) and objective (CMJ and Wattbike) measurements.

RESULTS

The results showed a significantly large relation between PRS and jump height ($r = 0.56$; $p < .001$), peak velocity ($r = 0.52$; $p < .001$), flight time ($r = 0.57$; $p < .001$) and contraction time ($r = 0.54$; $p < .001$). In addition, the RPE and jump height ($r = -0.70$; $p < .001$) and peak velocity ($r = -0.66$; $p < .001$) were large and significantly correlated. Additionally, flight time ($r = -0.71$; $p < .001$) and RPE were very large and significantly correlated.

CONCLUSION

The CMJ-derived variables, in particular the jump height, could be used to easily assess training demands and recovery, without athletes' subjective measures. Athletes may use this information to adjust training design, according to players' response.

Funding

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References.

Thorpe, R. T., Atkinson, G., Drust, B., & Gregson, W. (2017). Monitoring fatigue status in elite team-sport athletes: Implications for practice. *International Journal of Sports Physiology and Performance*, *12*(May), 27–34. https://doi.org/10.1123/ijspp.2016-0434

O53. Post-match perceived exertion and subjective exercise experiences in referees and assistant referees of national football leagues

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INTRODUCTION

Refereeing a football match is a very physically demanding task. The external load of refereeing seems to covariate with players' activities, suggesting that the referees might need to prepare the match according to teams' competitive level and style of play. Still, little is known about the perceived exertion and subjective exercise experiences of football referees during match play. Therefore, the purpose of this study was to assess post-match perceived exertion and subjective exercise experiences of field referees and assistant referees according to two different professional football leagues.

METHODS

Twenty field referees and fifty-three assistant referees were monitored over official football matches of the Portuguese 1st League (176 matches; 342 observations) and the Portuguese 2nd League (114 matches; 317 observations) during the 2017-18 season. The rating of perceived exertion (RPE) was assessed using the CR-10 Borg scale adapted by Foster (1996). The subjective exercise responses were evaluated with Portuguese version (Palmeira, 2006) of the Auley and Courneya 12-item (7-point scale) Subjective Exercise Experiences Scale (SEES), a measure of global psychological responses to the stimulus properties of exercise. Differences between competitive leagues were analysed with a linear mixed model with unstructured covariance, taking into consideration the facts that the participants differed in the number of matches in which they participated, and they all officiated matches from the two national leagues. The leagues were set as a fixed effect, individual subjects were set as random effects, and RPE and SEES were set as dependent variables. The t statistics from the mixed models were converted to effect size correlations (Rosnow et al., 2000) and interpreted according to Hopkins (2009). An α-level of 0.05 was used as the level of significance for statistical comparisons.

Table 1

Mean and 95% confidence interval estimates of the post-match rating of perceived exertion (RPE) and Subjective Exercise Experiences Scale (SEES) scores of field referees in 1st and 2nd professional league matches, and respective p-value and Effect Size (ES, r) of differences observed with 95% confidence interval (95%CI).

Variables	1st League Mean (95%CI)	2nd League Mean (95%CI)	p-value	ES (95%CI)
Great	5.36 (5.08-5.64)	5.49 (5.20-5.79)	0.215	0.07 (-0.04-0.19)
Awful	1.84 (1.61-2.08)	1.48 (1.22-1.75)	0.005	0.17 (0.05-0.28)
Drained	3.78 (3.14-4.42)	3.50 (2.84-4.16)	0.051	0.12 (0.00-0.23)
Positive	5.34 (5.02-5.66)	5.49 (5.15-584)	0.252	0.07 (-0.05-0.19)
Crummy	1.70 (1.42-1.99)	1.55 (1.23-1.86)	0.219	0.07 (-0.04-0.19)
Exhausted	3.69 (3.11-4.27)	3.62 3.02-4.22)	0.604	0.03 (-0.09-0.15)
Strong	5.33 (5.01-5.66)	5.42 (5.08-5.75)	0.402	0.05 (-0.07-0.17)
Discouraged	1.92 (1.64-2.20)	1.67 (1.36-1.99)	0.085	0.10 (-0.01-0.22)
Fatigued	3.75 (3.15-4.34)	3.75 (3.14-4.36)	0.957	0.00 (-0.12-0.12)
Terrific	5.10 (4.73-5.46)	5.23 (4.83-5.62)	0.328	0.06 (-0.06-0.18)
Miserable	1.79 (1.50-2.08)	1.45 (1.13-1.77)	0.014	0.15 (0.03-0.26)
Tired	4.24 (3.69-4.78)	3.99 (3.43-4.56)	0.068	0.11 (-0.01-0.23)
RPE	6.52 (5.96-7.08)	6.37 (5.79-6.96)	0.330	0.06 (-0.06-0.18)

Table 2

Mean and 95% confidence interval estimates of the post-match rating of perceived exertion (RPE) and Subjective Exercise Experiences Scale (SEES) scores of assistant referees in 1st and 2nd professional league matches, and respective p-value and Effect Size (ES, r) of differences observed with 95% confidence interval (95%CI).

Variables	1st League Mean (95%CI)	2nd League Mean (95%CI)	p-value	ES (95%CI)
Great	5.32 (5.09-5.56)	5.54 (5.29-5.78)	0.009	0.11 (0.03-0.19)
Awful	1.61 (1.42-1.79)	1.40 (1.20-1.59)	0.011	0.11 (0.02-0.19)
Drained	3.51 (3.11-3.91)	3.24 (2.82-3.65)	0.010	0.11 (0.03-0.19)
Positive	5.29 (5.05-5.53)	5.51 (5.25-5.76)	0.016	0.10 (0.02-0.18)
Crummy	1.63 (1.43-1.82)	1.42 (1.21-1.62)	0.011	0.11 (0.02-0.19)
Exhausted	3.53 (3.10-3.97)	3.29 (2.85-3.74)	0.016	0.10 (0.02-0.18)
Strong	5.32 (5.06-5.58)	5.42 (5.15-5.69)	0.147	0.06 (-0.02-0.14)
Discouraged	1.63 (1.45-1.80)	1.42 (1.23-1.61)	0.016	0.10 (0.02-0.18)
Fatigued	3.56 (3.17-3.96)	3.27 (2.87-3.68)	0.003	0.13 (0.04-0.21)
Terrific	5.04 (4.74-5.34)	5.30 (4.99-5.61)	0.004	0.12 (0.04-0.20)
Miserable	1.54 (1.38-1.70)	1.35 (1.18-1.53)	0.021	0.10 (0.01-0.18)
Tired	3.90 (3.52-4.28)	3.69 (3.30-4.08)	0.028	0.09 (0.01-0.18)
RPE	5.98 (5.54-6.43)	5.44 (4.99-5.90)	<0.001	0.20 (0.12-0.28)

RESULTS

No significant differences in RPE were observed between 1st and 2nd league matches for the field referees ($p > 0.05$). For SEES, the items miserable and awful were higher after 1st league matches, presenting small magnitude differences (ES = 0.15 and 0.17, respectively). All the other items presented similar values after 2nd league matches compared with 1st league matches, with trivial to small magnitude differences. On the other hand, significant differences were detected for assistant referees between competitive leagues in RPE ($p < 0.05$). The SEES items awful, drained, crummy, exhausted, discouraged, fatigue, miserable, and tired registered higher values after 1st league matches with small magnitude differences (ES = 0.09 to 0.13). Similarly, the items great, positive, strong, and terrific registered higher values after 2nd league matches.

CONCLUSIONS

Overall, refereeing in the 1st Portuguese League appears to be more demanding than refereeing in the 2nd Portuguese League for the assistant referees. However, refereeing 2nd Portuguese League matches seems to be a less stressful task both for field referees and assistant referees.

References.

Borg, G., A. (1982). Psychophysical bases of perceived exertion. *Medicine and Science in Sports and Exercise*, 14(5), 377-81.

Cabral, A., & Palmeira, A. (2003). Validação preliminar da Escala da Experiência Subjectiva ao Exercício - EESE – para a língua portuguesa. In P. Malico, J. Antunes e A. Palmeira (Eds) *Actas das IX Jornadas Nacionais de Psicologia do Desporto*.

Castagna, C., Grant, A., & D'Ottavio, S. (2007). Physiological Aspects of Soccer

Refereeing Performance and Training. *Sports Medicine*, 37 (7), 625-46.

Castillo D, Yanci J, Cámara J, Weston M. (2016). The influence of soccer match play on physiological and physical performance measures in soccer referees and assistant referees. *Journal of Sports Sciences*, 34(6), 557-63.

Cohen, J. (1992). A power primer. *Psychological Bulletin*. 112 (1), 155-9.

Foster, C., Daines, E., Hector, L., Snyder, A., & Welsh, R. (1996). Athletic performance in relation to training load. Wisconsin Medical Journal, 95(6),370-4.

Foster, C., Florhaug, J., A., Franklin, J., Gottschall, L., Hrovatin, L., Parker. S. Doleshall, P., & Dodge, C. (2001). A new approach to monitoring exercise training. *Journal of Strength and Conditioning Research*, 2001, 15(1), 109-15.

Fessi, M., & Moalla, W. (2018). Postmatch Perceived Exertion, Feeling, and Wellness in Professional Soccer Players. *International Journal of Sports Physiology and Performance*, 13(5), 631-7.

Gaudino, P., Iaia, F., Strudwick, A., Gawkins, R., Alberti, G., Atkinson, G., & Gregson, W. (2015). Factors influencing perception of effort (session-RPE) during elite soccer training. *International Journal of Sports Physiology and Performance*, 7, 860-4.

Hopkins, W. G., Marshall, S. W., Batterham, A. M., & Hanin, J. (2009). Progressive statistics for studies in sports medicine and exercise science. *Medicine and Science in Sports and Exercise*, 41(1), 3-13.

Rosnow, L., Rosenthal R., & Rubin DB. (2000). Contrasts and correlations in effect-size estimation. *Psychological Science*, 11(6),446-53.

Weston, M. (2015). Match performances of soccer referees: The role of sport science. *Movement and Sport Sciences, 87*, 113-7.

O54. Differential learning vs motor literacy: a case study in youth football

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INTRODUCTION

Contemporary research has debated the merit of differential learning approach to the enhancement of motor performance in view of the promotion of random elements within a movement pattern (Schollhorn, Hegen, & Davids, 2012). At the same time, alternative approaches such as motor literacy training (e.g., Giblin, Collins, Button, 2014) have been consistently used in the development of fundamental and specific movements skills. Given this state of affairs, this study intended to compare the effects of a differential learning vs motor literacy intervention programs on the physical, technical and tactical performance of young football players.

METHODS

Sample was composed of 22 youth football players (M_{age} = 12 years; SD = 1.15; M). Participants were allocated to two different experimental groups, motor literacy group and differential training, in view of a balanced performance criteria. The intervention program in the two independent groups lasted for 8 weeks, with two training sessions per week that took place during the initial 15 minutes of the ordinary training session, and was composed of customised training tasks aligned with motor literacy and differential training approaches. Physical, technical and tactical performance of participants was evaluated using a pre/post-test design.

RESULTS

Regarding physical performance we found unclear differences in flexibility; 51% of players presented a small impair in agility time test after Differential Learning program compared to Motor Literacy (mean group changes; ±90% confidence limits, practical inference: 0.2; ±0.4, possibly). For technical and tactical performance unclear trends were depicted between Motor Literacy and Differential Learning groups in the following variables: right foot touch, left foot touch, successful ball reception, unsuccessful ball reception, ball recovery, ball lost, successful dribbles, unsuccessful dribbles, assists, unsuccessful passes, shot off target and goals. While Motor Literacy promoted a moderate increase in both successful passes and intercepted shots (-1.6; ±1.3, likely; and -0.2; ±0.2, likely, respectively), the Differential Learning group denoted a moderate increase in shots on target (0.5; ±0.5, likely).

CONCLUSIONS

In conclusion, the impact of a differential training and a motor literacy intervention program on physical, technical and tactical performance was quite similar. More research is needed to expand knowledge on the effectiveness of these approaches to enhance performance of young football players.

References.

Giblin, S., Collins, D. and Button, C. (2014). Physical Literacy: Importance, Assessment and Future Directions. *Sports Medicine, 44*(9), 1177-1184.

Schollhorn,W. I., Hegen, P., & Davids, K. (2012). The Nonlinear Nature of Learning – a Differential Learning Approach. *The Open Sports Science Journal, 5,* 100-112.

P84. Evaluation of referees' performance in-loco and in video

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INTRODUCTION

In last years in football, and particularly in refereeing, technological innovations have been used to increase the accuracy of decision-making and judgment during the game, and to improve the evaluation of referees' judgments and decision-making after the game (Colwell, 2007). However, previous research revealed that the assessment of referees' judgement and decision-making might be affected by the specific method used such as in-situ, video or both (Pina, Passos, Araújo & Maynard, 2018). To clarify this issue, the aim of this research was to evaluate the intra- and interobserver agreement of referees' observers, using in loco and video analysis, for assessing football referees' performance.

METHODS

A total of 34 observers from the 1st category of professional football referees participated in the study. Three types of observations were made: *(i)* Observer 1 *in-situ* (OB1); *(ii)* video observer 1, after watching the game in loco, with a minimum of 8 weeks of difference (OBv1); and *(iii)* video observer 2, that only observed the game in vídeo (OBv2). The analysis covered the three specific parts of an observer's report: Grade evaluation of the game, identification of Difficulty of the game and related variables and Discipline intervention of referees. Statistic techniques used for comparison were the Intraclass Correlation Coefficient, the Fleiss Kappa and the Lin Concordance Coefficient.

RESULTS

The results revealed that, for the Grade, the intra-observer agreement (OB1 vs OBv1) was greater than the inter-observer agreement (OBv1 vs OBv2), with higher values for *in loco* observation (OB1) than in video observation (OBv1V and OBv2). Also, for Difficulty, intra-observer agreement (OB1 vs OBv1) was greater than the inter-observer agreement (OB1 vs OBv2). Finally, the Disciplinary Assessment revealed that the intra-observer agreement (OB1 vs OBv1) was greater than the inter-observer agreement (OB1 vs OBv2), with differences in the trend of evaluation among the variables, but with higher values for observation on-site (OB1) than for video observation (OBv1 and better with descriptive stats

CONCLUSIONS

In conclusion, observers who assessed football referees' performance only by video revealed less agreement than those who assessed in loco. Accordingly, the major practical implication of this investigation is that reliable assessment of referees' performances should combine in loco and video analysis while the use of video analysis in isolation should be avoided. These results reinforce the importance of in situ analysis for refereeing performance assessment.

References

Aragão e Pina, J., Passos, A., Araújo, D., & Maynard, M. T. (2018). Football refereeing: An integrative review. *Psychology of Sport and Exercise*, *35*, 10-26. doi:https://doi.org/10.1016/j.psychsport.2017.10.006.

Sharon, C. (2007). The 'letter' and the 'spirit': Football laws and refereeing in the twenty-first century. *Soccer & Society*, *1*:1, 201-214, doi: 10.1080/14660970008721259.

P85. The effect of a differential learning training program on external load variables in young basketball players

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INTRODUCTION

Although there is recent advance in research dedicated to illustrate the effects of differential learning training programs in skill acquisition (Santos et al., 2018), it is not adequately described yet. Therefore, the aim of this study was to identify the effects of a differential learning training program based on small-sided games on external load variables in young basketball players.

METHODS

Twenty-five young basketball players, fourteen under-13 males and eleven under-15 females participated in this study (training experience = 4 years). The subjects performed several small-sided games SSG (balanced and unbalanced; 2x1, 1x2, 2x2, 3x2, 2x3, 3x3, 4x3, 3x4, 4x4) under different conditions. One group in fixed and incremental approach and other in differential learning approach. Pre and post-tests were performed in 4x4 format. Workload data was collected via WIMU PRO Local Positioning System (Realtrack Systems, Almeria, Spain), sampled at 20 Hz, and housed tri-axial accelerometer (100 Hz). External workload consisted of distance covered (DC) ($m \cdot min^{-1}$), distance covered ($m \cdot min^{-1}$) in SZ1 (< 6.0 $km \cdot h^{-1}/min^{-1}$), SZ2 (>6.0–12.0 $km \cdot h^{-1}$), SZ (>12.1 $km \cdot h^{-1}$), accelerations (Acc) and decelerations (Dec) ($n \cdot min^{-1}$), high-intensity accelerations (HIAcc) and decelerations (HIDec) ($n \cdot min^{-1}$), peak speed (PS) ($km \cdot h^{-1}$), peak acceleration (Pacc) and deceleration (Pdec) ($m \cdot s^{-2}$), body impacts (BI) ($n \cdot min^{-1}$) and Player Load (PL) (a.u./min.) (Vazquez-Guerrero, Reche, Cos, Casamichana, & Sampaio, 2018). Specifically-designed spreadsheets were used to analyse within- and between-group changes using magnitude-based inferences (Hopkins, 2006b, 2006a).

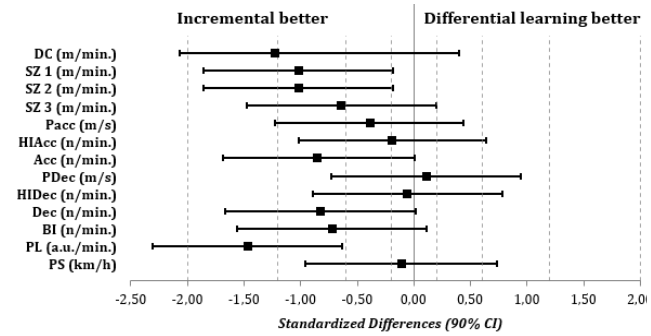

Figure 1. Effects of differential learning training program on various performance indices

RESULTS

Within-group analysis showed moderate increase in SZ2 and SZ3 in both groups. The Differential learning group showed moderate increase in Dec and PS, and incremental in Pacc and PL. The Incremental group presented a very large increase in PS. Between-groups analysis showed general better results in post-test for incremental group (Figure 1).

CONCLUSIONS

External load variables alone, could not be exact to measure the effects of differential learning approach. Due to increased noise, the short-term interventions may be ineffective. Further studies should explore other variables (e.g. tactical variables) and explore longer interventions.

Acknowledges

I would like to thank professor Leite.

References

Hopkins, W. G. (2006a). Analysis of a post-only crossover trial with adjustment for one of two predictors.

Hopkins, W. G. (2006b). Spreadsheets for Analysis of Controlled Trials, with Adjustment for a Subject Characteristic. *Sportscience*, *10*, 46–50.

Santos, S., Coutinho, D., Gonçalves, B., Schöllhorn, W., Sampaio, J., & Leite, N. (2018). Differential Learning as a Key Training Approach to Improve Creative and Tactical Behavior in Soccer. *Research Quarterly for Exercise and Sport*, *89*(1), 11–24. https://doi.org/10.1080/02701367.2017.1412063

Vazquez-Guerrero, J., Reche, X., Cos, F., Casamichana, D., & Sampaio, J. (2018). Changes in External Load When Modifying Rules of 5-on-5 Scrimmage Situations in Elite Basketball. *Journal of Strength & Conditioning Research*, *00*(00), 1–8. https://doi.org/10.1519/JSC.0000000000002761

P86. Establishing "excellence" in the Portuguese football referee

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INTRODUCTION

Within the development of sporting careers, there are several studies that show the importance of inner factors (e.g. physical, physiological and socioemotional), and contextual (e.g. surrounding environment, personnel and organisational support network, learning environment). According to several patterns, this development is associated with a long, ongoing and deliberate process. But in what concerns football referee, research on the topic is scarce. The existing research is mainly focused on aspects relating to the sporting career, even though one can also identify, in a residual manner, studies related to organisational support in the referee's career development process. However, there are very few studies related to the assessment of the football referee's training process, mainly in Portugal. The aim of our study was to identify recognised factors to sustain excellence in football referee, exploit training conditions and the Portuguese football referee's professional career development.

METHODS

From data inductive analysis it was possible to verify that: i) a referee of excellence needs to gather a set of personal cognitive, physical and socioemotional skills; ii) the significant interventions of the Portuguese Football Federation in what concerns training and positioning of the referees' career, with the introduction of a National Training Plan and the amendments on the Football referee Regulation has had an impact on the geographical distribution of the referees from national frameworks and has contributed to the meteoric rising of some members; it isn't ensured a training process in equal conditions to all the country's referees in lower classes.

RESULTS

From data inductive analysis it was possible to verify that: i) a referee of excellence needs to gather a set of personal cognitive, physical and socioemotional skills; ii) the significant interventions of the Portuguese Football Federation in what concerns training and positioning of the referees' career, with the introduction of a National Training Plan and the amendments on the Football referee Regulation has had an impact on the geographical distribution of the referees from national frameworks and has contributed to the meteoric rising of some members; it isn't ensured a training process in equal conditions to all the country's referees in lower classes.

CONCLUSIONS

The research results: 1) allow us a better characterisation of the necessary skills of football referees of excellence; 2) suggest information related to aspects that should be revised not only in the training process but also in the recruitment of football referees from entities that manage football referees in Portugal.

P87. Skill transference: link between previous sport experience, notational statistics, positional analysis and creativity score

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INTRODUCTION

The ability to transfer and perform a skill successfully in various conditions allows it to be truly mastered (McMorris, 2004). Thus, it means that it is easier to master a skill and reach elite level for athletes with more various sport related experience. The aim of this study was to find a connection between previous sport experience, notational statistics, positional analysis and creativity score of 10-13 year-old children belonging to basketball and handball teams playing handball, futsal and basketball.

METHODS

Seventeen 10-13 year-old children from basketball (n=6) and handball teams (n=11) participated in this study. In total nine games were played: three handball games (GK+5v5+GK), three futsal games (GK+4v4+GK) and three basketball games (5v5). Based on the number of previous sports practiced either structured or unstructured, all participants were divided into four groups: participants with one previous sport experience (G1), participants with two previous sports experience (G2), participants with three previous sports experience (G3) participants with four or more previous sports experience (G4). Individuals' efficiency was calculated for basketball and futsal (Correll, 2012) and a shot for handball. Individuals' creativity score was assessed by summing attempts, fluent and versatile actions (S. D. L. Santos et al., 2016). Positioning data was transferred from GPS units to computer and analysed using SPRO software (REALTRACK systems, Spain). The data was used to obtain individuals' distances to their own teams' centroid and opposing teams' centroid. Statistical analysis was calculated by performing One-Way ANOVA test for normal distributed results and Kruskal-Wallis H and Mann-Whitney U tests for not normally distributed results.

RESULTS

A significant difference was revealed in goals scored in handball games, when comparing the G1 (0,4±0,548 goals) with G4 (2±0 goals). There was a significant difference between all the groups playing handball: on average participants from G1 had the highest distance to their teams' centroid (4,65±2,57 m) and participants from G4 were closest to their teams' centroid (2,96±1,74 m). Regarding futsal, on average, participants from G4 were the most distanced from their teams' centroid (4,78±2,64 m) and the participants from G3 were within the smallest average distance from their teams' centroid (3,87±2,62 m). As for basketball, the distance to own teams' centroid presented the largest distance to G3 (3,503±2 m) and participants from G4 were the closest to their teams' centroid (3,068±1,86 m). Considering all sports, the average distance to the opponent teams' centroid revealed the largest distance corresponding to G3 (5,69±3,85 m) and participants from G4 held the shortest average distance to the opponent teams' centroid (5,31±4,15 m).

CONCLUSION

The differences showed by the goals scored in the handball setting indicate that the participants belonged either to basketball or to handball teams as their main sport, and that could lead to an advantage over other participants. In addition, players' performance can be influenced by early maturation process, which includes higher aerobic power, muscular strength, muscular endurance, motor skill execution and general intelligence (Baxter-Jones, 1995). Positional analysis showed that participants with four or more previous sports experience were the closest to their own teams' centroid in games of handball, basketball and total averages out of all groups. In addition, they had the smallest distance to centroid variability in basketball games and total. These results support the research provided by S. Santos et al. (2015) that players, who had early diversification background, showed greater regularity in distance to their own teams' centroid. Calculation of creativity score reported that participants with four or more previous sports experience had the highest results in the games of handball, futsal, basketball and total averages. These results support the

statement that early diversification increases players' creativity, by improving its components: attempts, fluency and versatility (S. Santos et al., 2017).

References

Abernethy, B., Baker, J., & Côté, J. (2005). Transfer of pattern recall skills may contribute to the development of sport expertise. *Applied Cognitive Psychology*, *19*(6), 705–718. https://doi.org/10.1002/acp.1102

Baker, J., Côté, J., & Abernethy, B. (2003). Learning from the experts: practice activities of expert decision makers in sport. *Research Quarterly for Exercise and Sport*, *74*(3), 342–347. https://doi.org/10.1080/02701367.2003.10609101

Baxter-Jones, A. D. (1995). Growth and development of young athletes. Should competition levels be age related? *Sports Medicine (Auckland, N.Z.)*, *20*(2), 59–64.

Correll, J. (2012). Players' Performance Index for Major League Soccer. *All Theses*. Retrieved from https://tigerprints.clemson.edu/all_theses/1328

McMorris, T. (2004). *Acquisition and performance of sports skills*. *Wiley SportTexts series*. Chichester: John Wiley & Sons. Retrieved from http://www.loc.gov/catdir/description/wiley042/2004000843.html

Moesch, K., Elbe, A.-M., Hauge, M.-L. T., & Wikman, J. M. (2011). Late specialization: the key to success in centimeters, grams, or seconds (cgs) sports. *Scandinavian Journal of Medicine & Science in Sports*, *21*(6), e282-90. https://doi.org/10.1111/j.1600-0838.2010.01280.x

Santos, S., Mateus, N., Gonçalves, B., Silva, A., Sampaio, J., & Leite, N. (2015). The influence of previous sport experiences in transfer of behaviour patterns among team sports. *Revista De Psicologia Del Deporte*, *24*(3), 89–92. Retrieved from http://www.rpd-online.com/article/download/v24-n3-santos-mateus-goncalves-etal/Santos_Mateus_Goncalvesetal

Santos, S. D. L., Memmert, D., Sampaio, J., & Leite, N. (2016). The Spawns of Creative Behavior in Team Sports: A Creativity Developmental Framework. *Frontiers in Psychology*, *7*, 1282. https://doi.org/10.3389/fpsyg.2016.01282

P88. A systematic review of constraint-led approach

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INTRODUCTION

The constraint-led approach (CLA) is a pedagogical approach which investigates how players' and teams' adapt their behaviour under specific sport constraints (Renshaw, Chow, Davids, & Hammond, 2010). The publications about CLA have been raising throughout the years, but few papers are dedicated to the revision of the main findings within this research field (Chow et al., 2007; Davids, 2015; Eccles, 2010; Travassos et al., 2013). Indeed, a systematic review that encompasses several studies centred on CLA could offer the opportunity to understand what has been researched so far and inform academics about the gaps in literature in order to guide them for future investigations. In line with this, the study aims to provide an overview about the investigation centred in CLA, particularly focused on players' adaptive behaviour within the sport context, via a systematic review.

METHODS

An electronic literature search was conducted for articles published up to and including August of 2018, on the online databases PubMed, Scopus, EBSCO, SPORTDiscus and Web of Science. All databases were searched using combinations of the main CLA concepts. The present review only includes manuscripts written in English, with full text available and published in peer-reviewed journals with impact factor indexed. Moreover, empirical articles focused on CLA concepts applied to performance analysis or tactical behaviour within sports context were included as well. No restrictions were placed on participants' age, skill, gender or type of sport. After the systematic search, the following information was extracted from the selected articles: Authors, year of publication, type of study, study design, sample, statistical analysis, main results, and suggestions for future researches. The studies methodological quality was evaluated through Downs and Black checklist (Downs & Black, 1998).

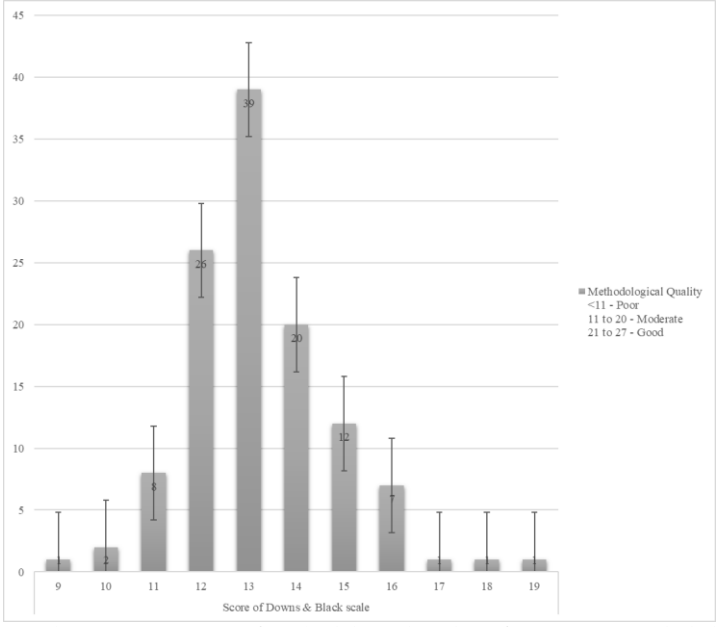

Figure 1. Assessment of methodological quality of manuscripts included in systematic review

RESULTS

The database search yielded 882 potential studies. However, only 118 met the eligibility criteria and were included in systematic review, with only 3 studies presenting poor methodological quality (Figure 1).

The systematic analysis suggests a prevalence of cross-sectional studies, experimental protocol designs, male samples, and analysis of team sports. Overall, studies record players' positional coordinates to analyse several variables (e.g., centroid, and relative phase), which in turn, allows to infer about the players' and teams' tactical behaviour. Globally, as a response to different constraints, players establish systematically a perception-action coupling, which in turn, affords them adaptive skills.

CONCLUSIONS

In conclusion, longitudinal studies, that evaluate how players adapt their behaviour under competitive constraints are mandatory. Furthermore, studies that link the sport learning designs (i.e., training plan) with players' and teams' behaviour during competitive context will allow to move forward on sport pedagogy.

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References

Chow, J. Y., Davids, K., Button, C., Shuttleworth, R., Renshaw, I., & Araújo, D. (2007). The role of nonlinear pedagogy in physical education. *Review of Educational Research, 77*(3), 251-278. doi:10.3102/003465430305615

Davids, K. (2015). Athletes and sports teams as complex adaptive system: A review of implications for learning design. *Revista Internacional de Ciencias del Deporte, 39*(11), 48-61.

Downs, S., & Black, N. (1998). The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomised studies of health care interventions. *Journal of Epidemiology and Community Health, 52*, 377-384.

Eccles, D. (2010). The coordination of labour in sports teams. *International Review of Sport and Exercise Psychology, 3*(2), 154-170. doi:10.1080/1750984X.2010.519400

Renshaw, I., Chow, J. Y., Davids, K., & Hammond, J. (2010). A constraints-led perspective to understanding skill acquisition and game play: A basis for integration of motor learning theory and physical education praxis? *Physical Education and Sport Pedagogy, 15*(2), 117-137. doi:10.1080/17408980902791586

Travassos, B., Araújo, D., Davids, K., O'Hara, K., Leitão, J., & Cortinhas, A. (2013). Expertise effects on decision-making in sport are constrained by requisite response behaviours e A meta-analysis. *Psychology of Sport and Exercise, 14*, 211-219.

P89. Anthropometric and fitness profiles of elite senior Portuguese rugby union players

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INTRODUCTION

Rugby unions throughout the world are implementing player development models in order to prepare young players to meet the demands of professional rugby union. The purpose of the present study was to provide normative data relating to the physical fitness of elite senior Portuguese rugby union players and determine the differences in the physical capacities between players in the forward and back units, as well as providing descriptive data for the position categorisations within these units for this unique population.

METHODS

Data were collected on 46 senior Portuguese rugby players, classified as backs (n=22; age 26.2±2.8, body mass (kg) 88.0±11.4 and body height (cm) 180.6±7.1) and forwards (n=24; age 26.7±2.9 body mass (kg) 100.7±12.9 and body height (cm) 184.4±6.3). Performance-based anthropometric evaluation and fitness measures included sum of seven skinfolds, maximum strength (1RM), speed (10,20,30, 40 and 50 meters) and anaerobic capacity of players (multi-stage fitness test).

RESULTS

No statistical differences were found between the backs and forwards for the speed performance variables although positional differences were found across all speeds when assessed relative to body mass since the forwards were significantly heavier. The backs body mass (kg) was significantly lower ($t = -3.2$, $p < .001$, $ES = -1.04$) than the forwards. When speed variable were adjusted for players' weight differences were found across all indicators between positions (10 metres: $t = 4.2$, $p<. 001$, $ES = 0.80$; 20 m: $t = 3.2$, $p < .01$, $ES = 0.79$; 30 m: $t = 3.1$, $p < .01$, $ES = 0.75$; 40 m: $t = 4.3$, $p< .01$, $ES = 0.81$; and 50 m: $t = 3.3$, $p< .01$, $ES = 0.82$).

CONCLUSIONS

The anthropometric and fitness profiles of elite senior Portuguese rugby players are poorly explored. These findings suggest that no normative profiles for specific positions exist and Portugal's rugby union couldn't find a model for Portuguese rugby player's development.

References

Vaz, L., Morais, T., Rocha, H., & James, N. (2014). Fitness profiles of elite Portuguese rugby union players. *Journal of human kinetics*, *41*, 235-44. doi:10.2478/hukin-2014-0051

P90. Comparison of the goal scoring patterns between the European Championship in Portugal 2004 and the European Championship in France 2016

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INTRODUCTION

With all the technological innovation and evolution in football analysis, teams are now better prepared in all moments during the game. Common sense states that set-pieces are now the best way to score. Regarding this idea, the aim of this study was to compare the characteristics of goal scoring patterns between two major international competitions.

METHODS

All the games (n=33) from the European Championship in France 2016, were analysed through video notational analysis. The following performance indicators were considered: time of scoring, style of attack, actions that occurred prior to the goal, set-pieces and zone of scoring. Our results were compared with a previous study from the European Championship in Portugal 2004 (Yiannakos & Armatas, 2006).

RESULTS

The results revealed that the tendency of the goal scoring patterns was the same. More goals were achieved in the second half (61.1% -2016, 57.4% -2004) than in the first half. Also, goals achieved through organised offence present a higher frequency (50.9%, 44.1%), followed by goals through set play (30.6%, 35.6%) and counter-attacks (18.5%, 20.3%). Regarding the actions that occurred prior to the goal, long passes presented higher frequency (40.4%, 34.1%) followed by combination play (40.4%, 29.3%). Free kicks and corners were more frequent throughout the game in set-pieces. Finally, regarding the zone of scoring, goals inside the penalty area were higher (67.6%, 44.4%).

CONCLUSIONS

These analysed competitions, although separated in time for 12 years, showed a regularity of goal scoring patterns. Set-pieces are important, but not so decisive as the common fan assumes. We detected that during the first half, almost half of the goals scored were through set-play, but we also proved that in fact, goals through organised offence present a higher frequency. Thus, these results prove that, although the game evolved, the goal patterns remained the same.

References

Yiannakos, A., & Armatas, V. (2006). Evaluation of the goal scoring patterns in European Championship in Portugal 2004. *International Journal of Performance Analysis in Sport*, *6*(1), 178–188. https://doi.org/10.1080/24748668.2006.11868366

P91. Competitive warm-up in international friendly fixtures: Exploratory study in U-16 national basketball team

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INTRODUCTION

A proper warm-up strategy is determinant to achieve the optimal state of readiness and consequently to perform in basketball (Berdejo-del-Fresno, 2011). However, the physical demands of warm-up strategies during international fixtures is practically unknown. The purpose of this study was to assess the reliability of external measures of a competitive warm-up.

METHODS

Ten under-16 national team basketball players participated in an 18-minute warm-up before 3 international friendly fixtures. The warm-up consisted of (a) four-corner passing drill (2 min.) (b) general warm-up and offensive skills drill (6 min.), (c) lay-ups (3 min.), (d) 3-points shooting (2 min.), (e) free-throws and defensive slide (2 min.) and (f) quick lay-ups (3 min.). Workload data was collected via WIMU PRO Local Positioning System (Realtrack Systems, Almeria, Spain), sampled at 20 Hz, and housed tri-axial accelerometer (100 Hz). External workload consisted of distance covered (DC) ($m \cdot min^{-1}$), distance covered ($m \cdot min^{-1}$) in stationary per walking (< 6.0 $km \cdot h^{-1}/min^{-1}$), jogging (>6.0–12.0 $km \cdot h^{-1}$), running (>12.10–18.0 $km \cdot h^{-1}$), high-intensity running (> 18.0 $km \cdot h^{-1}$), accelerations (Acc) and decelerations (Dec) ($n \cdot min^{-1}$), high-intensity accelerations (HIAcc) and decelerations (HIDec) ($n \cdot min^{-1}$), peak speed (PS) ($km \cdot h^{-1}$), peak acceleration (PAcc) and deceleration (PDec) ($m \cdot s^{-2}$), high-intensity actions (HIA) ($n \cdot min^{-1}$) and Player Load (PL) (a.u./min.) (Vazquez-Guerrero, Reche, Cos, Casamichana, & Sampaio, 2018). Intraclass correlation coefficient (2,1) (ICC) between the 3 international friendly fixtures three assessments, was computed using SPSS (SPSS, Inc., Version 24.0, Chicago, IL) with the 95% confidence limit.

RESULTS

The highest amount of distance was covered at low-intensity (stationary per walking and jogging) (Table 1). *Almost perfect* agreement was found for high-intensity actions (ICC = 0.82). *Substancial* agreement was found for distance covered in stationary per walking, jogging and, high-intensity running, but also for accelerations, decelerations and player load (ICC range = 0.69-0.79) (table 1).

Table 1

Intraclass correlation coefficient for the external load measures

Variable	Mean±SD	ICC	Variable	Mean±SD	ICC
DC ($m \cdot min^{-1}$)	82.14±6.43	0.25	HIAcc ($n \cdot min^{-1}$)	1.13±0.43	0.40
Stationary per walking ($m \cdot min^{-1}$)	31.48±3.11	0.79	HIDec ($n \cdot min^{-1}$)	1.03±0.38	0.57
Jogging ($m \cdot min^{-1}$)	40.94±6.50	0.72	PS ($km \cdot h^{-1}$)	16.43±1.36	0.24
Running ($m \cdot min^{-1}$)	9.62±3.39	0.58	PAcc ($m \cdot s^{-2}$)	2.87±0.27	0.20
High-intensity running ($m \cdot min^{-1}$)	0.09±0.24	0.73	PDec ($m \cdot s^{-2}$)	-2.84±0.35	0.58
Acc ($n \cdot min^{-1}$)	18.71±1.11	0.73	HIA ($n \cdot min^{-1}$)	10.55±4.07	0.83
Dec ($n \cdot min^{-1}$)	18.63±1.08	0.69	PL (a.u./min.)	1.43±0.20	0.77

CONCLUSIONS

The present competitive warm-up is a reliable strategy in most of acceleration/deceleration related variables (Acc, Dec, HIA and PL). The athletes performed higher values of DC, HIAcc, HIDec, HIA, and PL in the warm-up than during the international friendly fixtures. Thus, current strategy may afford suitable opportunities for the athletes to prepare physically and mentally for the international fixtures.

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References

Berdejo-del-Fresno, D. (2011). Calentamiento competitivo en baloncesto: revisión bibliográfica y propuesta. *E-Balonmano.Com: Revista de Ciencias Del Deporte*, *7*(2), 101–116.

Vazquez-Guerrero, J., Reche, X., Cos, F., Casamichana, D., & Sampaio, J. (2018). Changes in External Load When Modifying Rules of 5-on-5 Scrimmage Situations in Elite Basketball. *Journal of Strength & Conditioning Research*, *00*(00), 1–8. https://doi.org/10.1519/JSC.0000000000002761

P92. Effects on tactical behaviours of manipulations constraints in small-sided games of football: A systematic review

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INTRODUCTION

Small-sided games (SSGs) are practice contexts specifically designed with a reduced number of players and manipulations to task constraints, as well as specific adjustments to rules which support acquisition of skills, tactical understanding and conditioning in participants (Davids, Araújo, Correia, & Vilar, 2013). The study is a systematic review that attempts to identify the key positional variables and effects of manipulating task constraints on individual and collective tactical behaviour in small-sided games (Folgado, Lemmink, Frencken, & Sampaio, 2012; Travassos, Gonçalves, Marcelino, Monteiro, & Sampaio, 2014).

METHODS

The Web of Science database was used to research the articles by using the following inclusion criteria: 1) studies published in peer-reviewed journals; 2) articles written in English; 3) studies that reviewed the effect of different task constraints manipulations in SSGs to shape tactical behaviours; 4) studies that reported positional data of players and teams; 5) studies that provided a detailed description of the participants; and 6) that showed manipulation effects in SSGs, supplemented with detailed statistical analyses.

RESULTS

From the first selection, 21 articles were included in this study. Seven manipulated the numerical relations between players in SSGs, four used the playing area dimensions, three handled the different age groups and two manipulated the goal types used for scoring. The most frequent positional variables in the studies that characterise tactical behaviour in football were the centroid position in fourteen articles, the surface area in 6 articles, the Ipwratio in 5 of them and the stretch index in five.

CONCLUSIONS

The review systematic revealed that the number of players and the dimension manipulations were the most frequently manipulations made in the football SSGs. These manipulations resulted in the following findings: i) teams that are numerically inferior or do not have a goalkeeper intensify pressure on teams in the defensive sub-phase; ii) the higher the number of players involved, the smaller is the variability in occupation of space by players in a team; iii) The positional variables of centroid position and the surface area / effective play area shape affordances for goal scoring attempts; and iv). The stretch index and the Ipwratio variables enables identification of each team's performance model.

References

Davids, K., Araújo, D., Correia, V., & Vilar, L. (2013). How Small-Sided and Conditioned Games Enhance Acquisition of Movement and Decision-Making Skills. *Exercise and Sport Sciences Reviews, 41 (3)*.

Folgado, H., Lemmink, K. A., Frencken, W., & Sampaio, J. (2012). Length, width and centroid distance as measures of teams tactical performance in youth football. *Eur J Sport Sci, 14 Suppl 1*, S487-492. doi: 10.1080/17461391.2012.730060

Travassos, B., Gonçalves, B., Marcelino, R., Monteiro, R., & Sampaio, J. (2014). How perceiving additional targets modifies teams' tactical behavior during football small-sided games. *Human Movement Science 38*, 241–250.

P93. Football counterattacks patterns according to the quality of opposition

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INTRODUCTION

Studies conducted in futsal have verified that counterattacks are important in the creation of goal opportunities and that the majority of goal chances come from counter attacks. The defensive transition is characterised by behaviours that must be assumed during the first seconds after losing ball possession. These seconds are particularly importante considering that teams are momentarily disorganised for the new actions that they must assume, so both of them try to take advantage from the opposition's disorganisation. In its turn, the offensive transition is characterised by the behaviours that must be expressed in the first seconds after regaining the ball possession. These seconds are crucial since as in defensive transition, teams are temporarily disorganised and the aim is to take advantage of the other team's disorganisation for its own benefit. The aim of this study is to observe counterattacks standards in teams that went down from division in matches against the two immediately above and against the top three ranked.

METHODS

We analyse 202 counterattacks, in 88 matches, from the last four seasons in the Primeira Liga Portuguesa teams that went down from division and faced each other against the two immediately above and against the top three ranked. The teams analysed are Gil Vicente F.C. / F.C. Penafiel (2014/2015); C.F. União / A. Académica C. (2015/2016); F.C. Arouca / C.D. Nacional (2016/2017); F.C.P. Ferreira / G.D. Estoril P. (2017/2018). The counterattacks were analysed through video and notational analysis and focused on: number of players involved in the counter-attack; type of counterattack (backed or direct); relationship between the number of players involved in the attack vs. the number of players to defend; number of passes; error that triggers the counterattack (forced or non-forced); recovery zone; duration; predominant technical actions; results/finalisation in the end of the counter-attack.

RESULTS

In the analysed games the counterattack pattern revealed that descended teams rarely create situations of numerical superiority at this moment since there is a numerical inferiority relation to the number of players who defend (n = -1). Is was also verified that most of the counterattacks didn't end in a shooting opportunity. There were also no significant differences in relation to the number of players involved in the counterattack and the number of passes, when comparing matches against teams in the top of the table and teams in the bottom of the table. Furthermore, most of the counterattacks were registered at the second halves of the matches, regardless of the opponent's level.

CONCLUSIONS

Since the study focus on teams that were relegated, it's normal that most of the counterattacks are in a numerical inferiority situation and, consequently, they result in few goal chances. As the difference between the number of players attacking and the number of players defending tends to be negative, it's also clear that teams privilege team balance instead of attacking with a high number of players while trying to take advantage of the opponents' disorganisation.

References

da Silva Barrena, A. (2016). Análise dos contra-ataques da equipe do Corinthians na categoria adulto e sub 20 no ano de 2013. *RBFF-Revista Brasileira de Futsal e Futebol*, *7*(26), 375-381.

Sarmento, H., Anguera, M. T., Pereira, A., Marques, A., Campaniço, J., & Leitão, J. (2014). Patterns of play in the counterattack of elite football teams-A mixed method approach. *International Journal of Performance Analysis in Sport*, *14*(2), 411-427.

Araújo, M., & Garganta, J. (2002). Do modelo de jogo do treinador ao jogo praticado pola equipa: um estudo sobre o contra-ataque, em futebol de alto rendimento. In *A investigação em futebol: estudos ibéricos* (pp. 161-168). Porto: Universidade de Porto, Faculdade de Ciências do Desporto e da Educação Física.

P94. Jump performance in Volleyball: type and intensity of the jumps of the outside hitter and middle blocker

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INTRODUCTION

Volleyball is a non-invasive net sport. Teams perform alternative high-intensity actions of passing a ball and trying to send it to the opponent's court. Traditionally, monitoring players' jumping ability in a competition involves the assessment of the types and the number of jumps that the players perform. Previous studies showed that players' game demands changed according to the players' positions and their specificity. The purpose of this pilot study was to assess the types and intensities of the jumps that professional male volleyball players executed according to particular playing positions.

METHODS

Four male elite volleyball players participated in this study. The sample was composed of 1021 jumps done in 15 sets of five official matches of the regular season of a semi-professional team. A descriptive pilot study design was implemented to analyse the types of jumps and jump heights by players' playing positions (outside hitters and middle blockers). The jump height was recorded using an inertial measurement device - VERT.

RESULTS

No significant differences in the heights of jumps were found between the sets of the matches. Different players' roles had different usage frequencies for the types of jumps and different jump intensities. The data provided reference values of the type of jumps performed, their frequency, and their intensity by players' playing positions in competition.

CONCLUSIONS

The purpose of this pilot study was to assess the types and intensity of the jumps of outside hitters and middle blockers in the senior 1st division of volleyball in Portugal. The results confirm the need to individualise the practice and training of volleyball players according to the players' roles. More studies are needed to provide more information about repeated jump ability in volleyball players.

P95. Match performance of national and European competitions: relationship between teams of the same championship

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INTRODUCTION

Previous investigation has shown that context is determinant for football performance (Sarmento et al., 2014). The aim of this study was to examine the relationship between teams of the same championship when playing for national and European competitions assessing match performances of professional football teams.

METHODS

The research included football matches between Liverpool F.C. and Manchester City F.C. teams during the 2017/2018 season. Match performances were determined analysing Shots (from box; outside box; average distance), Attacks (positional and counter attacks), Passes (long and total), Duels (defensive; offensive; aerial and ground), Recoveries (defensive; offensive; left, central and right wings), Offsides (total; average distance) and Number of players involved in attacking situations.

RESULTS

Results showed that there were some differences between playing for a national competition and for an European competition. Manchester City F.C. exhibited more shots, long passes and created more attacks in the attacking third of the pitch for Champions League. For Liverpool F.C. , more counter-attacks were shown in the Premier League matches and a more advanced offside line in Champions League matches.

CONCLUSIONS

These findings suggest that the type of competition influences match performances of professional football teams. Furthermore, we hypothesised that the elimination factor of Champions League may explain differences in performance.

References

Sarmento, H., Marcelino, R., Anguera, M. T., Campaniço, J., Matos, N., & Leitão, J. C. (2014). Match analysis in football: a systematic review. Journal of Sports Sciences, 32(20), 1831–1843. https://doi.org/10.1080/02640414.2014.898852

P96. Tactical decision making of the Portuguese beach volleyball player

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INTRODUCTION

Decision-making can be defined as the mental processes that underpin the selection of one course of action from various alternatives (Reason, 1990). Therefore, a decision-making situation presents the individual with more than one possible outcome to consider whenever there is uncertainty regarding the consequences of these outcomes. A decision maker forms expectations relating to these different choices and evaluates them according to judgments and values (Hastie & Dawes, 2010). So, a decision-making is a highly complex process, that involves a distributed network of brain regions including frontal, parietal, and limbic structures (Rosenbloom, Schmahmann, & Price, 2012; Starcke & Brand, 2012). Usually, after an athlete has identified the context, and the action, he should be able to decide. Beach Volleyball is frequently played under extreme weather conditions that may influence decision-making and overall performance. The aim of this study was to understand how the Portuguese Beach Volleyball player makes his tactical decision during the competition.

METHODS

The sample consisted of 74 male and female athletes participating in the 2018 national beach volleyball championship. A questionnaire on tactical decision-making was applied. The questionnaire consisted of tactical questions related with the main game skills (type of service performed, organisation of the block, type of defence, type of reception, type of distribution, type of reception, Match complexes) evaluated on a 5-point scale ranging from 1 (rather important) to 5 (very important).

RESULTS

The main factors that influence the type of service were the characteristics of the opposing team ($p<0,05$), and the climatic conditions ($p<0,05$). The block organisation was significantly affected by the previously established tactical plan ($p<0,05$). However, considering players' experience, tactical decision may change. Moreover, defence organisation depended also on the players' expertise: expert athletes decided accordingly to the opponent attacker 's characteristics ($p<0,05$). According to the type of attack performed, climatic conditions and the opposing blocker characteristics are the main concerns of the athletes.

CONCLUSIONS

This study pointed out that Portuguese Beach Volleyball players make their tactical decision during the competition based on the opponent team characteristics and climatic conditions.

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References

Afonso, J., Garganta, J., & Mesquita, I. (2012). A tomada de decisão no desporto: o papel da atenção, da antecipação e da memória. *Revista Brasileira. Cineantropometria e Desempenho Humano, 4*(5), 592-601. Doi:10.5007/1980-0037.2012v14n5p592.

Klostermann, A., Vater, C., Kredel, R., & Hossner, E-J. (2015). Perceptual Training in Beach Volleyball Defence: Different Effects of Gaze-Path Cueing on Gaze and Decision-Making. *Front. Psychol.* , 1834. doi: 10.3389/fpsyg.2015.01834

Hastie, R., & Dawes, R. M. (2010). *Rational choice in an uncertain world: The psychology of judgment and decision making*. Sage.

Rosenbloom, M. H., Schmahmann, J. D., & Price, B. H. (2012). The functional neuroanatomy of decision-making. *The Journal of neuropsychiatry and clinical neurosciences*, *24*(3), 266-277.

P97. The reproducibility of technical performance of young soccer players in medium-sided games

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INTRODUCTION

The purpose of this study was to analyse the reproducibility of a medium-sided game (6x6) in the technical performance of children during two sessions interspersed by one week.

METHODS

Twelve soccer players (10.1±0.3 years old; 4.4±2.0 years of practice; 34.3±4.7 kg; 143.6±7.1 cm) participated in this study. Three sets of 6 minutes with a rest period of 2 minutes between sets were implemented after a standardised warm-up protocol. The games were played at a synthetic turf in a pitch size of 30x22m. The protocol was implemented in two sessions interspaced by one week with the same teams and players. The variables of volume of play (VP), efficiency index (IE), performance score (PS) and attacks with ball were calculated after the observational analysis of the sessions. Intra-observer reliability was firstly tested to ensure the quality of the data collection.

RESULTS

For the sum of three sets, moderate variations between sessions were observed in the variables of VP (Coefficient of Variation, CV, 38.9 [90% Confidence Interval, [27.1;71.7]; Standardised Typical Error, STE, 0.73 [0.53;1.20]), efficiency index (CV, 72.5 [48.8;145.3]; STE, 0.79 [0.58;1.31]), performance score (CV, 44.8 [31.0;83.8]; STE, 0.66 [0.48;1.09]) and attacks with ball (CV, 71.3 [48.1;142.5]; ETS, 0.79 [0.58;1.30]). In within-session analyses for examining differences between sets, an unclear small increase was observed in VP in set 2 versus set 1 (20.3%, 90%CI [-24.3; 91.2%]; standardised difference ES: 0.25[-0.38; 0.89]), unclear trivial increases of set 3 versus 1 (8.0%, [-24.8; 55.2%]; ES: 0.11[-0.39; 0.60]) and unclear small decreases of set 3 versus 2 (-10.2%, [-37.9; 29.8%]; ES: -0.32[-1.40; 0.77]). Regarding IE, we found unclear trivial decreases of set 2 versus 1 (-3.5%, [-47.9; 78.5%]; ES: -0.06[-1.02; 0.91]), 3 versus 1 (-7.3%, [-43.0; 50.8%]; ES: -0.12[-0.88; 0.64]) and 2 versus 3 (-6.4%, [-44.5; 58.0%]; ES: -0.08[-0.73; 0.57]). Considering PS, we found unclear small increases of set 2 versus 1 (17.5%, [-26.0; 86.5%]; ES: 0.25[-0.46; 0.95]), unclear trivial increases of 3 versus 1 (2.7%, [-26.2; 42.8%]; ES: 0.04[-0.46; 0.54]) and unclear small decreases of 2 versus 3 (-12.6%, [-41.0; 29.4%]; ES: -0.27[-1.07; 0.53]).

CONCLUSIONS

The results suggest that the 6x6 format it is not reliable to reproduce the same technical performance in children. However, unclear trivial-to-small between sets changes were found revealing that sequence of sets may not affect the technical performance of young players.

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P98. Variations of technical actions between the top-4 Portuguese professional volleyball teams and the top-4 Euro league top national teams

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INTRODUCTION

In elite volleyball, previous studies revealed some patterns in male technical actions. The opposite is the most scorer player, middle blockers are the most efficient players in the block action, while outside hitters – to winning points in a high level – require perfect receptions, fast attack tempo and powerfully executed attacks (João, Leite, Mesquita, & Sampaio, 2010; Peña & Casals, 2016). The purpose of this study was to compare different technical actions between the top 4 Portuguese volleyball teams and top 4 Golden European League.

METHODS

The study included the top 4 teams participating in the European Volleyball Golden League in 2018 and the top 4 teams participating in the Portuguese Volleyball League. We analysed 8 outside hitters, 8 middle blockers and 4 opposite players from each league (total of 40 players).

This study analysed a total of 430 technical actions (attack efficacy of the opposite – 109 actions –, block efficiency of the middle blockers – 155 actions – and receptions efficacy of the outside hitters – 166 actions). For the current study, data was collected using Data Volley and the intra-class correlation coefficient test was executed to analyse the reliability levels.

Between-leagues variations were analysed using the standardised differences of effect size (ES) with a 90% confidence interval (CI). The percentage of changes (%) were also calculated and presented with a 90% CI.

RESULTS

Opposite's attacking efficacy was trivially lower in players participating in Euro League than in Portuguese league (-1.6%, [-10.8;8.5]; ES: -0.06, [-0.40;0.29]). Central's blocks were trivially greater in players participating in Euro League than in Portuguese league (6.6%, [-7.9;23.4]; ES: 0.11, [-0.14;0.37]). Z4's reception errors were trivially greater in players participating in Euro League than in Portuguese league (3.1%, [-11.4;20.1]; ES: 0.06, [-0.22;0.33]), however Z4's positive receptions were moderately lower in players participating in Euro League (-16.6%, [-25.3;-11.2]; ES: -0.54, [-0.76;-0.31]). Finally, Z4's perfect receptions were largely lower in players participating in Euro League than in Portuguese league (-39.6%, [-46.2;-32.3]; ES: -1.10, [-1.35;-0.85]).

CONCLUSIONS

There were, generally, trivial differences between the top 4 teams in the Portuguese League and European Golden League. However, Z4's positive and perfect receptions were greater in players from the top 4 Portuguese teams, probably based on the difficulty level of the opponent's service. More studies should be accomplished to identify which behaviours may conduct such outcomes.

References

João, P. V., Leite, N., Mesquita, I., & Sampaio, J. (2010). Sex Differences in Discriminative Power of Volleyball Game-Related Statistics. *Perceptual and Motor Skills*, *111*(3), 893–900. https://doi.org/10.2466/05.11.25.PMS.111.6.893-900

Peña, J., & Casals, M. (2016). Game-Related Performance Factors in four European Men's Professional Volleyball Championships. *Journal of Human Kinetics*, *53*(1), 223–230. https://doi.org/10.1515/hukin-2016-0025

P99. The ratings of perceived exertion are associated with training session classification and match, in youth basketball?

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INTRODUCTION

The use of differential ratings of perceived exertion promotes an easier interpretation of internal load (Weston, Siegler, Bahnert, McBrien, & Lovell, 2015). However, this approach has been explored in elite context, and exclusively in match settings. The aim of this study was to analyse differential ratings of perceived exertion and live time, according to the type of training sessions and match.

METHODS

Sixteen under-16 regional level basketball players participated in 180 training sessions (September to May). Live time during practice was calculated, excluding all stoppages and breaks time. Thirty minutes after each training session, players provided ratings for match/training session exertion (RPE-M), along with differential ratings for breathlessness (RPE-B), leg exertion (RPE-L), upper body exertion (RPE-U) and technical demand (RPE-T). The training sessions/matches were classified according to the following categories: Match (n = 39); Recovery Session (1 and 2 days post-match, n = 28); Acquisition Session (3, 4 and 5 days post-match, n = 39); Tapering Session (1 and 2 days pre-match, n = 26), Preparation Period Session (n = 23), and Transition Period Session (n = 25). Values were compared by one-way ANOVA and Bonferroni-adjusted t-tests.

RESULTS

The ANOVA revealed that live time, RPE-M and RPE-B were significantly different between training sessions ($p<.05$). Post-hoc analysis showed that live time in Match is significantly lower than in Recovery, Acquisition and Preparation Period training sessions. Also, Transition Period sessions were significantly shorter than Preparation Period. The RPE-M was significantly higher in Matches and Transition Period sessions comparing to Preparation Period sessions. The RPE-B was significantly higher in Matches than in Tapering and Preparation Period sessions.

CONCLUSIONS

Different ratings of perceived exertion, particularly RPE-M and RPE-B, but also live time, were associated with training session classification. Thus, RPE and live time are a useful and suitable tool to monitoring internal load in different moments of season, in youth basketball.

References

Weston, M., Siegler, J., Bahnert, A., McBrien, J., & Lovell, R. (2015). The application of differential ratings of perceived exertion to Australian Football League matches. *Journal of Science and Medicine in Sport*, *18*(6), 704–708.https://doi.org/10.1016/j.jsams.2014.09.001

P100. Dynamics of tactical and pacing behaviour during soccer small-sided games when prior information is manipulated.

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INTRODUCTION

In soccer training, the analysis of pacing is a key issue to understand player performance and it is limited by factors such as previous knowledge of exercise duration (Ferraz et al., 2017, 2018). The phenomenon of pacing is regarded as the resource of energy spreading for optimisation of performances during exercise. However, such characteristic of soccer performance is not singly tied to the physiological system. It is also connected by the constant adaptation of players to the changes on the information that sustain their individual and collective behaviour to ensure functional performance (Travassos et al., 2013). The aim of this study was to investigate how the prior knowledge of exercise duration constraints pacing and tactical patterns employed during game-based exercise activities in soccer.

METHODS

Twenty professional male soccer players participated in this study and three small-sided games (three game scenarios) were created (Ferraz, 2016). In first game scenario, players were not informed on the length of time they would take to play the small-sided game. However, this activity was ended after 20 minutes (Unknown Condition). In the following game scenario, players were briefed about playing the small-sided game for 10 minutes. However, soon after they completed the 10-minute game, the participants were requested to complete another 10 minutes making the total exercise duration take 20 minutes (Partially Condition). In the third game scenario, players were informed that they would play the small-sided game for 20 minutes before completing the 20-minute game (Known Condition).

RESULTS

The first 10 minutes of each game / scenario have a higher physical impact (pacing behaviour is more aggressive) independently of the initial information about exercise duration. Moreover, during this time of the exercise the collective team organisation decreased.

CONCLUSIONS

The initial minutes of small-sided games duration seems to have a greater physical impact regardless of prior information about exercise duration. The potential influence of prior knowledge of exercise duration is likely to have more effect on longer duration exercise and in the later part of it. During small-sided games, the collective team's organisation seems to decrease in the period in which the physical impact is greater and improves when pacing pattern is less aggressive (less physical impact). Coaches should consider this relationship (pacing behaviour vs. tactical behaviour) in terms of the physical and tactical impact regulation in their training exercises.

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References

Ferraz, R., Gonçalves, B., Tillaar, R. V., Sáiz, S. J., Sampaio, J., & Marques, M. C. (2017). Effects of knowing the task duration on players' pacing patterns during soccer small-sided games. *Journal of Sports Sciences, 36*(1), 116-122. doi:10.1080/24733938.2017.1283433

Ferraz, R., Gonçalves, B., Coutinho, D., Marinho, D. A., Sampaio, J., & Marques, M. C. (2018). Pacing behaviour of players in team sports: Influence of match status manipulation and task duration knowledge. *Plos One, 13*(2). doi:10.1371/journal.pone.0192399

Travassos, B., Davids, K., Araújo, D., & Esteves, T. P. (2013). Performance analysis in team sports: Advances from an Ecological Dynamics approach. *International Journal of Performance Analysis in Sport, 13*(1), 83-95. doi:10.1080/24748668.2013.11868633

P101. Influence of playing position in strength exercises performance using eccentric-overload device in young basketball players

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INTRODUCTION

Eccentric overload training was recently applied in movement variability analysis (Moras et al., 2018). The in-court response during training and match varies according to playing position (Torres-Ronda, Ric, Llabres-Torres, de Las Heras, & Schelling I Del Alcazar, 2016), however, regarding eccentric-overload training, this dependency is scarcely explored. The aim of this study was to examine the influence of playing positions on physical parameters in strength exercises using eccentric-overload device.

METHODS

Nine under-16 regional level basketball players were recruited for this study. Participants were grouped according to their playing positions: point guards (n=3; height = 171.1±3.2 cm), wings (n=3; height = 170.7±4.1 cm) and power forwards (n=3; height = 188.2±4.1 cm). Players performed two sets of 8 repetitions of Side-Step (Side), Backwards Lunge (Back) and Lateral Squat (Lateral) using a flywheel device (Eccotek Training Force) for each side with 2-minute rest between each set. The acceleration in the anteroposterior axis (Z), in the transverse or lateral axis (X), and vertical axis (Y) for overall movement was measured using an inertial measurement unit (WIMU PRO). The measurement of the mean velocity (Vm) was collected using chronojump software (v1.7.1), which was connected to an encoder attached to the rotation axis of the Eccotek Training Force. Approximate entropy (ApEn) for each acceleration was computed using SPRO Software v1.0.0 (Realtrack Systems, Almeria, Spain). The between-group differences were analysed using magnitude-based inferences.

RESULTS

Point guards showed higher Vm and ApEn in all axis in Side. Wings presented higher ApEn in all axis in Back, while power forwards obtained a higher Vm. Finally, power forwards showed higher Vm and ApEn in all axis in Lateral.

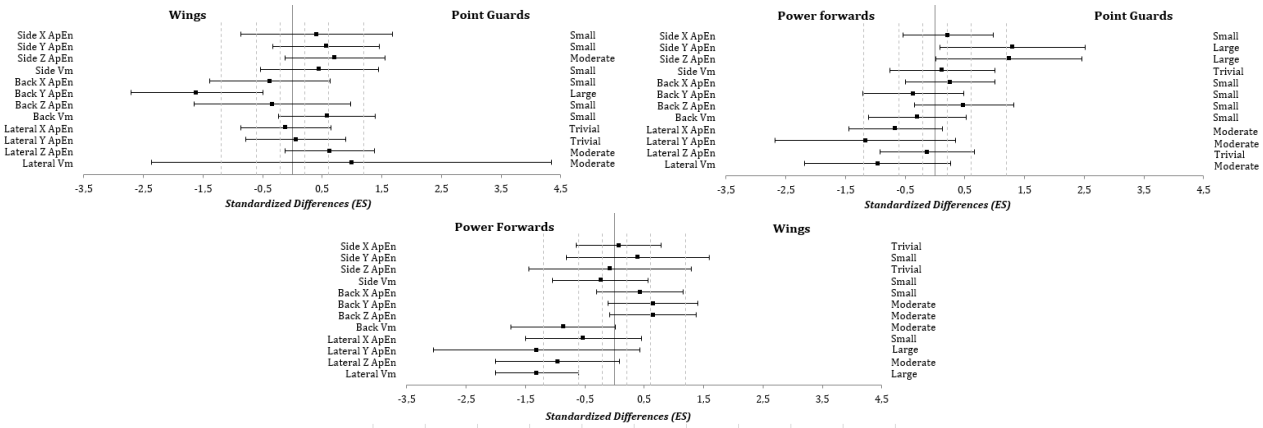

Figure 1. Between-group comparisons in the acceleration and strength-related variables

CONCLUSION

Each playing position revealed a different performance profile which might be explained by the specific demands of the playing positions. Consequently, individualised training focused on the position demands is needed in order to compensate the flaws, create well-adapted players and reduce injury risk.

References

Moras, G., Fernández-Valdés, B., Vázquez-Guerrero, J., Tous, J., Exel, J., & Sampaio, J. (2018). Entropy measures detect increased movement variability in resistance training when elite rugby players use the ball. *Journal of Science and Medicine in Sport*, *0*(0).

Torres-Ronda, L., Ric, A., Llabres-Torres, I., de Las Heras, B., & Schelling I Del Alcazar, X. (2016). Position-Dependent Cardiovascular Response and Time-Motion Analysis During Training Drills and Friendly Matches in Elite Male Basketball Players. *Journal of Strength and Conditioning Research / National Strength & Conditioning Association*, *30*(1), 60–70. https://doi.org/10.1519/JSC.0000000000001043

P102. Relationship Between Body Composition and Physical Capacities in Pubertal Soccer Players

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INTRODUCTION

Power and speed usually support the decisive decision-making situations in professional soccer, for example, straight sprinting is the most frequent physical action in goal situations (Faude et al., 2012). The aim of this study was to analyse the relationship between body composition and physical capacities in soccer in pubertal soccer players from the total squad and playing field position perspectives.

METHODS

A total of 48 soccer players (15.0±0.5 years; 60.2±7.2 kg; 1.72±0.06 m) participated in the study. Later, the group was divided in 14 defenders, midfield and forward players, a total of 42 players, for player field position analysis. Body composition was assessed through a bioelectric impedance analysis method (Tanita BC 420S MA, Japan). The strength of lower limbs was determined using Ergojump System (Byomedic, SCP, Barcelona, Spain) and countermovement (CMJ). Maximal isometric strength was evaluated using a digital dynamometer, handgrip (HG), (Camry 90 kg), agility was evaluated using the Illinois Agility Run Test and the speed by a 30 m sprint test measured with a stopwatch (Golfinho Sports MC 815, Aveiro, Portugal). Flexibility was assessed through the seat and reach test. Pearson correlation coefficients were determined.

RESULTS

Globally (48 players), correlations were observed between agility and weight ($r=0.37$, $p<0.05$), %BF ($r=0.30$, $p<0.05$) and %MM ($r=0.32$, $p<0.05$). HG correlated only to the 30m sprint ($r=-0.30$, $p<0.05$) and, as expected, CMJ was correlated to agility ($r=-0.54$, $p<0.01$) and sprint ($r=-0.48$, $p<0.01$), the last was also correlated to flexibility ($r=0.43$, $p<0.01$). Analysing the results by players field position, at body composition level, only %MM in the midfield players correlated to performance in a physical capacity test, namely agility ($r=0.55$, $p<0.05$). CMJ correlated to the agility test only in the defensive ($r=-0.56$, $p<0.05$) and forward players ($r=-0.64$, $p<0.05$). Velocity was correlated to CMJ in the defensive player ($r=-0.56$, $p<0.05$) and was the most correlated physical capacity with the agility test, namely in defensive ($r=0.77$, $p<0.01$), midfield ($r=0.58$, $p<0.05$) and forward players ($r=-0.82$, $p<0.01$).

CONCLUSIONS

This study evidences that body composition and physical capacities are related in pubertal soccer player and the global soccer squad analysis in these ages may lead to results that do not consider field position specificities. These facts should be considered in talent identification and daily training practice in pubertal soccer players.

References

Faude, O., Koch, T., Meyer, T. (2012). Straight sprinting is the most frequent action in goal situations in professional football. J Sports Sci, 30(7), 625-31.

P103. Training factors predominance affects training perceptual response and training workload variables in youth basketball.

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INTRODUCTION

The planning of training factors is determinant for the effectiveness of training process, but also to maximize the technical staff ability (Bompa & Haff, 1999). However, the research about training factors planning is scarcely explored. The aims of this study were to identify different types of training sessions according to training factors predominance intended and compare the player's perceptual response and live time sessions, according to training sessions typology.

METHODS

Sixteen under-16 male regional level basketball players participated in 123 training sessions. Before each training session, the coach rated in percentage the predominance of each training factor, such as physical, technical, tactical, psychological and social (per session, the sum of all factors should be 100%). Live time during practice was calculated, excluding all stoppages and breaks time. Thirty minutes after each training session, the players had to rate the perceived exertion (RPE) using the 0–10 Borg's scale; perceived difficulty using the DP-15 rating scale (Delignières, 1994); and mental effort using the Paas (1992) rating scale. A 2-step cluster with log-likelihood as the distance measure and Schwartz's Bayesian criterion was performed to classify the training factor predominance considering the rating of importance of each training factor. Specifically-designed spreadsheets were used to analyse between-group differences using magnitude-based inferences.

RESULTS

According to the clustering procedures, the training sessions were grouped into three training factors dominance categories, such as tactical, technical, and multifactorial (Table 1). The between-cluster analysis revealed slightly higher perceptual response in multifactorial training sessions (Figure 1). However, small-to-moderate differences were observed for technical dominance training sessions compared to other types of sessions.

Table 1

Descriptive data of different clusters

Training factor (%)	Cluster 1 Tactical (n = 58)	Cluster 2 Technical (n = 36)	Cluster 3 Multifactorial (n = 29)
Physical	17.33±5.94	35.69±21.52	19.66±7.55
Technical	24.22±8.88	53.61±20.72	31.72±17.13
Tactical	58.45±9.97	9.31±11.66	41.72±20.97
Psychological	0.00±0.00	0.00±0.00	5.34±3.25
Social	0.00±0.00	0.00±0.00	1.55±3.30

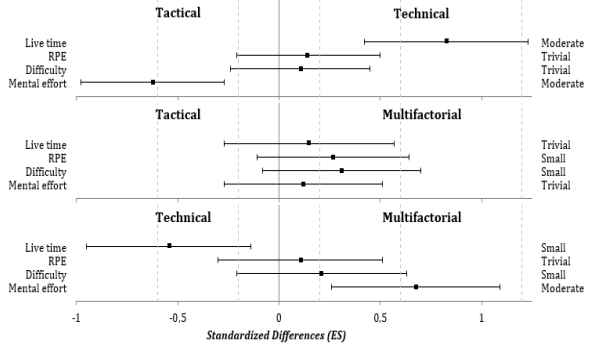

Figure 1. Between-clusters comparisons in live time and perceptual response

CONCLUSION

The present findings showed that the training sessions could be classified according to coach's intentionality, and player's perceptual response and live time is associated with training objectives.

References

Bompa, T. O., & Haff, G. G. (1999). *Periodization: theory and methodology of training* (4ª ed). Champaign: Human Kinetics.

Delignières, D. (1994). Perception de la difficulté et nature de la tâche. *Science et Motricité*.

Paas, F. G. W. C. (1992). Training Strategies for Attaining Transfer of Problem-Solving Skill in Statistics: A Cognitive-Load Approach. *Journal of Educational Psychology, 84*, 429–434. https://doi.org/10.1037/0022-0663.84.4.429

O55. The relationship between sedentary behaviour, physical activity and sports performance among adolescents

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INTRODUCTION

Although it has been already identified that professional athletes present high levels of moderate-to-vigorous physical activity, which clearly meet and exceed the physical activity recommendations, they are overly sedentary during off-training time (Exel et al., 2018; Sperlich et al., 2017; Weiler, Aggio, Hamer, Taylor, & Kumar, 2015). Contemporary research describing young players' physical activity and sedentary behaviour patterns during the non-training time is scarce and may compromise the effectiveness of monitoring and impair performance and health. With the recent advances in technology, accelerometers appear as accessible and non-invasive instruments, that measure information about daily physical activity and sedentary behaviour. Thus, the aim of this study was to identify the influence of physical activity and sedentary behaviour related variables in young athletes' training performance.

METHODS

Thirty-eight young male adolescents (age: 15±0.9) were recruited from football and basketball team sports. Training content (i.e. internal and external-workload) was monitored during three regular training sessions. Physical activity and sedentary behaviour were estimated using accelerometers (Actigraph, GT9X-link), during a full week. Additionally, all participants were required to report their families' socioeconomic status and parents' education level. A hierarchical clustering analysis (Euclidean distance metric and Ward method) was performed across variables to identify associations between variables of different dimensions, as well as the degree of variability within each dimension.

RESULTS

The analysis allowed to cluster different players' performances profiles, differing in off-training behaviour, training performance and parents' socioeconomic status and education level. The players with higher levels of activity during non-training hours (moderatePA: 2666.9±604.5 sec; vigorousPA: 9011.3±2279.2 sec) revealed "hardworking" training performances (distance run: 5608.2±560.8 m; HRavg: 146.1±9.5 bpm). High levels of activity during the week (moderatePA: 2439±520.7 sec; vigorousPA: 12832.8±2027.3 sec) are related to upper activity levels during the weekend (moderatePA: 2062.3±1151.5 sec; vigorousPA: 9923.6±4784.4 sec). Advanced levels of sedentariness during the weekend (27764.4±7048.8 sec) are related to inferior socioeconomic status (4.4±1) and education level (father: 3.7±1; mother: 3.6±1.3) of the players' families.

CONCLUSIONS

Coaches should be aware of players' non-training habits, in order to fine-tune training loads and, ultimately, improve performance and health. The development of strategies to reduce adolescent players' sedentary behaviour and maximise their physical activity is recommended. Furthermore, interventions are needed to apprise parents about the detrimental effects of the sedentary behaviour identified during the off-training time.

Funding

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References.

Exel, J., Mateus, N., Travassos, B., Gonçalves, B., Gomes, I., Leite, N., & Sampaio, J. (2018). Off-Training Levels of Physical Activity and Sedentary Behavior in Young Athletes: Preliminary Results during a Typical Week. *Sports*, 6(4), 141. doi: 10.3390/sports6040141

Sperlich, B., Becker, M., Hotho, A., Wallmann-Sperlich, B., Sareban, M., Winkert, K., . . . Treff, G. (2017). Sedentary behavior among national elite rowers during off-training—a pilot study. *Frontiers in physiology*, 8, 655. doi: 10.3389/fphys.2017.00655

Weiler, R., Aggio, D., Hamer, M., Taylor, T., & Kumar, B. (2015). Sedentary behaviour among elite professional footballers: health and performance implications. *BMJ open sport & exercise medicine*, 1(1), e000023. doi: 10.1136/bmjsem-2015-000023

O56. Physical activity and mobile health: promises, pitfalls and challenges

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Physical inactivity is the fourth leading behavioural risk factor for cardiovascular diseases, cancers, chronic pulmonary diseases and diabetes, all of which account for about 80% of deaths from non-communicable diseases (Hunter & Reddy, 2013). Leisure-time moderate to vigorous physical activity in most days of the week is required to promote health benefits in adults (Sattelmair et al., 2011). However, a worldwide prevalence of insufficient physical activity of 23.3% has been recently reported, with higher levels being observed among women and older age groups (Guthold, Stevens, Riley, & Bull, 2018). The prevalence of physical inactivity has been increasing over time in high-income countries, and limited progress has been achieved towards the global target of 10% reduction of physical inactivity by 2025 (Guthold et al., 2018). Barriers for adopting positive lifestyle changes seem to differ from one individual to another (Chinn, White, Harland, Drinkwater, & Raybould, 1999), which may question the effectiveness of group interventions to promote physical activity and improve individual health outcomes. Mobile health technology has been increasingly employed to monitor individual physical activity and health outcomes, offering new opportunities to enhance data gathering, analysis and integration, facilitating the development of individually tailored mobile health interventions (Lobelo et al., 2016). Despite the reported success of several mobile health-based interventions in promoting positive lifestyle changes, including physical activity, the differences in program design and content may hamper the identification and selection of the most effective technologies (Burke et al., 2015). In addition, a large number of software applications and commercial physical activity monitors have never been compared against scientific-validated devices, while the validity and efficacy of others have been questioned (Nelson, Kaminsky, Dickin, & Montoye, 2016). Furthermore, difficulties in standardising data collection and integration as well as issues regarding privacy and security of mobile health technologies may also compromise the integration of these technologies in clinical care and management of population health (Lobelo et al., 2016). Therefore, this critical review appraises the role of mobile health technologies for assessing, monitoring and promoting physical activity and health, as well as the challenges pertaining the integration of these technologies in routine clinical care and management of population health.

Funding

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References.

Burke, L. E., Ma, J., Azar, K. M., Bennett, G. G., Peterson, E. D., Zheng, Y., Riley, W., Stephens, J., Shah, S. H., Suffoletto, B., Turan, T. N., Spring, B., Steinberger, J., Quinn, C. C., American Heart Association Publications Committee of the Council on, E., Prevention, B. C. C. o. t. C. o. C. H. C. o. C., Stroke Nursing, C. o. F. G., Translational Biology, C. o. Q. o. C., Outcomes, R., & Stroke, C. (2015). Current Science on Consumer Use of Mobile Health for Cardiovascular Disease Prevention: A Scientific Statement From the American Heart Association. *Circulation, 132*(12), 1157-1213. doi: 10.1161/CIR.0000000000000232

Chinn, D. J., White, M., Harland, J., Drinkwater, C., & Raybould, S. (1999). Barriers to physical activity and socioeconomic position: implications for health promotion. *J Epidemiol Community Health, 53*(3), 191-192.

Guthold, R., Stevens, G. A., Riley, L. M., & Bull, F. C. (2018). Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1.9 million participants. *Lancet Glob Health, 6*(10), e1077-e1086. doi: 10.1016/S2214-109X(18)30357-7

Hunter, D. J., & Reddy, K. S. (2013). Noncommunicable diseases. *N Engl J Med, 369*(14), 1336-1343. doi: 10.1056/NEJMra1109345

Lobelo, F., Kelli, H. M., Tejedor, S. C., Pratt, M., McConnell, M. V., Martin, S. S., & Welk, G. J. (2016). The Wild Wild West: A Framework to Integrate mHealth Software Applications and Wearables to Support Physical Activity Assessment, Counseling and Interventions for Cardiovascular Disease Risk Reduction. *Prog Cardiovasc Dis, 58*(6), 584-594. doi: 10.1016/j.pcad.2016.02.007

Nelson, M. B., Kaminsky, L. A., Dickin, D. C., & Montoye, A. H. (2016). Validity of Consumer-Based Physical Activity Monitors for Specific Activity Types. *Med Sci Sports Exerc, 48*(8), 1619-1628. doi: 10.1249/MSS.0000000000000933

Sattelmair, J., Pertman, J., Ding, E. L., Kohl, H. W., 3rd, Haskell, W., & Lee, I. M. (2011). Dose response between physical activity and risk of coronary heart disease: a meta-analysis. *Circulation, 124*(7), 789-795. doi: 10.1161/CIRCULATIONAHA.110.010710

O57. Exploring new approaches to access cognitive demands in football small-sided games

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INTRODUCTION

Designing and manipulating tasks has always been a hot topic to understand the physical and physiological demands from the training sessions (Figueira, Gonçalves, Masiulis, & Sampaio, 2018). In this era of technological and data tsunamis, the available research is consistently focused in objective measures of workload, relegating the task cognitive demands to unclear subjective measurements. Cognitive function is especially demanding during competitive performance environments, which require prolonged periods of activity, involving several brain mechanisms that are engaged in sports performance (Coutinho et al., 2017; Miller, 2000). However, it is still unclear how all the informational constraints involved in sports environment can be translated and interpreted as task cognitive load (Gonçalves et al., 2017). Thus, the aim of this study was to explore a new approach to access cognitive demands in football small-sided games (SSG).

METHODS

The cognitive load during SSG was calculated considering the environmental information from the tasks, specifically, the number of players involved, the pitch dimension and the duration of the exercise, according to the following equation:

$$CognitiveLoad = (\frac{\frac{c * p}{m * o} + 2 * f}{\frac{a}{f}} t) + 50$$

where c is the number of dyads between all players involved in the task, p is the total number of players, m is the number of teammates, o is the number of opponents, f is the difference of the number teammates and opponents $(m - o)$, a is the total area in meters, and t the duration of exercise in minutes. When the teammates are in inferiority over the opponents, f should be multiplied by -1, while when teammates are in superiority over the opponents, f is maintained positive. A value of 50 arbitrary units is added to the equation as a process of normalisation and improving aesthetics from the final score (Welkowitz, Cohen, & Lea, 2011). A simulation of 19 SSG situations considering three different pitch dimensions and three different tasks durations were performed to understand the distribution of the scores across the different scenarios.

RESULTS

Figures 1 and 2 provide results for balanced and unbalanced SSG formats respectively, for different pitch dimensions and tasks durations. The results showed a similar trend, with the higher results of cognitive load being presented by formats with larger number of players, small areas and bigger duration drills.

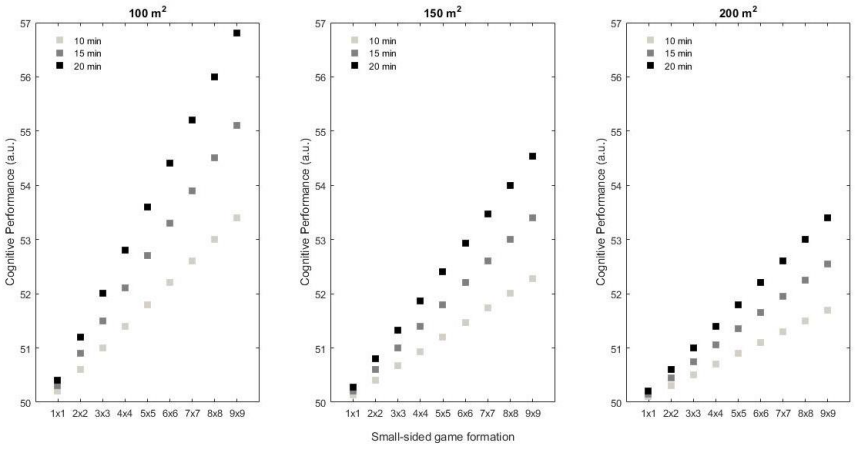

Figure 1. Cognitive load obtained for balanced small-sided games formats (equal number of teammates and opponents) for different field dimensions and with different time durations.

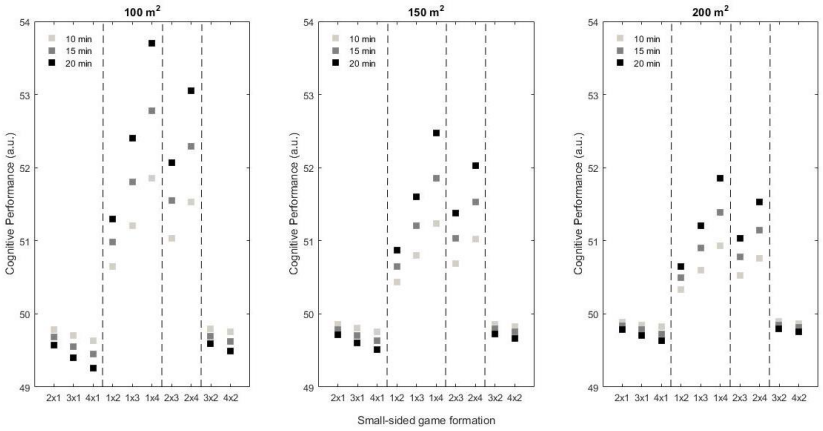

Figure 2. Cognitive load obtained for unbalanced small-sided games formats (equal number of teammates and opponents) for different field dimensions and with different time durations.

CONCLUSIONS

The relationship between all variables showed that complexity of tasks increases using formats with higher number of players, small areas and bigger durations. Thus, the cognitive load formula requires further validation, but might be a candidate variable to be used when objectively assessing the cognitive demands of football SSG.

Funding

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References.

Coutinho, D., Gonçalves, B., Travassos, B., Wong, D. P., Coutts, A. J., & Sampaio, J. E. (2017). Mental Fatigue and Spatial References Impair Soccer Players' Physical and Tactical Performances. *Front Psychol, 8*, 1645. doi:10.3389/fpsyg.2017.01645

Figueira, B., Gonçalves, B., Masiulis, N., & Sampaio, J. (2018). Exploring how playing football with different age groups affects tactical behaviour and physical performance. *Biology of Sport*, 145-153. doi:10.5114/biolsport.2018.71603

Gonçalves, B., Esteves, P., Folgado, H., Ric, A., Torrents, C., & Sampaio, J. (2017). Effects of Pitch Area-Restrictions on Tactical Behavior, Physical, and Physiological Performances in Soccer Large-Sided Games. *Journal of Strength and Conditioning Research, 31*(9), 2398-2408. doi:10.1519/JSC.0000000000001700

Miller, E. K. (2000). The prefrontal cortex and cognitive control. *Nat Rev Neurosci, 1*(1), 59-65. doi:10.1038/35036228

Welkowitz, J., Cohen, B. H., & Lea, R. B. (2011). *Introductory Statistics for the Behavioral Sciences (7th Edition)*.

O58. The Portuguese practices on the use of wearables for aquatic activities

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INTRODUCTION

In recent years, the significant increase of physical exercise in the aquatic context has led to an increase of concern by health and sports professionals regarding their monitoring (Raffaelli, Galvani, Lanza, & Zamparo 2011). The role of wearable technology on those tasks is unquestionable, however, little is known about the characteristics that wearables should have for people who use this technology in water-context. Therefore, the purpose of this study was to characterise the use of the wearable technology by the Portuguese population, understanding their needs and habits.

METHODS

A questionnaire (33 multiple choices and 2 short answers) was applied to several swimming pools in Portugal, randomly selected. This questionnaire focused on characterisation of the aquatic physical activity performed (part 1) and assessment of the opinion about the use of wearable technology during in-water exercise (part 2).

RESULTS

Until now, the questionnaire was filled by 530 subjects of both genders, aged between 18 and 88 years-old. Approximately 75% of the subjects have already heard of wearables, but only 23% used this technology during physical exercise. From those who already used it, 29% experimented it during the aquatic activity. Most of the subjects did not use wearable technology because they did not have the opportunity (59%), because they considered it to be without utility (17%), or due to the high cost (13%). The participants considered essential for this type of technology to monitor the heart rate (26%), energy spent (22%), travelled distance (13%) and exercise time (12%). Finally, it was observed an absolute preference for the use of these devices on the wrist (65%), instead of using it on the chest (18%) and in the arm (10%).

CONCLUSIONS

Overall, people have the knowledge about the existence of wearable technology. However, only few subjects have experienced to perform physical in aquatic context exercise using these devices. Despite this, people have shown some curiosity in starting to use wearable technology, with special interest in monitoring heart rate and calories spent. Wearables worn on the wrist revealed to be the most frequently used devices, due to its ease of use and to the similar appearance to a watch. Therefore, it seems necessary to improve this type of technology, according to the preferences of its users.

Acknowledgments

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References.

Raffaelli, C., Galvani, C., Lanza, M., & Zamparo, P. (2011). Different methods for monitoring intensity during water-based aerobic exercises. *European Journal of Applied Physiology, 112*(1), 125–134. doi:10.1007/s00421-011-1963-7

O59. Effect of two strategies to reduce workplace sedentary behaviour in quality of life and musculoskeletal pain: A pilot study

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INTRODUCTION

Sedentary behaviour, incorrect posture and repetitive movements in workplace are the main causes of several musculoskeletal changes, which can result in discomfort, numbness and pain in several regions of the body (Coury, 1998; Andersen, Haahr & Frost, 2007).

Strategies to break sedentary behaviours in workplace, along with computer technologies, mobile phones and wearable technologies can promote improvements in both musculoskeletal pain and quality of life (Lock & Colford, 2005; Kietrys, Galper &Verno, 2007). The aim of this study is to test the effect of two short-term strategies to reduce sedentary behaviour during workplace in quality of life and musculoskeletal discomfort.

METHODS

This pilot study recruited a sample of 24 volunteer employees of the common services of the University of Trás-os-Montes and Alto Douro. After the baseline evaluations, the participants were randomly assigned into: MOVE-TE (comparison group) group, which consisted into a sensitisation and awareness through a visual / oral presentation of the concept of sedentary behaviours and their consequences, and several ways to reduce sedentary behaviour; and STOP-STOPING group (intervention group), which used the Workrave® software. The software was previously programmed to take a 3-minute break every 60-minutes, where participants performed a proposed sequence of exercises. Evaluations were carried out pre and post a short-term intervention of 6-weeks. The groups' participants were evaluated before and after the short-term intervention with the short-form quality of life questionnaire (SF-36) and with the Nordic musculoskeletal questionnaire (NMQ).

RESULTS

In SF-36 after the determination of the percentage of variation between pre and post-intervention, the T-Test for independent measurements revealed no differences between groups, and the Wilcoxon revealed that general health increase in STOP-STOPING ($p=0.05$) after intervention and it seems to be a non-significant slight trend to improve most of the domains in both groups.

In Nordic musculoskeletal questionnaire, the Chi-square revealed significant differences ($p<0.05$) at baseline in MOVE-TE group on Shoulder, Hands/Wrists, Upper-Back, Hips/Thighs, Knee and Ankles/Feet, while STOP-STOPING group have significant differences on Hands/Wrists, Upper-Back and Knee. After intervention MOVE-TE have significant differences ($p<0.05$) on Elbows, Hands/Wrists, Hips/Thighs and Knee, while STOP-STOPING on Upper-Back, Hips/Thighs and Ankles/Feet.

CONCLUSIONS

The short-term strategies used to improve sedentary behaviour at workplace and related benefits promoted a small effect in quality of life. The STOP-STOPING intervention reveal a positive effect on general-health domain. In both groups, it seems to be a slightly trend to improve the musculoskeletal pain. Further studies including more data and medium-term strategies are necessary.

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References.

Andersen, J. H., Haahr, J. P., Frost, P. (2007). Risk factors for more severe regional musculoskeletal symptoms: a two-year prospective study of a general working population. *Arthritis Rheumatologist*, *56*(4), 1355–64.

Coury, H. J. C. (1998) Self-administered preventive program for sedentary workers: reducing musculoskeletal symptoms or increasing awareness. *Applied Ergonomics, 29*(6), 415-42.

Lock, D., Colford, N. (2005) International review of the literature relating to the benefits of limbering up exercises at work. *HSE Research Report* 309.

Kietrys, D., Galper, J. S., Verno, V. (2007) Effects of at-work exercises on computer operators. *Work, 28*(1), 67–75.

O60. Effects of a long-term community-based exercise program in diabetic foot risk in middle-aged and older patients with type 2 diabetes

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INTRODUCTION

Diabetic foot is one of the most prevalent complications of diabetes. It has the potential risk of pathologic consequences including infection, ulceration and amputation, and it is associated with disability, death and substantial costs. Diabetic foot results from neuropathy and/or ischemia. Nevertheless, the premature identification of risk factors may prevent this condition and avoid amputations. The aim of this study was to investigate the effects of a long-term community-based exercise program in foot ulceration risk in middle-aged and older patients with type 2 diabetes (T2D).

METHODS

The study included 79 participants with T2D (36 men, 64.63±7.44 years old, non-smokers) recruited from *Diabetes em Movimento®* Vila Real, a community-based exercise program composed by 3 exercise sessions per week, 75 min per session (aerobic, resistance, agility/balance and stretching exercise), during 9-month cycles (Mendes, Sousa, Reis, & Themudo-Barata, 2017). Assessments were performed pre and post exercise program participation during one cycle. The protocol included: questions about relevant patient history; clinical foot examination (observation of structural and dermatological characteristics; 10-g Semmes-Weinstein monofilament test; 128-Hz tuning fork test; and palpation of peripheral arterial pulses); and evaluation of the difficulties in taking care of the feet (ability to see the plantar surfaces). Risk of ulceration (no risk, low risk, medium risk, and high risk) was compared using chi-square test.

RESULTS

After the exercise program, significant changes in ulceration risk were identified ($p = 0.04$). For the medium risk, the adjusted residuals revealed significant favourable modifications (Table 1).

Table 1

Crosstabulation for foot ulceration risk in both evaluations (pre vs. post-test).

		Pre Intervention	Post Intervention
No risk	Count	1 (1.3%)	1 (1.3%)
	Adjusted residuals	0.00	0.00
Low risk	Count	34 (43.0%)	48 (60.7%)
	Adjusted residuals	-1.09	1.09
Medium Risk	Count	24 (30.4%)	6 (7.6%)
	Adjusted residuals	2.32*	-2.32*
High risk	Count	20 (25.3%)	24 (30.4%)
	Adjusted residuals	-0.43	0.43

*$p < 0.05$.

CONCLUSIONS

Long-term exercise had positive effects on the risk of foot ulceration in patients with type 2 diabetes. The findings suggest that physical activity and exercise may prevent foot lesions and avoid minor and/or major complications, such as amputations.

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References.

Mendes, R., Sousa, N., Reis, V. M., & Themudo-Barata, J. L. (2017). Implementing Low-Cost, Community-Based Exercise Programs for Middle-Aged and Older Patients with Type 2 Diabetes: What Are the Benefits for Glycemic Control and Cardiovascular Risk? Int. J. Environ. Res. Public Health, 14(9), 1057. doi:10.3390/ijerph14091057

O61. Evaluation of physical activity levels in FPF eSports e-athletes

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INTRODUCTION

Participation in eSports has increased exponentially over the last few years. However, little is known about the physical activity levels of e-athletes participating in official eSports competitions. Therefore, the present study aimed to evaluate the levels of physical activity and sedentarism of e-athletes participating in the FPF eSports competitions.

METHODS

This was a cross-sectional analytic investigation, based on a structured online questionnaire, comprising the International Physical Activity Questionnaire (IPAQ) and a set of questions regarding the habits of physical training. Overall, 928 e-athletes enrolled with FPF eSports accepted to participate. The mean age of the participants was 24 ± 6 years old (99% men and 1% women). There were 721 valid answers to the questionnaire considered for the analysis. The levels of physical activity were analysed according to the recommendations for physical activity proposed by the World Health Organisation (WHO, 2010), and the guidelines for data processing and analysis of the IPAQ (IPAQ Group, 2005).

RESULTS

The e-athletes reported spending 4332 (interval quartile range, IQR = 4673) MET-min/week on physical activity. On a normal week, the e-athletes spent 270 (IQR = 420) min/day sitting, 120 (IQR = 160) min/day on screen activities (e.g. watching TV, playing with the cell phone), and 120 (IQR = 180) min/day practicing eSports. Considering the levels of physical activity, 73% of the e-athletes reported having a high physical activity level, 15% had a moderate level, and 12% didn't meet the recommendations for physical activity ($X2 = 499.52$; $p < 0.01$). 79% of the e-athletes reported performing regular physical training. In 51% of the cases, the e-athletes reported being themselves who planned their physical training, whereas 16% of the e-athletes reported having their physical training planned by their eSports team coach. Overall, the e-athletes reported better health (32%) and enhanced physical capacity (24%) as the main motivations for practicing physical activity. Only 6% of the e-athletes referred to being active as a strategy to improve eSports performance.

CONCLUSIONS

Overall, the results of the present study showed that most of the e-athletes participating in FPF eSports competitions accomplish the recommendations for physical activity. The majority of the e-athletes reported having high levels of physical activity, encompassing regular physical training, which focused mostly on health promotion enhanced physical capacity rather than improved eSports performance.

References.

WHO Guidelines Review Committee (2010). *Global Recommendations on Physical Activity for Health*. Geneva: World Health Organization.

IPAQ Group (2005). Guidelines for Data Processing and Analysis of the International Physical Activity Questionnaire (IPAQ) – Short and Long Forms. Available from: *www.ipaq.ki.se*

O62. Effect of zumba virtual reality intervention on depression symptoms in women with fibromyalgia: The possible role of creative arts therapies.

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INTRODUCTION

Fibromyalgia is one of the most common chronic pain diseases. It is characterised by widespread pain and stiffness as well as sleep disturbance, poor physical fitness, cognitive impairment or anxiety and depression (Wolfe et al., 2010).

Virtual reality intervention focused on Zumba showed an improvement in pain, quality of life, mobility skills, balance and fear of falling (Collado-Mateo, Dominguez-Muñoz, Adsuar, Merellano-Navarro, & Gusi, 2017). However, the effect of a Zumba-based virtual reality intervention on depression symptoms is unknown.

METHODS

A total of 72 women with fibromyalgia participated in this randomised controlled trial. After randomisation, 41 women completed an 8-week exergame-based training program focused on Zumba. 35 women were included in the control group. The Spanish Version of the 15-item Geriatric Depression Scale (GDS-15) (Martínez de La Iglesia et al., 2002) was administrated.

A repeated measure ANOVA was used to evaluate the effects of the program. A T-test of related samples was conducted to evaluate the effects of the intervention program in each of the groups.

RESULTS

The T-tests showed a significant decrease of the depression symptoms in the experimental group after the intervention (p-value=0.021). The control group did not show significant differences (p-value=0.781). However, the repeated measures ANOVA did not show statistical effect of the intervention program (F= 2.496; η^2=0.033; p-value=0.118).

Table 1

Zumba virtual reality-based intervention effects on depression symptoms.

				Within group comparison			Between groups comparison		
		Pre	Post	t	P-value	Effect Size	F	P-value	Effect Size
Score GDS	Exercise (N= 41)	6.15 (3.23)	5.05 (3.56)	2.398	0.021	0.348	2.496	0.118	0.033
	Control (N= 35)	6.43 (4.60)	6.31 (4.59)	0.281	0.781	0.028			

CONCLUSIONS

The current study does not provide enough information to draw solid conclusions about the effects of exergames on depression symptoms in people with fibromyalgia. Nevertheless, previous studies with artistic expression-based interventions presented benefits on anxiety and depression (Baptista, Villela, Jones, & Natour, 2012; Carbonell-Baeza et al., 2010; López-Rodríguez et al., 2013). This reduction may be related to the artistic expression of creative arts therapies (Martin et al., 2018). Future studies should combine the virtual reality with creative arts therapies in order to determine the benefits on depression symptoms in patients with fibromyalgia.

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References.

Baptista, A., Villela, A., Jones, A., & Natour, J. (2012). Effectiveness of dance in patients with fibromyalgia: A randomised, single-blind, controlled study. *Clinical and experimental rheumatology, 30*(6), 18-23.

Carbonell-Baeza, A., Aparicio, V. A., Martins-Pereira, C. M., Gatto-Cardia, C. M., Ortega, F. B., Huertas, F. J., . . . Delgado-Fernandez, M. (2010). Efficacy of Biodanza for Treating Women with Fibromyalgia. *Journal of Alternative & Complementary Medicine, 16*(11).

Collado-Mateo, D., Dominguez-Muñoz, F. J., Adsuar, J. C., Merellano-Navarro, E., & Gusi, N. (2017). Exergames for women with fibromyalgia: a randomised controlled trial to evaluate the effects on mobility skills, balance and fear of falling. *PeerJ, 5*, e3211.

López-Rodríguez, M. M., Fernández-Martínez, M., Matarán-Peñarrocha, G. A., Rodríguez-Ferrer, M. E., Gámez, G. G., & Ferrándiz, E. A. (2013). Efectividad de la biodanza acuática sobre la calidad del sueño, la ansiedad y otros síntomas en pacientes con fibromialgia. *Medicina Clínica, 141*(11), 471-478.

Martin, L., Oepen, R., Bauer, K., Nottensteiner, A., Mergheim, K., Gruber, H., & Koch, S. C. (2018). Creative Arts Interventions for Stress Management and Prevention—A Systematic Review. *Behavioral Sciences, 8*(2), 28. doi: 10.3390/bs8020028

Martínez de La Iglesia, J., Onís-Vilches, M., Dueñas-Herrero, R., Albert-Colomer, C., Aguado-Taberné, C., & Luque-Luque, R. (2002). Versión española del cuestionario de Yesavage abreviado (GDS) para el despistaje de depresión en mayores de 65 años: adaptación y validación. *Medifam, 12*(10), 26-40.

Wolfe, F., Clauw, D. J., Fitzcharles, M. A., Goldenberg, D. L., Katz, R. S., Mease, P., . . . Yunus, M. B. (2010). The American College of Rheumatology Preliminary Diagnostic Criteria for Fibromyalgia and Measurement of Symptom Severity. *Arthritis Care & Research, 62*(5), 600-610. doi: 10.1002/acr.20140

O63. The use of wearable technology in a sample of Portuguese population

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INTRODUCTION

Wearable technology is increasing and have radically altered how we live our lives today. Personal wearable systems offer real-time feedback, (Lamont, Daniel, Payne, & Brauer, 2018) which enable people to evaluate several parameters: range of movement, meters or number of steps in a day, walking speed, burnt calories, heart rate, and sleeping hours and also give feedback on physical activity (Lamont et al., 2018). Despite the potential and the wide range of wearables available, there is little knowledge about the interest, usage and preferences for using wearables (Stephanie Alley & Mitch J Duncan, 2016), even the efficacy for using wearables in physical activity promotion. This study aimed to investigate the use of wearable technology in Portugal, in particular how often people use it and how they use it to monitor exercise/physical activity.

METHODS

Participants were N=1498 of both sexes (N = 841 females) aged between 14 and 85. Participants were recruited from schools, universities, clubs, work sites, and communities' settings across Portugal (North, Center, Lisbon, Alentejo, Algarve, Madeira and Azores islands). Interest, use and preferences for wearables devices were measured through a questionnaire (24 multiple-choice questions), based on a review of literature. The questionnaire was administered by the research in paper or using an online platform (website). In both cases, participants gave their informed consent. Statistics analyses were calculated with SPSS version 23 for Mac.

RESULTS

More than a half of the participants (57.1%) practice physical activity/exercise (walking/running/swimming or collective sports), and 36.1% practiced in the past. 30.6% of these 57.1% participants were female. Of the participants who practice physical activity, 37.3% (24.3% used) were using or have used wearable devices. The most frequently used device was a mobile application (22.2%), 11.1% used heart rate monitor and 11.4% used GPS. From the wearable device users, 9.7% think that it has allowed them to increase their physical activity, 3.2% at least more 1 hour/week, 3.7% more 1-2 hours/week, 1.8% more 3-4 hours/week, 0.9% more than 4 hours/week. Wearable device users considered exercise time (28.0%) and displacement time (25.6%) the most important functions, and time, frequency and intensity the most important wearable device characteristics. The main reasons for not using a device were 'uncomfortable" (26.6%) and 'high cost' (27.1%).

CONCLUSIONS

In conclusion, the majority of the participants who exercise regularly use wearable devices during the practice, which demonstrates some interest in using and the ones who do not have a device would like to own one.

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References.

Lamont, R. M., Daniel, H. L., Payne, C. L., & Brauer, S. G. (2018). Accuracy of wearable physical activity trackers in people with Parkinson's disease. Gait Posture, 63, 104-108. doi: 10.1016/j.gaitpost.2018.04.034

Stephanie Alley, S. S., Diana Guertler, Cally Jennings, & Mitch J Duncan, C. V. (2016). Interest and preferences for using advanced physical activity tracking devices: results of a national cross-sectional survey. BMJ Open, 6.

O64. The magnitude of intra-rater difference using the iPhone camera for estimation of jump height: A case study

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INTRODUCTION

iPhone high-speed cameras (120Hz or 240 Hz) have been used to assess vertical jump performance (Balsalobre-Fernández, Glaister, & Lockey, 2015). Intra-rater and inter-rater agreement, as well as agreement with other instruments considered as gold standards have also been studied (Balsalobre-Fernández et al., 2015; Gallardo-Fuentes et al., 2016; Stanton, Wintour, & Kean, 2017). In the present paper we focused on intra-rater agreement and the magnitude of the difference.

METHODS

One healthy participant (male, 22 years-old) performed 46 consecutive counter movement jumps (CMJ) for 30 seconds. Flight time was calculated after identifying the take-off and landing frames from iPhone6 camera recordings (240 Hz, Apple Inc, USA). The procedures followed were described elsewhere (Balsalobre-Fernández et al., 2015). Using the equations of constant acceleration, other quantities such as jump height can be calculated. To assess intra-rater agreement two repeated measurements were made one week apart by three raters (F, PR, R). The statistical procedures used included Bland-Altman plots, the coefficient of repeatability and the One-sample T-test (Bland & Altman, 1986).

RESULTS

Bland-Altman plots are presented in Fig.1.

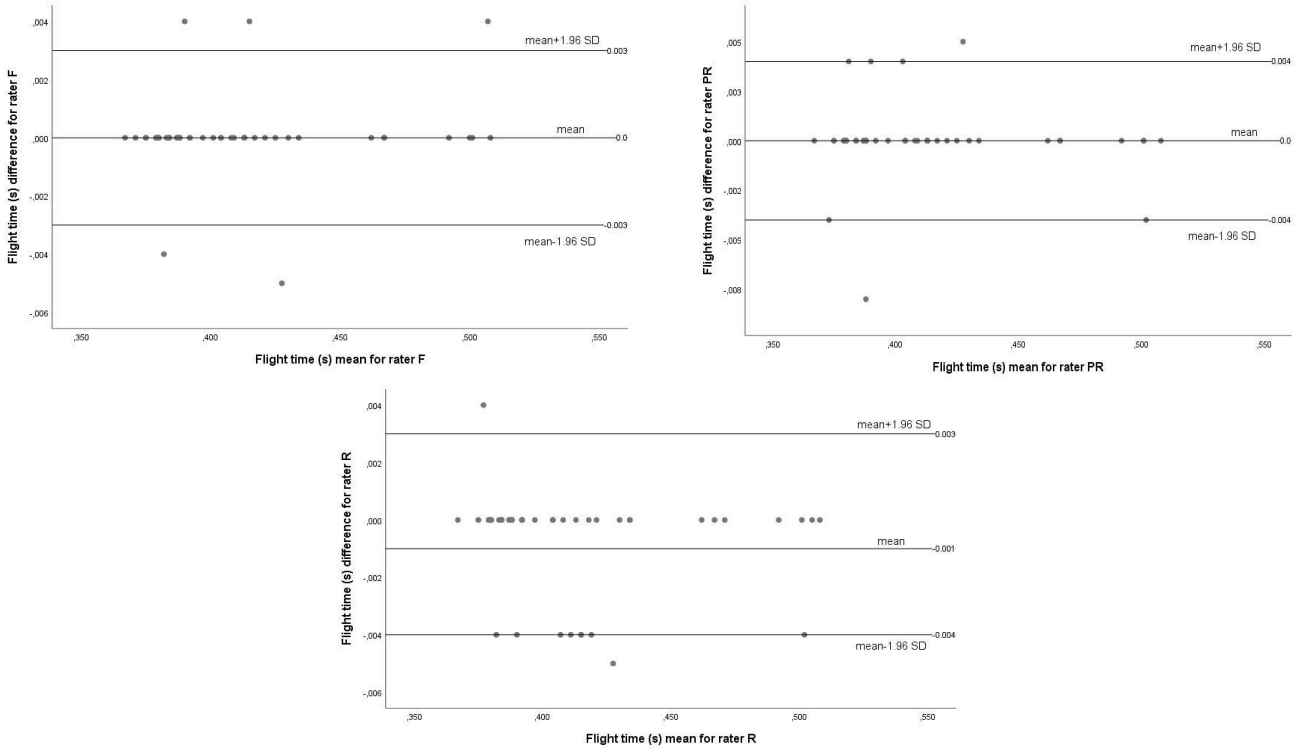

Figure 1. Bland-Altman plots for repeated measurements of each of the three raters (F, PR and R). The bias is represented by the central line (mean of the difference between repeated measurements) and the 95% upper and lower limits of agreement (95%LOA).

The mean difference for each rater was 0.000s±0.001s (F), 0.000s±0.002s (PR), and -0.001s±0.002s (R). The coefficients of repeatability (twice the SD) were 0.003s (F) and 0.004s (for PR and R) suggesting 95% of the differences will be smaller than 0.004s (≤1 frame). Nevertheless, a one frame difference in the identification of take-off or landing events may have a significant effect on jump height, because its

magnitude varies with the square of flight time. For example, a ±1 frame (or ±0.004s) variation for a jump height of 20 cm (flight time equal to 0.4045 s) will produce jump heights ranging from 19.61cm to 20.40cm (diff.=0.79cm). However, for a height of 60cm the difference increases to 1.37cm (ranging from 59.32cm to 60.69cm). If the maximum difference found in raters is considered (0.008s or 2frames) the difference increases 1.58cm and 2.74cm for jumps of 20cm and 60cm, respectively.

The variable difference for each rater did not followed a normal distribution (assessed by the Kolmogorov-Smirnov test ($p < 0.05$), kurtosis, skewness, and the visual inspection of the histogram, normal QQ and boxplot. Despite that, the One-Sample T-test was applied suggesting no evidence for significant variation in two raters judgments [F (t=0.315, P=0.754) and PR (t=0.076, P=0.940)] but not for rater R (t=-2.708, P=0.010).

CONCLUSIONS

Uncertainties of 1 cm or higher in the assessment of vertical jumps may affect the judgment on athletes' performance. In elite athletes of many sports these differences are enough to distinguish their performance.

References.

Balsalobre-Fernández, C., Glaister, M., & Lockey, R. A. (2015). The validity and reliability of an iPhone app for measuring vertical jump performance. *Journal of Sports Sciences, 33*(15), 1574-1579.

Bland, J. M., & Altman, D. (1986). Statistical methods for assessing agreement between two methods of clinical measurement. *The lancet, 327*(8476), 307-310.

Gallardo-Fuentes, F., Gallardo-Fuentes, J., Ramírez-Campillo, R., Balsalobre-Fernández, C., Martínez, C., Caniuqueo, A., . . . Nakamura, F. Y. (2016). Intersession and intrasession reliability and validity of the My Jump app for measuring different jump actions in trained male and female athletes. *Journal of strength and conditioning research, 30*(7), 2049-2056.

Stanton, R., Wintour, S.-A., & Kean, C. O. (2017). Validity and intra-rater reliability of MyJump app on iPhone 6s in jump performance. *Journal of science and medicine in sport, 20*(5), 518-523.

O65. Novel in-vivo assessment of muscular viscoelastic characteristics and the association with physical function in patients with non-dialysis dependent chronic kidney disease

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INTRODUCTION

Patients with chronic kidney disease (CKD) have reduced physical functioning partially caused by reductions in muscle mass but also quality (Wilkinson et al. 2018). Considered an important criterion of muscle function (Gervasi et al. 2017), viscoelastic characteristics (tone, elasticity, and stiffness) describe the mechanical properties of skeletal muscles at rest (Aird et al. 2012). For the first time, we present preliminary data on these characteristics in skeletal muscle of patients with non-dialysis CKD.

METHODS

The viscoelastic characteristics (tone, elasticity, and stiffness) of 9 patients with non-dialysis dependent CKD [mean age: 66.0 (±13.1) years, 44% females, eGFR: 23.0 (±12.3) ml/min/1.73m2] were assessed using a MyotonPRO device (Figure 1). The measurements were made in the non-dominant rectus femoris muscle at rest by positioning the device's 3mm probe perpendicular to the skin over the muscle (0.18 N preloading). The device applied ten brief (15 m/s) low force (0.4 N) mechanical impulses, inducing damped natural oscillations of the underlying tissues which are recorded by an accelerometer connected to a friction measurement mechanism. The device then calculated the resting tone parameters [frequency of oscillation (Hz)], elasticity of weak oscillations [logarithmic decrement (arbitrary units, AU)], and stiffness (N/m). To assess the relationship with muscle function, patients completed a 4m gait speed test (m/s) and the 'Timed-Up-and-Go' (secs).

Figure 1. The MyotonPRO device

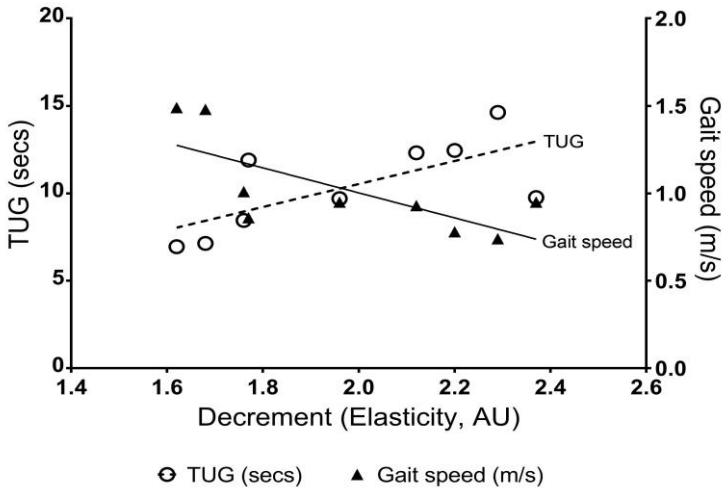

Figure 2. Association between decrement (elasticity) and physical function (gait speed and TUG)

RESULTS

The mean frequency (tone) was 13.1 (±2.5) Hz, decrement (elasticity) 2.0 (±0.3) AU, and stiffness 258.22 (±43.2) N/m. Viscoelastic characteristics were not associated with age, sex, or renal function. Greater decrement (poor elasticity) was significantly associated with slower gait speed ($r = -.725$, $P = .027$) and TUG ($r = -.701$, $P = .036$) (Figure 2).

CONCLUSIONS

Whilst frequency and stiffness values appear consistent with norm reported data, elasticity was greater than that reported in older individuals (~72 years) (Aird et al. 2012). Decreased muscle elasticity brings on easier fatigability and limited speed of movement (Chaung et al. 2012). In support, we found only greater

decrement (and thus poorer muscle elasticity) was associated with poor physical function. The MyotonPRO provides a novel simple means to collect in-vivo assessment of muscular viscoelastic characteristics in CKD patients.

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References.

Aird, L., Samuel, D., & Stokes, M. (2012). Quadriceps muscle tone, elasticity and stiffness in older males: reliability and symmetry using the MyotonPRO. *Archives of Gerontology and Geriatrics*, 55(2), 31-39. doi: 10.1016/j.archger.2012.03.005

Chuang, L. L., Wu, C. Y., & Lin, K. C. (2012). Reliability, validity, and responsiveness of myotonometric measurement of muscle tone, elasticity, and stiffness in patients with stroke. *Archives of Physical Medicine and Rehabilitation,* 93(3), 532-540. doi: 10.1016/j.apmr.2011.09.014

Gervasi, M., Sisti, D., Amatori, S., Andreazza, M., Benelli, P., Sestilli, P ... Calavalle AR. (2017). Muscular viscoelastic characteristics of athletes participating in the European Master Indoor Athletics Championship. *European Journal of Applied Physiology, 117*(8), 1739-1746. doi: 10.1007/s00421-017-3668-z

Wilkinson, T. J., Gould, D. W., Nixon, D. G., Watson, E. L., & Smith, A. C. (2018). Quality over quantity? Association of skeletal muscle myosteatosis and myofibrosis on physical function in chronic kidney disease. *Nephrology Dialysis Transplantation,* gfy139. doi: 10.1093/ndt/gfy139

O66. The use of activity trackers devices and physical activity levels in adolescents and adults

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INTRODUCTION

Physical activity (PA) trackers could be an important complement that enables people to modify their sedentary behaviour and to monitor their PA and exercise. This study aimed to examine the use of PA trackers in Portuguese adolescents and adults, including differences by demographic factors and PA levels.

METHODS

Participants were N = 1498, of both sexes (N = 841 females) aged between 14 and 85 years. PA was measured using the short version of the International Physical Activity Questionnaire (IPAQ) (Craig et al., 2003; Hagströmer et al., 2008), carried out in three domains (leisure time, domestic and gardening/yard activities, work-related and transport-related activity) and sitting, providing information on the time spent walking, in vigorous- and moderate-intensity PA and in sedentary activity. Participants were asked if they use, had used or never used an activity tracker assessed activity tracker use. Participants who had used activity trackers were further asked for how long they used the activity tracker regularly at least once a week (less than a month, between 3 and 4 months, between 6 and 12 month, between 1 and 2 years, and more than 2 years), and how often they used the tracker (only during exercise, during waking hours, only at night, always all day and all night). Questionnaires were distributed and answered in paper format and online. In both cases, participants gave their informed consent. Factorial ANOVA was used to test when there were significant differences in PA levels between the participants' PA trackers use by age and sex.

RESULTS

Participants who use a PA tracker had significant more total PA per week than participants who had never used it and with the ones who have used it. However, there were no significant differences in sitting time, in moderate PA nor in walking. Participants who use a PA tracker had significant more vigorous PA than participants who have used it and the ones who had never used it, and the participants who have used it have significant more vigorous PA than the ones who had never used.

CONCLUSIONS

Participants who use PA trackers have a higher PA level than the participants who had never used one and the ones who have used it. It seems that PA trackers could be a motivation tool to improve PA levels.

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References

Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., . . . Oja, P. (2003). International Physical Activity Questionnaire: 12-Country Reliability and Validity. *Medicine and Science in Sports and Exercise, 35*(8), 1381.

Hagströmer, M., Bergman, P., De Bourdeaudhuij, I., Ortega, F. B., Ruiz, J. R., Manios, Y., . . . Group., H. S. (2008). Concurrent validity of a modified version of the International Physical Activity Questionnaire (IPAQ-A) in European adolescents: The HELENA Study. *International Journal of Obesity, 32*(Suppl 5), S42-48. doi: 10.1038/ijo.2008.182.

P104. Effects of two awareness strategies in sedentary behaviour during workplace: A pilot study

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INTRODUCTION

Sedentary behaviour (i.e. the lowest level of physical activity) refers to a daily behaviour characterised by the amount of time allocated to a set of activities that do not increase the energy expenditure above 1.5 metabolic equivalents (Katzmarzyk, Church, Craig & Bouchard 2009). Sitting (and reclining) time has been considered as one of the main components of sedentary behaviour and promotes a negative impact in health-related physical fitness (Blair, Cheng & Holter, 2001); plus the sitting posture, for long periods, is responsible for several changes in the lumbar spine musculoskeletal structures, reduction of the circulation of the lower limbs, causing edema in the feet and ankles. The objective of this study was to compare the effect of two short-term strategies designed to reduce sedentary behaviour in workplace applied for 6 weeks, in physical fitness (body composition, muscle strength, flexibility and body posture), blood pressure (BP), heart rate (HR) and fasting glycaemia.

METHODS

The sample consisted of 28 employees from the common services of the University of Trás-os-Montes and Alto Douro. In a first phase, the volunteer participants were randomly assigned into: MOVE-TE group which consisted into a sensitisation through a visual / oral presentation of the concept of sedentary behaviours, their consequences and different ways to reduce sedentary behaviour; and STOP-STOPING group, which used the "Workrave®" software. The software was previously programmed to take a 3-minute break every 60-minute, where participants perform some pre-established exercises. Evaluations were carried out pre and post a short-term intervention of 6-weeks.

Table 1

Comparison between MOVE-TE and STOP-STOPING programs when controlling for baseline differences (ANCOVA models).

Variables	STOP-STOPING (n = 13)	MOVE-TE (n = 15)	Difference (SE)	*p*	Square partial Eta
Fasting Glycemia (mg / dl)	95.08 ± 9.96	96.33 ± 9.13	-1.25 (1.62)	0.957	.000
Abdominal Perimeter (cm)	78.78 ± 8.54	90.77 ± 10.77	-11.97 (0.72)	0.05	.157
Systolic Blood Pressure (mmHg)	125.53 ± 18.66	124.00 ± 21.35	+1.53 (1.90)	0.797	.003
Diastolic Blood Pressure (mmHg)	76.92 ± 7.15	78.33 ± 11.04	-1.41 (0.88)	0.769	.004
Heart Rate (bpm)	66.31 ± 7.77	65.87 ± 5.80	+0.44 (1.07)	0.601	.011
Right Hand Muscle Strength (kg)	34.76 ± 11.02	36.31 ± 11.43	-1.55 (0.75)	0.916	.001
Left Hand Muscular Strength (kg)	34.13 ± 13.26	37.23 ± 11.52	-3.10 (0.61)	0.728	.006
Flexibility (cm)	30.16 ± 7.65	30.31 ± 7.75	-0.14 (0.53)	0.610	.011
Body Weight (kg)	66.92 ± 14.48	75.28 ± 14.47	-8.35 (0.28)	0.213	.061
Body Mass Index	25.41 ± 4.69	27.52 ± 4.22	-2.11 (0.10)	0.209	.062
Fat mass (%)	29.40 ± 9.55	33.46 ± 8.38	-4.05 (0.38)	0.505	.018

Standard error (SE); * $p<0.05$

RESULTS

The results reveal that no significant differences were found between STOP-STOPING and MOVE-TE in studied variables after the 6-weeks short-term intervention. There were potential positive effects for the STOP-STOPING in fasting glycaemia, abdominal perimeter, diastolic blood pressure, muscle strength, flexibility, body weight, body mass index and fat mass). On the other hand, the systolic blood pressure and heart rate were higher in the MOVE-TE group.

CONCLUSIONS

The results of the present study identify that the chosen strategies did not improve the physical fitness health-related variables. This result was in part expected because the short-term strategies were designed to reduce sedentary behaviour in workplace and did not focus on exercise dose to improve physical fitness. Despite these results, this initial approach seems to be important to produce changes in the participants' awareness of sedentary behaviour in the workplace.

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References

Katzmarzyk, P. T., Church, T. S., Craig, C. L., Bouchard, C. (2009) Sitting time and mortality from all causes, cardiovascular disease, and cancer. *Medicine and Science in Sports and Exercise, 41*(5): 998-1005.

Blair, S. N., Cheng Y., Holder, J. S. (2001) Is physical activity or physical fitness more important in defining health benefits? *Medicine and Science in Sports and Exercise, 33*(6): S379-99.

P105. Kinematic Measurement of Wheelchair Racing Using Smartphones Sensors

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INTRODUCTION

Given the increasing demand for high-performance in Paralympic sports, there is likewise a larger demand for analytical data. Recent developments in miniaturisation allows tri-axial measurement of the acceleration with very small sensors (~2.6mm^3) such as the ones embedded in smartphones. Therefore, smartphones might provide kinematic data in field testing (Hummell, Fehr & Ferger, 2013). The aim of the study was to compare linear kinematic data recorded by a smartphone and an IMU in wheelchair sprinting.

METHODS

A T52 wheelchair sprinter competing at national and regional competitions was recruited. Over a period of two weeks, and as part of the standard training program, the participant was requested to perform 60m and 120m all-out trials. Acceleration data over the 60m (12 trials) and the 120m sprints (17 trials) was recorded concurrently at 100Hz by a smartphone (Galaxy A3, Samsung, South Korea) and an IMU (OS3D, InertialLabs, US). Smartphone and IMU were fixed on the lower support bar of the seating cage and aligned in the same orientation to limit the effects of gravitational acceleration to one axis. Data was handled on RStudio (v 1.0.136). Time-series was processed with a second-order low-pass Butterworth digital filter at 8Hz and detrended with a constant filter (best-fit line subtracted from data) to remove the bias within the acceleration data. Distance and velocity were obtained by integration of the time-series. The Root Mean Squared Error (RMSE) of the velocity and the normalised RMSE to maximum velocity (NRMSE) for smartphone time-series against IMU were calculated. Comparison of mean values between 60m and 120m trials were analysed by student's T-test ($p<0.05$).

RESULTS

Typical velocity-time series is depicted in Figure 1. Comparison of data is presented in table 1. The 120m bouts elicited a faster maximum velocity in comparison to 60m trials ($p<0.001$). RMSE was smaller over the 60m than the 120m trials ($p<0.001$). However, when normalised, there was no significant differences ($p=0.14$). The mean NRMSE in the 60m and 120m trials was 16.82±7.09% and 22.42±11.96%, respectively.

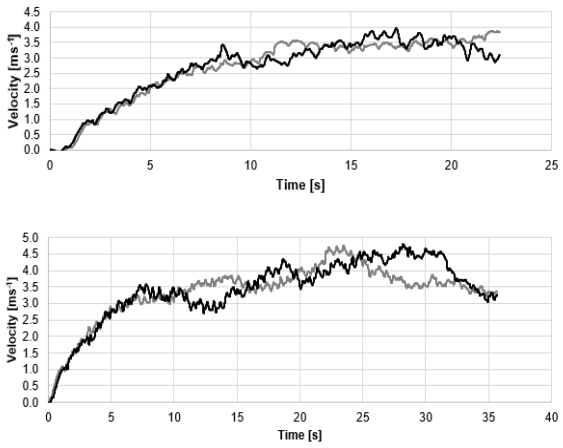

Figure 1. Comparison of the velocity-time series collected by a smartphone accelerometer (black line) and an IMU (grey line) in the 60m (top panel) and 120m (bottom panel) trials.

Table 1

Comparison of the velocity collected by a smartphone accelerometer and an IMU.

	Maximum velocity [m/s]	RMSE [m/s]	NRMSE [%]
60m trials	3.35±0.38	0.55±0.21	16.82±7.09
120m trials	4.63±0.60	1.04±0.55	22.42±11.96
p-value	<0.001	<0.001	0.14

CONCLUSIONS

On average, the smartphone accelerometer yields an error of about 16-22%. In the event of selecting this device to monitor wheelchair sprinting, one should be aware of such bias; specially comparing time-series collected by different apparatus in other time points or settings.

Acknowledgments

To the Wheelchair Racing Association - Singapore and coach Jaffa

References

Hummel, O., Fehr, U., & Ferger, K. (2013). Beyond ibeer-exploring the potential of smartphone sensors for performance diagnostics in sports. *International Journal of Computer Sciences in Sport*, *12*, 46-60

P106. Using iPhone camera for temporal gait analysis: A case study

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INTRODUCTION

A comprehensive clinical gait analysis can only be obtained in laboratory setting with motion capture systems (Eldeeb & Khodair, 2014; Roriz & Lobo, 2018). However, it cannot be done at the doctor's office. Hence, affordable, portable and still reliable instruments are being developed, and will allow to obtain some of the gait variables. The Optogait is such an instrument, providing reliable time parameters for gait (Lienhard, Schneider, & Maffiuletti, 2013). Supported by the wide use of smartphones and their potential for sensing applications, we tried to verify if equally reliable data can be obtained from an iPhone6 high speed camera.

METHODS

One healthy participant (22 year-old female) performed several gait cycles, captured by an Optogait system (1000 Hz, Microgate, Italy) and recorded with an iPhone6 camera (240 Hz, Apple Inc, USA) positioned near the ground and 4 m away from the walkway. Nine gait cycles recorded for the left and right sides were analysed using Kinovea software (www.kinovea.org) and used to calculate stance, swing and double support time (s) from heel strike and toe-off events. The "iPhone" intra-rater (three raters) and inter-rater agreement along with instruments agreement have been assessed following the procedures recommended by Bland and Altman (1986).

RESULTS

Intra-rater (Fig.1a) and inter-rater agreement (Fig.1b) as well as instruments agreement were excellent (Fig.2).

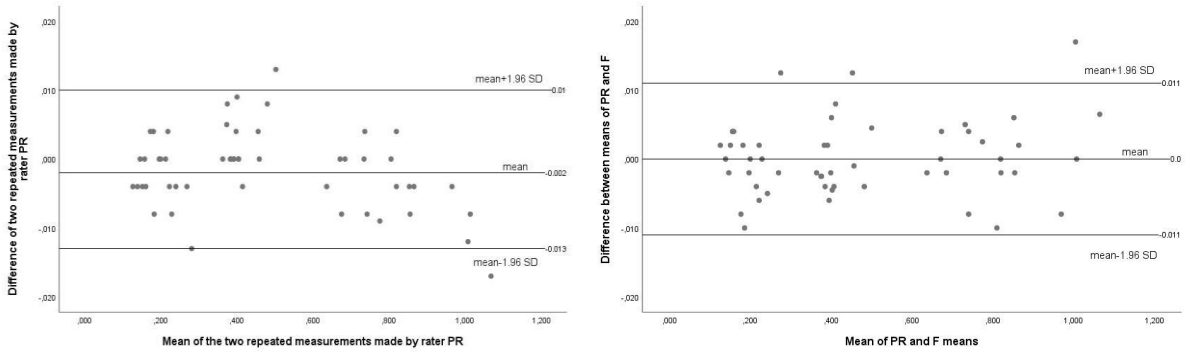

Figure 1. a) Bland-Altman plot for the rater with lower agreement (PR) and b) between the two raters with lower intra-rater agreement (PR and F). The bias is represented by the central line (mean of the difference) and the 95% upper and lower limits of agreement (95%LOA).

The mean difference for the "worst" rater was -0.002s±0.006s (PR, Fig.1a). The coefficient of repeatability (0.012s) suggests 95% of the differences will be smaller than 0.012s (≤3 frames). The maximum difference found in repeated measurements was 0.020s (5 frames) and it may not have clinical relevance. Results from One-Sample T-test applied to the variable difference [t=0.092, P=0.927 (F); t=-1.941, P=0.058 (PR) and t=0.483, P=0.631 (R)], suggest no evidence for significant (P<0.05) variation in repeated measurements (however, the variable did not follow a normal distribution).

The mean difference between the two raters with lower agreement was 0.000s±0.006s (PR and F; Fig.1b) and between instruments was 0.000s±0.007s (PR and Optogait; Fig. 2).

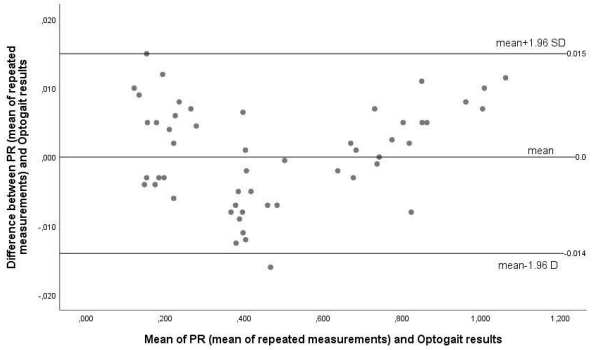

Figure 2. Bland-Altman plot for assessing instruments agreement. The bias is represented by the central line (mean of the difference between the worst rater and Optogait results) and the 95% upper and lower limits of agreement (95%LOA).

The One-Sample T-test was applied to the corresponding difference variables (both normally distributed) suggesting no evidence for significant variation between raters [t=0.126, P=0.900>0.05] and instruments [t=0.478, P=0.635>0.05].

CONCLUSIONS

The iPhone6 high-speed camera seems to be a reliable instrument to obtain temporal gait parameters when compared to optogait. An application for quick identification of gait events should be pursued and the study extended for larger samples.

References

Bland, J. M., & Altman, D. (1986). Statistical methods for assessing agreement between two methods of clinical measurement. *The lancet, 327*(8476), 307-310.

Eldeeb, A. M., & Khodair, A. S. (2014). Three-dimensional analysis of gait in postmenopausal women with low bone mineral density. *J Neuroeng Rehabil, 11*, 55. doi:10.1186/1743-0003-11-55

Lienhard, K., Schneider, D., & Maffiuletti, N. A. (2013). Validity of the Optogait photoelectric system for the assessment of spatiotemporal gait parameters. *Medical engineering & physics, 35*(4), 500-504.

Roriz, P., & Lobo, A. (2018). Fiber Optical Sensors in Biomechanics. In H. Alemohammad (Ed.), *Opto-Mechanical Fiber Optic Sensors* (1st ed., pp. 263-300): Elsevier.

O67. Is it quality more important than quantity? Developmental pathway and training environment of highly skilled and less skilled volleyball players

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INTRODUCTION

Talent development literature has largely examined the role of quantity and type of practice in developing expertise in several sports (Güllich et al, 2018; Rothwell et al, 2017). Specifically in volleyball, evidence has shown that players had an early diversified sport participation, specialising later in volleyball and investing high quantities of practice in later years of development (e.g. Coutinho et al, 2016). However, little is known about the characteristics of that practice, specifically the coach and teammates behaviours as well as the players' age profile. Thus, the purpose of this study was twofold. First off, we analysed the quantity and type of sporting activities undertaken by skilled and less skilled volleyball players throughout development as well as their age in comparison to teammates in those experiences. Next, we examined the players' perceptions about coaches and teammates behaviours in those activities.

METHODS

Thirty highly skilled (HS) and thirty less skilled (LS) players participated in retrospective interviews in order to provide longitudinal account of the sport involvement throughout different stages (stage 1: 8-12 years, stage 2: 13-16 years, stage 3: 17-20 years). A mixed method design was used in this study. Quantitative data was collected to ascertain the quantity and type of sporting activities as well as the player's age in comparison to peers in those activities. Then, participants used their own words to explain in more detail coaches and teammates behaviours in those activities (qualitative data). Quantitative variables examined from a developmental perspective used an analysis of variance with repeated measures. Additionally, a one-way ANOVA was used to compare groups for each variable. Content analysis was used to analyse the qualitative data.

RESULTS

HS and LS volleyball players had an early diversified sport involvement with a greater participation in diversified activities in stage 1 and 2. HS players specialised later in volleyball and performed more hours of volleyball in stage 3. Furthermore, HS players were younger in both diversified sport activities and volleyball in the later stages of development. HS players' reports highlighted a demanding training environment provided by coaches and teammates, which was characterised by coaches' individualised instruction and goal setting as well as teammates' positive push.

CONCLUSIONS

These findings suggest the importance of considering a more holistic and ecologic approach in the study of talent development in volleyball, considering not only the quantity and type of practice but also the overall environment that may influence the quality of practice.

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References

Coutinho, P., Mesquita, I., Davids, K., Fonseca, A. M., & Côté, J. (2016). How structured and unstructured sport activities aid the development of expertise in volleyball players. *Psychology of Sport & Exercise*, *25*, 51-59. doi:10.1016/j.psychsport.2016.04.004

Güllich, A. (2018). Sport-specific and non-specific practice of strong and weak responders in junior and senior elite athletics: A matched-pairs analysis. *Journal of Sports Sciences*, *36*(39), 2256-2264. doi:10.1080/02640414.2018.1449089

Rothwell, M., Stone, J. A., Davids, K., & Wright, C. (2017). Development of expertise in elite and sub-elite British rugby league players: A comparison of practice experiences. *European Journal of Sport Science*, *17*(10), 1252-1260. doi:10.1080/17461391.2017.1380708

O68. Exploring patient experiences of healthcare providers' advice about exercise after renal transplant: a qualitative study

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INTRODUCTION

Healthcare providers (HCP) can have a positive impact on patient behaviours including exercise (Kreuter, Chheda, & Bull, 2000). In transplant recipients, lack of expertise of health professionals was identified as a barrier to physical activity which brought about negative feelings towards exercise and even prompted discontinuation of training (van Adrichem et al., 2016). Conversely, social support from professionals is known to be a strong physical activity facilitator. These are important findings as it has been suggested that as low as one in five renal transplant recipients (RTR) are sufficiently active for health (Lloyd-Davies et al., 2014). The aim of this study was to explore RTR experiences and perspectives of HCP exercise advice through face to face interviews to build upon previous survey-based studies.

METHODS

Semi-structured interviews explored RTR (N=12, 7 males; 5 females; mean [±SD] age 51 [±12] years; eGFR 54 [±22] mL/min/1.73m2) experiences of HCP advice on exercise. Patients were recruited at University Hospitals of Leicester NHS Trust outpatients' clinics at least 12 weeks post-transplant. All data were audio-recorded, transcribed verbatim and subjected to thematic analysis.

RESULTS

Lack of guidance and desire for guidance were prevalent themes with 8 (67%) patients stating that they had received no specific advice or guidance on exercise following transplant. Those patients who did receive input relating to exercise, reported receiving general support, but no specific guidance. Patients proposed several ideas that they felt would be useful such as written guidance, supervised programmes and prescriptive exercise. Some felt that written guidance from HCP was enough for 'getting back into exercise and knowing what is safe' (male, 36). There was a clear impact of the lack of guidance on behaviour: "I think that's probably why I've never done it [exercise]" (female, 32).

CONCLUSIONS

This study provides evidence that RTR want, and in some cases need, greater exercise advice and guidance. It also highlights the impact that HCP can have on exercise behaviours. Despite calls for tailored exercise regimens in RTR and with strong evidence for it to be part of post-transplant care (Gordon, Prohaska, Siminoff, Minich, & Sehgal, 2005) there are still no official guidelines in most recent clinical practice guides (Kasiske et al., 2010) which may be a factor in the lack of advice given to RTR by HCP.

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References

Gordon, E. J., Prohaska, T., Siminoff, L. A., Minich, P. J., & Sehgal, A. R. (2005). Needed: Tailored exercise regimens for kidney transplant recipients. *American Journal of Kidney Diseases*, *45*(4), 769–774. doi: 10.1053/j.ajkd.2005.01.002

Kasiske, B. L., Zeier, M. G., Chapman, J. R., Craig, J. C., Ekberg, H., Garvey, C. A., … Balk, E. M. (2010). Kidney Disease: Improving Global Outcomes (KDIGO) clinical practice guideline for the care of kidney transplant recipients: a summary. *Kidney International*, *77*(4), 299–311. doi: 10.1038/ki.2009.377

Kreuter, M. W., Chheda, S. G., & Bull, F. C. (2000). How Does Physician Advice Influence Patient Behavior?: Evidence for a Priming Effect. *Archives of Family Medicine*, *9*(5), 426. doi: 10.1001/archfami.9.5.426

Lloyd-Davies, L. H., Clarke, A. L., Brown, S. A., Hull, K. L., Burton, J. O., & Smith, A. C. (2014). Renal Transplant Recipient Perspectives on Physical Activity and Exercise. In *Proceedings of the American Society of Nephrology Annual Meeting 2014* (p. 370).

van Adrichem, E. J., van de Zande, S. C., Dekker, R., Verschuuren, E. A. M., Dijkstra, P. U., & van der Schans, C. P. (2016). Perceived Barriers to and Facilitators of Physical Activity in Recipients of Solid Organ Transplantation, a Qualitative Study. *PloS One*, *11*(9), e0162725. doi: 10.1371/journal.pone.0162725

O69. Students' self-determined motivation toward Physical Education does matter on the effectiveness of a physical fitness teaching unit

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INTRODUCTION

Nowadays, to our knowledge, there isn't any previous study examining the influence of the students' self-determined motivation towards Physical Education on the effectiveness of a Physical Education-based teaching unit to improve cardiorespiratory fitness levels. Consequently, the purpose of the present study was to compare the effect of a Physical Education-based physical fitness teaching unit to improve cardiorespiratory fitness levels between students' motivational profiles towards Physical Education.

METHODS

A total of 165 high-school students (53% girls) aged 11-15 years old (M age = 12.9 years, SD = 0.9) were cluster-randomly assigned to the control group (n = 57, non-intervention) and experimental group (n = 108, physical fitness intervention). The experimental group students performed a physical fitness teaching unit twice a week for nine weeks. Before the intervention participants filled out the Spanish version of the Perceived Locus of Causality-II Scale (Ferriz, González-Cutre & Sicilia, 2015). Before and after the intervention the students performed the 20-meter shuttle run test (Léger, Mercier, Gadoury, & Lambert, 1988). After the intervention (i.e., manipulated independent variable), the experimental group students were divided according to their baseline self-determined motivation toward Physical Education (i.e., non-manipulated independent variable). Grounded in the Self-Determination Theory (Ryan, Williams, Patrick, & Deci, 2009), a three-step cluster analyses was carried out with the six dimensions (Chemolli & Gagné, 2014; Hair, Black, Babin, & Anderson, 2018).

RESULTS

The cluster analysis found out a four-cluster structure: (1) "High autonomous, moderate controlled and amotivational profile" (n = 18); (2) "Moderate self-determined motivational profile" (n = 45); (3) "Moderate motivational profile" (n = 14), and (4) "High self-determined motivational profile" (n = 31). The results of the one-way ANOVA ($p < 0.05$), followed by the pairwise comparisons with the Bonferroni adjustment, showed that the experimental group students with high autonomous motivation profiles toward Physical Education (i.e., clusters 1, 2 and 4) statistically and significantly improved their cardiorespiratory fitness levels compared to the control group students ($p < 0.05$, d = 0.38-0.49). However, statistically significant differences between the students with a moderate autonomous motivation profile toward Physical Education (i.e., cluster 3) and control group students were not found ($p > 0.05$, d = 0.28-0.34).

CONCLUSIONS

A Physical Education-based physical fitness teaching unit is only effective with students with high autonomous motivation profiles towards Physical Education. Thus, with the aim of increasing the students' cardiorespiratory fitness, teachers should previously promote self-determined motivation towards Physical Education.

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References

Chemolli, E., & Gagné, M. (2014). Evidence against the continuum structure underlying motivation measures derived from self-determination theory. *Psychological Assessment*, *26*(2), 575–585. http://doi.org/10.1037/a0036212

Ferriz, R., González-Cutre, D., & Sicilia, Á. (2015). Revisión de la Escala del Locus Percibido de Causalidad (PLOC) para la inclusión de la

Medida de la Regulación Integrada en educación física. *Revista de Psicología Del Deporte*, *24*, 329–338.
Hair, J., Black, W., Babin, B., & Anderson, R. (2018). *Multivariate data analysis* (8th editio). United Kingdom: Cengage Learning Emea.
Léger, L. A., Mercier, D., Gadoury, C., & Lambert, J. (1988). The multistage 20 metre shuttle run test for aerobic fitness. *Journal of Sports Sciences*, *6*(2), 93–101. http://doi.org/10.1080/02640418808729800
Ryan, R., Williams, G., Patrick, H., & Deci, E. (2009). Self-determination theory and physical activity: The dynamics of motivation in development and wellness. *Hellenic Journal of Psychology*, *6*(2), 107–124.

O70. A retrospective analysis of career termination of football players in Portugal

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INTRODUCTION

Athletic career termination has been a topic of research in sport sciences due to the societal concerns about athletes' adaptation to their new life (Alfermann & Stambulova, 2007). The understanding of the contextual factors that surround career termination and the individual coping strategies of athletes have been studied in last years (Stambulova, Alfermann, Statler, & Côté, 2009), highlighting the main issues that constrain the quality of career termination. However, further studies are required in different sport contexts in different countries (Stambulova et al., 2009). Thus, the purpose of this study was to analyse the career termination process of elite football players in Portugal, specifically the motifs of career termination and the quality of career termination.

METHODS

A semi-structured interview was applied to ninety male professional players who have played in Portuguese football national teams and who have terminated the football career between 1985 and 2015 (M = 50.68 ± 9.14 age). The characteristics of players, the quality and the level of voluntariness of career termination, the time taken to accept career termination and the life changes following the sport career termination (Taylor & Ogilvie, 1994) were evaluated.

RESULTS

Fifty percent of the Portuguese elite footballers retired from sport between 36 and 40 years of age (M = 35.53 ± 3.63 years) and a strong athletic identity. Regarding the quality of career termination, the athletes reported a difficult an involuntary career termination. For the majority, the adaptation to a new life was hard and caused mental and physical stress. The age was referred as the highest motif for retirement followed by injuries. Regarding the time to accept career termination, the greatest proportion of participants, accepted it immediately or in less than one year.

CONCLUSIONS

Despite the findings being consistent with previous research from other Southern European cultures, it seems that the athletic retirement of Portuguese footballers has some particularities, such as, later career termination, longer playing career, short time to accept termination and an involuntary and hard retirement. These particularities should be explored in depth in future researches and investigations.

References

Alfermann, D., & Stambulova, N. (2007). Career transitions and career termination. In R. C. Tenenbaum & G. Eklund (Eds.), *Handbook of Sport Psychology, Third Edition* (pp. 712-733). New York: Wiley.

Stambulova, N., Alfermann, D., Statler, T., & Côté, J. (2009). ISSP position stand: Career development and transitions of athletes. *International journal of sport and exercise psychology, 7*(4), 395-412.

Taylor, J., & Ogilvie, B. C. (1994). A conceptual model of adaptation to retirement among athletes. *Journal of applied sport psychology, 6*(1), 1-20.

O71. Motor Development in Children from 11 to 46 months: influence of the variable "type of childbirth"

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INTRODUCTION

Motor development assumes a set of life-long processes of change. These processes occur mostly during the first years of life, presenting each child with different developmental rhythms (Barreiros & Neto, 2005). Motor skills are central to our day-to-day life and are key to a child's development (Leonard & Hill, 2014). For Khalaf et al. (2015), dystocic deliveries (birth with medical assistance or intervention) are usually associated with lower motor and cognitive development at 9 months after birth. However, a natural birth without obstetrical procedures (i.e., eutocic delivery) is generally considered as the most natural form of birth, with fewer complications and less severity for the woman and the fetus (Campos et al., 2010, p.8). The objective of this study is to verify if there were differences in motor skills (global and fine), comparing children who were born through eutocic births and those born through dystocic births.

METHODS

In this study 405 children of both sexes participated (29.64 ± 8.83 months). Two groups were created: the group with Eutocic delivery, consisting of 208 children (30.70 ± 8.67 months) and the group with Dystocic delivery, including 197 children (28.53 ± 8.89 months). The motor skills were evaluated using the scales of the PDMS-2 test battery (Saraiva & Rodrigues, 2005). For the data analysis we used descriptive and inferential statistics. The Kolmogorov-Smirnov test was applied to test normality, all variables being non-normal, using the Mann-Whitney test for independent samples.

RESULTS

The group of children born with Eutocic delivery presented, on average, better results in all motor skills (global and fine) when compared to children born with Dystocic delivery, with statistically significant differences in all motor skills: Postural Skills. (p= 0.001), Locomotion Skills (p= 0.002), Object Manipulation Skills (p= 0.006), Fine Manipulation Skills (p= 0.034), Visuo-motor Integration Skills (p= 0.003), Global Motricity (p= 0.000) and Fine Motricity (p= 0.001).

Table 1

Results of the Mann-Whitney test for the study variables.

PDMS2	Childbirth	N	M±SD	Z	Sig.
Postural Skills	Eutocic	208	12.06±1.85	-3.30	.001
	Dystocic	197	11.58±1.82		
Locomotion Skills	Eutocic	208	8.82±1.47	-3.16	.002
	Dystocic	197	8.29±1.50		
Object Manipulation Skills	Eutocic	208	9.47±1.89	-2.75	.006
	Dystocic	197	9.03±2.15		
Fine Manipulation Skills	Eutocic	208	11.01±2.50	- 2.12	.034
	Dystocic	197	10.44±2.34		
Visuo-motor Integration Skills	Eutocic	208	10.36±2.30	- 2.92	.003
	Dystocic	197	9.72±2.16		
Global Motricity	Eutocic	208	100.94±8.71	- 3.89	.000
	Dystocic	197	97.27±9.89		
Fine Motricity	Eutocic	208	103.70±12.43	-3.41	.001
	Dystocic	197	100.20±10.71		

CONCLUSIONS

These results point to the fact that the type of birth (eutocic and dystocic) may have an influence on the motor skills of these children, directly associated with their motor development, observing that, in this study, Eutocic delivery in addition to a better recovery of labor and of the immediate affective bond between mother and child, also leads to better results in terms of global and fine motor skills.

References

Barreiros, J., & Neto, C. (2005). *O Desenvolvimento Motor e o Género*. Lisboa: Faculdade.

Campos, D., Furtado, J., Crisóstomo, M., Carrapato, R., Cunha, E., & Conceição, M. (2010). *Medidas para reduzir a taxa de cesarianas na região Norte de Portugal*. Portugal: Comissão para a redução da taxa de cesarianas da ARS Norte.

Leonard, H. C., & Hill, E. L. (2014). Review: The impact of motor development on typical and atypical social cognition and language: A systematic review. *Child and Adolescent Mental Health*, 19, 163–170.

Khalaf, S., O´Neill, S., O´Keeffe, L., Henriksen, T., Kenny L., Cryan, J., & Khashan, A. (2015). The impact of obstetric mode of delivery on childhood behavior. *Social Psychiatry and Psychiatric Epidemiology*, *50*(10), 1557-1567. doi: 10.1007/s00127-015-1055-9

Saraiva, L. & Rodrigues, L. (2005) *Peabody Developemental Motor Scale (PDMS- 2): validação preliminar para a população Pré-escolar Portuguesa.* Viana do Castelo: Instituto Politécnico de Viana do Castelo.

O72. From directive to constructive practices in developing a supervisory identity: The cases of an experienced and a novice physical education cooperating teacher.

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INTRODUCTION

Teaching perspectives in initial teaching education are invaluable analytic tools for exploring, not only the way the cooperating teachers (CT) share knowledge and experience, but also how they develop supervisory practices and pedagogical relationships with their cohort of pre-service teachers (PST) in school placements (Awaya et al., 2003; Clarke and Jarvis-Selinger, 2005). In addition, teaching perspectives inform the means whereby mentoring experiences assist the development of teachers' professional identities (PI) as CT at workplace settings (Amaral-da-Cunha et al., 2018; Clarke et al.2014; Fletcher, 2016; Lave and Wenger, 1991). METHODS: A case-study design was employed with two physical education CT, an experienced and a beginner in the supervisory practices, to examine the challenging mentoring experiences that led to the reconstruction of their PI as a result of the pedagogical relationship established with the PST in the course of their school placements. Data was collected throughout a one-year school placement and included three semi-structured interviews and the CT's weekly journal entries. The inductive thematic analysis was informed by grounded theory coding procedures. RESULTS: The results were as followed: i) the development of an identity as a CT intersected with a previous (or coexisting) one (e.g., a classroom teacher); ii) personal characteristics and understandings about teaching informed the supervisory practices; iii) the perceptions about the PST (e.g., lack of specific knowledge, initiative and compromise) and the challenges encountered in the exercise of the role influenced the practices and the type of CT each participant enacted in the course of the academic year; iv) the experienced CT legitimised her mentoring in directive pedagogical practices, supported in modelling strategies and in the technical and instrumental features of the mentoring role; whereas the novice CT built his practice on collaborative, discovery, reflection, autonomy, innovation and affinity premises; and v) the directive supervisory style adopted by the experienced CT resulted in relational tensions with the PST which led to questioning her role and PI as a CT; whereas the collaborative inquiry approach to mentoring implemented by the newly appointed CT help both, the CT and the PST, to surpass the challenges encountered in the school placement-year. CONCLUSION: The CT called upon their educational perspectives on teaching physical education to build their PI as mentors. Constructive approaches to mentoring seemed to have assisted the development of a favourable supervisory identity than directive participatory styles.

References

Amaral-da-Cunha, M., Batista, P., MacPhail, A., & Graça, A. (2018). Reconstructing a supervisory identity: The case of an experienced physical education cooperating teacher. *European Physical Education Review*, 24(2), 240-254. doi: 10.1177/1356336X16683179

Awaya, A., McEwan, H., Heyler, D., Linsky, S., Lum, D., & Wakukawa, P. (2003). Mentoring as a journey. Teaching and Teacher Education, 19, 45-56.

Clarke, A., & Jarvis-Selinger, S. (2005). What the teaching perspectives of cooperating teachers tell us about their advisory practices. *Teaching and Teacher Education*, 21, 65-78.

Clarke, A., Triggs, V., & Nielsen, W. (2014). Cooperating teacher participation in teacher education: A review of the literature. *Review of Educational Research*, 84(2), 163-202.

Fletcher T. (2016) Developing principles of physical education teacher education practice through self-study. *Physical Education and Sport Pedagogy* 21(4): 347-365. doi:http://dx.doi.org/10.1080/17408989.2014.990370

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation* (18th ed.). New York: Cambridge University Press.

P107. Bullying in School Sports vs Federated Sports: Exploratory Study in the Interior Northern Region of Portugal

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INTRODUCTION

Bullying is an intentional, aggressive, provocative, and repetitive behaviour among peers (Olweus, 1997). There is little literature on bullying in the context of sports in Portugal, and only one study has been completed (Nery et al., 2018). In this research, the prevalence of bullying in federated sports was: 10% of athletes were victims, 11% aggressors, and 35% observers. However, this study did not include the Interior Northern Region nor the female athletes, which led to the elaboration of this investigation. Our objective was to characterise the prevalence of bullying, type, location, and associated feelings in the sports context in the Interior Northern Region of Portugal.

METHODS

The sample consisted of 252 athletes (155 male, 97 female), 169 federated athletes and 83 participants in school sports, aged between 12 and 18 (14.59±1.39). The Study and Prevention of Violence in Sports Questionnaire, developed by Olweus (1989) and adapted to Portuguese (Nery, 2016), was applied.

RESULTS

The prevalence of bullying in school sports was 3.75% (n=3) and in federated sport it registered 7.1% (n=12). In the context of school sports, only three students reported that they had been victims of verbal bullying and experienced multiple feelings. Regarding frequency, two students reported having been victims 3 to 6 times a week and one reported once a week; the most common locations was the training site (n=2) and hallway (n=1). In federated sport, the frequency of bullying occurred 1 to 2 times to 11 athletes and 10 times a year to one athlete. As to its type, seven athletes reported bullying as being verbal and five stated that it was a combination of different types; the most common places were in the training and/or competition site(s) (10), the locker room (1) and the hallways (1) were also mentioned. Regarding feelings, four athletes reported feeling unhappy, four experienced multiple feelings, three felt indifferent, and one ignored them.

CONCLUSIONS

This exploratory study has shown that the prevalence of bullying in federated and school sports in the Interior Northern Region is low, nevertheless we find that it is higher in federated sport. Bullying in school sports is characterised by being essentially verbal, and its victims experiencing multiple feelings. The training and competition sites are the most frequently mentioned for the occurrence of bullying in federated sport. We suggest the necessity to confirm the trends observed by increasing the sample, including data from other cities in the region.

References

Nery, M. (2016). *Bullying no contexto da formação desportiva em Portugal. Estudo exploratório a nível nacional de modalidades individuais, coletivas e de combate* (Tese de Doutoramento). Universidade de Lisboa Faculdade de Motricidade Humana, Lisboa.

Nery, M., Neto, C., Rosado, A., & Smith, P. K. (2018). Bullying in youth sport training: A nationwide exploratory and descriptive research in Portugal. *European Journal of Developmental Psychology, 0*(0), 1–17. https://doi.org/10.1080/17405629.2018.1447459

Olweus, D. (1997). Bullying in schools: facts and intervention. *European Journal of Psychology of Education, 12* (17), 495–510.

P108. Capoeira Gymnic Workout: Emotions and Gender

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This study was based on the International Research Project called "Games and Emotions", developed by Lavega et al (2008). The study aims to identify, describe and interpret the emotional expression tendencies of individuals who participated in the "Capoeira Workout". The method used was quasi-experimental, and the Games and Emotions Scale (GES) was the instrument used to assess the emotions felt by the participants. The variables were emotions and gender, and a specific protocol was developed. The sample consisted of 10 men and 10 women, and the data related to the 2nd session of the Capoeira gymnastic workout was used, which is based on the inverse execution of the groups of movements applied in the 1st session. We conclude that men expressed higher values for all types of emotion, with positive emotions being the most significant, and joy, happiness and humor being the most relevant. The data expressed by the individuals, emphasises that actions of the psychomotor domain can influence the expression of the emotions of men and women. Activities with the characteristics of workout gimnic are relevant for the education of the emotions, for the improvement of the physical, social and also an alternative subject for the school environment, providing greater involvement and motivation for students in Physical Education classes.

P109. Comparison of the effect between a traditional and intermittent physical fitness-based teaching unit on students' motivation toward Physical Education and autotelic experience

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INTRODUCTION

Cardiorespiratory fitness is considered one of the most important health markers among adolescents (Ruiz et al., 2016). Traditional physical fitness-based teaching units, where non-playful, monotonous and high-intensity exercises are performed, might affect students' motivation and autotelic experience due to the compulsory nature of the participation, consequently lowering their enjoyment more so than in other contexts (Moreno-Murcia et al., 2014). Conversely, the intermittent physical fitness-based teaching units (Viciana & Mayorga-Vega, 2016), which allows the development of two curricular objectives during the same lesson, could reduce this potential effect since it may introduce more playful contents in the latter part of the lesson. Consequently, the aim of this study was to examine the effect of the intermittent and traditional physical fitness-based teaching units on motivation toward Physical Education and autotelic experience in the Physical Education setting.

METHODS

A sample of 103 high school students (47 boys and 56 girls) aged 13-15 years old (M age = 13.6 yr., SD = 0.7) were cluster-randomly assigned to the control group (n = 38), traditional group (n = 23) and intermittent group (n = 42). The traditional and intermittent groups performed a physical fitness teaching unit twice a week for nine weeks during the whole sessions and only during the first half of the main part of the session (18-20 minutes; dedicating the rest of the session to work team sports), respectively. The control group worked a different content (body expression and outdoor physical activities) with the same duration and frequency, but without emphasising the improvement of physical fitness. Before and after the teaching units students filled out the Spanish version of the Perceived Locus of Causality-II Scale (Ferriz, González-Cutre, & Sicilia, 2015). Moreover, after the teaching units students filled out the autotelic experience dimension of the Spanish version of the Flow State Scale (García-Calvo, Jiménez, Santos-Rosa, Reina, & Cervelló, 2008).

RESULTS

The results of the two-way ANOVA (group x time) ($p < 0.05$), followed by the pairwise comparisons with the Bonferroni adjustment, did not show statistically significant differences between the three groups in motivation toward Physical Education ($p > 0.05$). Additionally, the one-way ANCOVA (grade as covariance), did not show statistically significant differences between the three groups in autotelic experience ($p > 0.05$).

CONCLUSIONS

The traditional and intermittent physical fitness-based teaching units do not negatively affect the students' motivation and autotelic experience in Physical Education.

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References

Ferriz, R., González-Cutre, D., & Sicilia, Á. (2015). Revisión de la Escala del Locus Percibido de Causalidad (PLOC) para la inclusión de la Medida de la Regulación Integrada en educación física. *Revista de Psicología Del Deporte*, *24*, 329–338.

García-Calvo, T., Jiménez, R., Santos-Rosa, F. J., Reina, R., & Cervelló, E. (2008). Psychometric properties of the spanish version of the Flow State Scale. *The Spanish Journal of Psychology*, *11*(2), 660–669. doi: 10.1891/jnum.11.1.61.52067

Moreno-Murcia, J. A., Sicilia, A., Sáenz-López, P., González-Cutre, D., Almagro, B. J., & Conde, C. (2014). Análisis motivacional comparativo en tres contextos de actividad física. *Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte*, *14*(56), 665–685.

Ruiz, J. R., Cavero-Redondo, I., Ortega, F. B., Welk, G. J., Andersen, L. B., & Martinez-Vizcaino, V. (2016). Cardiorespiratory fitness cut points to avoid cardiovascular disease risk in children and adolescents; what level of fitness should raise a red flag? A systematic review and meta-analysis. *British Journal of Sports Medicine*, *50*(23), 1451–1458. doi: 10.1136/bjsports-2015-095903

Viciana, J., & Mayorga-Vega, D. (2016). Innovative teaching units applied to Physical Education – changing the curriculum management for authentic outcomes. *Kinesiology*, *48*(1), 142–152.

P110. How do novice learners build knowledge? Joint activity organisation in the development of fighting knowledge

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INTRODUCTION

From the sociocultural constructivist perspective, knowledge construction is an individual process built by the learner along the interaction and continuous negotiation with the expert (Vygotsky, 1978), who guides the process looking for a greater autonomy of the apprentice, like it is suggested by the metaphor of "scaffolding" (Wood, Bruner, & Ross, 1976).

In addition, Game Centred Approach models, such as the Integrated Technical-Tactical model (IT-TM) (López-Ros & Castejón, 2005), emphasise the use of semiotic resources like questions, recapitulations, or debates for favouring significant learnings.

The present study focuses on the process of knowledge construction in a general approach of combat sports in a school setting with novice learners. We analyse the joint activity organisation (JAO) between teacher, apprentices and content, and their evolution, in a didactic sequence (DS) developed according to the IT-TM.

METHODS

This research is an intrinsic case study developed from an interpretative and naturalistic perspective.

The DS was applied through participant observation, with 4th year elementary Portuguese school pupils (n=12), constituted by 10 sessions of 60 minutes, recorded in audio-visual format, and build around two tasks of striking and throwing (according to Avelar-Rosa et al., 2015). All actions and verbal interactions were observed through a pragmatic discourse analysis, looking for the segments of interactivity (SI) that emerge as particular forms of JAO (Coll, Onrubia, & Mauri, 2008).

RESULTS

Seven types of SI were identified: activity organisation (SIAO), guided practice (SIGP), directive practice, observed practice, discussion, recapitulation and transition. These SI are coherent with other studies (Llobet-Martí, López-Ros, & Vila, 2018). However, once there was no decrease of the SIAO and increase of SIGP (both in time and number), which could suggest the knowledge appropriation through a lesser need of teacher intervention, it was found that the existence of prior moments of discussion inside the SIAO and the interactions of the teacher with different pairs individually throughout the SIGP seem to have influence in the knowledge construction process.

CONCLUSIONS

The results show the main features of the JAO and its evolution during the learning process which is neither easy nor linear and present setbacks and disruptions. These results also show the singularities of each pattern of interactivity, suggesting: a) each process of knowledge construction has its particular features; b) these features are not defined in advance; c) the intersubjectivity between the agents around the contents is also built during the process of teaching and learning.

References

Avelar-Rosa, B., Gomes, M.S.P., Figueiredo, A., & López-Ros, V. (2015). Caracterización y desarrollo del "saber luchar": contenidos de un modelo integrado para la enseñanza de las artes marciales y de los deportes de combate. *Revista de Artes Marciales Asiáticas*, *10*(1), 16-33. doi: 10.18002/rama.v10i1.1501.

Coll, C., Onrubia, J. & Mauri, T. (2008). Ayudar a aprender en contextos educativos: el ejercicio de la influencia educativa y el análisis de la enseñanza. *Revista de Educación, 346,* 33-70.

Llobet-Martí, B., López-Ros, V., & Vila, I. (2018). The analysis of interactivity in a teaching and learning sequence of rugby: the transfer of control and learning responsibility. *Physical Education and Sport Pedagogy*, *23*(1), 84-102. doi: 10.1080/17408989.2017.1341472.

López-Ros, V., & Castejón, F.J. (2005). L'ensenyament integrat tècnicotàctic dels esports en edat escolar. *Apunts. Educació Física i Esports, 79,* 40-48.

Vigotsky, L.S. (1978). *Mind in Society: The development of higher psychological processes.* Cambridge MA: Harvard University Press.

Wood, D., Bruner, J.S., & Ross, G. (1976). The role of tutoring in problem-solving. *Journal of Child Psychology and Psychiatry, and allied disciplines, 17,* 89-100. doi: 10.1111/j.1469-7610.1976.tb00381.x.

P111. Motivation between trekking and Trail Running

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INTRODUCTION

The aim of this study was to compare peoples' motivation between those who practise trekking and those who practise trail running, using EMI-2 Questionnaire in order to provide better nature sports and adventure programs and find better strategies to avoid possible barriers to this kind of physical activities.

METHODS

184 adults were inquired (N=74 trekking; N=110 Trail running). The Inquiry was divided in two parts, Sociodemografic and inventory of exercise motivations 2 (EMI-2), made up of 14 factors. Amongst trekking and trail running athletes, the variations were studied using pattern diferences of effect size (ES) with 90% of confidence level (CL). The following interval scale was used to analyse the magnitude effect: <0,2, trivial; 0,2-0,6, small; 0,6-1,2, moderate; > 1,2, large. The odds were tested considering the smallest worthwhile Changes (SW; 0,2 x Between SD Subjected). The following scale for qualitative odds was used: 25-75%, possibly; 75-95%,likely; 95-99%very likely; e> 99%almost certain.

RESULTS

Diferences in social recognition, keeping healthy, weight, stress, revitalisation, pleasure, challenge, affiliation, competition, health, disease, appearance, strength endurance and agility were tested. Just 3 variables (pleasure, affiliation and competition) resulted in moderate magnitude. The challenge variable, the odds are almost certain with the magnitude effect Large in trail running athletes (-34,9%, [-43,5; -25,0]; ES: -1,94, [-2,58; -1,30]).

CONCLUSIONS

To understand the motives that lead people to a certain sports practice is essential for planning it and making it more appealing and interesting for their athletes. Challenge Variable was the most significant in diferences between trekking athletes compared to trail running ones. Meanwhile, pleasure, affiliation and competition were also differentiating factors but in a moderate magnitude. Although intrinsic and extrinsic motivations are not separated in this inquiry, variables like pleasure and affiliation tend to have a more intrinsic nature which relates to the practice of nature sports. Interestingly, the challenge variable, in a trekking athlete, might not be such an important motive to its practice, as this sport relates stronger with enjoyment than with overcome challenge and difficulties, more common in the practice of Trail Running.

P112. Sports ethics: challenges posed by technological development

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INTRODUCTION

Literature has pointed to a plateauing of athletic performance, suggesting that further improvements will be driven by technology applied to sports (TAS) (Balmer, Pleasence and Nevill, 2012). TAS has a significant impact in several sports, (cycling, 100 m sprint, javelin, pole vault, long jump, high jump, triple jump and swimming) (Dyer, 2015). There has been a development in the technologies that can improve the sport performance and its use increased in both competitive and recreational sports (Esteves, Pinheiro, O'Hara, Brás, 2016). The use of TAS initiates a debate with respect to its acceptability, inclusion, or controversy in use, supported by ethical reflections. TAS is termed differently if considered positive - performance enhancement; technosport; human enhancement technologies or mechanical ergogenics – or negative - technological doping or technodoping (Dyer, 2015). Considering that TAS is becoming increasingly popular, it is important to summarise the possible ethical problems that technological use may cause.

METHODS

A literature search was conducted in Web of Science and Scopus from January 2014 to October 2018, including research studies that evaluate the effects of TAS, regarding ethical concerns. Search key words were Sports Ethic and Technology. Exclusion criteria were: (1) articles that focus on medical ethics, regarding sports medicine and (2) articles that aimed a philosophical redefinition of sports ethics.

RESULTS

Of the 58 articles retrieved (31 from Web of Science; 39 from Scopus), 12 met the inclusion criteria. The reviewed studies revealed seven major ethical problems concerning TAS: (1) The concept of fairness (or unfairness) due to technological introduction (Dyer, 2015); (2) The use of non-human decision-making in sport - TAS aids to referees (Kolbinger & Lames, 2017); (3) Using wearables sensors brings up issues related to data ownership and privacy, conflicts of interest or coercion (Arnold & Sade, 2017; Evans, McNamee, & Guy, 2017; Karkazis & Fishman, 2017); (4) Access and parity of TAS (Dyer, 2015); (5) Dehumanisation – performance is evaluated not by human capacities but by an interface human-technology (Frias, 2016; 2018); (6) The use of technology in recreational sports and physical activities highlights the conflict between technique-autonomous versus professional supervised exercise (the virtual versus real fitness instructor) (Goodyear, 2017; Long, Bazin, & Bai, 2018) and (7) Influence of TAS on sports values (Crocket, 2017).

CONCLUSIONS

TAS presents many positive possibilities of enhancing sports performance, nevertheless there is a fear that it could be abused at a sporting system level. Acknowledging ethical problems may facilitate a reflection on the evolution of sport.

References

Arnold, J. F., & Sade, R. M. (2017). Wearable technologies in collegiate sports: the ethics of collecting biometric data from student-athletes. *The American Journal of Bioethics, 17*(1), 67-70. doi: 10.1080/15265161.2016.1251648

Balmer N, Pleasence P, Nevill A (2012) Evolution and revolution: gauging the impact of technological and technical innovation on Olympic performance. *Journal of Sport Sciences 30*(11), 1075–1083. doi: 10.1080/02640414.2011.587018.

Crocket, H. (2017). Problematizing Foucauldian ethics: A review of technologies of the self in sociology of sport since 2003. *Journal of Sport and Social Issues, 41*(1), 21-41. doi: 10.1177/0193723516677617

Dyer, B. (2015). The controversy of sports technology: a systematic review. *SpringerPlus, 4*(1), 524. doi: 10.1186/s40064-015-1331-x

Esteves, D., Pinheiro, P., O'Hara, K., Brás, R. (2016). Internet and Social Network as Health/Physical Activity Information Sources, *in The Encyclopaedia of E-Health and Telemedicine*, ED. IGI Global, 49, 634-645. doi 10.4018/978-1-4666-9978-6

Evans, R., McNamee, M., & Guy, O. (2017). Ethics, nanobiosensors and elite sport: The need for a new governance framework. *Science and Engineering Ethics, 23*(6), 1487-1505. DOI: 10.1007/s11948-016-9855-1

Frias, F. J. (2016). The defining components of the cyborg: cyborg-athletes, fictional or real?. *Sport, Ethics and Philosophy, 10*(1), 97-111. doi: 10.1080/17511321.2016.1171249

Frías, F. J. L. (2018). Walking into the cyborg gym. Two conceptions of the cyborg athlete. *Teknokultura, 15*(1), 105-117. doi: 10.5209/TEKN.55441

Goodyear, V. A. (2017). Social media, apps and wearable technologies: navigating ethical dilemmas and procedures. *Qualitative research in sport, exercise and health, 9*(3), 285-302. doi: 10.1080/2159676X.2017.1303790

Karkazis, K., & Fishman, J. R. (2017). Tracking US professional athletes: The ethics of biometric technologies. *The American Journal of Bioethics, 17*(1), 45-60. doi: 10.1080/15265161.2016.1251633

Kolbinger, O., & Lames, M. (2017). Scientific approaches to technological officiating aids in game sports. *Current Issues in Sport Science (CISS)*.

Long, T., Bazin, D., & Bai, H. (2018). Environmental Ethics as Applied to Outdoor Physical Practices: An Analysis Through the Lens of Hans Jonas. *Sport, Ethics and Philosophy, 12*(2), 194-210. doi: 10.1080/17511321.2017.1341949

P113. Springboard: An interactive education tool to prevent gender-based violence against girls in gymnastics

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INTRODUCTION

Gymnastics is a highly gendered sporting environment (Weber & Barker-Ruchti, 2012) with a history of documented violence in all its forms (Mountjoy et al., 2016) against the girl child who represents over 75% 10 million gymnasts in Europe. Girl gymnasts are at high risk of violence and denied basic child rights. There is compelling evidence of the psychological and physical effects of violence on girl gymnasts which include disordered self-image and body dissatisfaction (Neves et al., 2017), self-harming (Ryan, 1995), disordered eating (Stewart, Schiavon, & Bellotto, 2017), stunted growth and puberty, life-long debilitation and death. Tolerance, normalisation and silencing of violent coaching models have been attributed as causes of violence inflicted on girl gymnasts and there is a strong bystander effect amongst adults (Jacobs, Smits, & Knoppers, 2016; Smits, Jacobs, & Knoppers, 2017). The main goals of the project are: To prevent gender-based violence (GBV) in all its forms against girls in gymnastics by creating, implementing, evaluating and sustaining an effective online education tool; to change social norms and behaviour and empower girls in gymnastics to stand up and call out against GBV; to increase bystander intervention and reporting of GBV in gymnastics; to provide any European country with a scalable, effective and sustainable primary intervention tool.

METHODS

The methodology consists on the creation, implementation, evaluation and sustainability of Springboard, a website with interactive tools to achieve behavioural levers or solutions, for girls in gymnastics (target audience) and bystanders (target group). Education packages will be created and pre-tested. Springboard will also contain a self-audit tool in the form of an interactive digital quiz. Springboard will use a multi-track storytelling approach and will contain a resource of gymnasts' stories in the form of short films created and produced through a digital storytelling methodology. A mixed method pre-post testing design to evaluate Springboard intervention and measure behaviour outcomes will be adopted. Baseline and end line data will be collected in the form of an interactive survey corresponding to attitudes, social norms and behaviours. Qualitative data on attitudes, social norms and behaviours will also be collected via focus groups.

EXPECTED RESULTS

Increased knowledge of GBV and reduction of tolerant attitudes towards violence in gymnastics; increased knowledge that violent relationships and practices are wrong and reduction in the social norm that bystanders should not intervene; increased feelings of empowerment to challenge and report violence; increased awareness of reporting pathways and reporting.

Funding

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References

Jacobs, F., Smits, F., & Knoppers, A. (2016). You don't realize what you see!: The institutional context of emotional abuse in elite youth sport. *Sport in Society*, *20*(1), 1–18.

Mountjoy, M., Brackenridge, C., Arrington, M., Blauwer, C., Carska-Sheppard, A., Fasting, K., … Budgett, R. (2016). The IOC consensus statement: harassment and abuse (non-accidental violence) in sport. *Br J Sports Medicine*, *50*(17), 1019–1029.

Neves, C., Meireles, J., Berbert de Carvalho, P., Schubring, A., Barker-Ruchti, N., & Ferreira, M. E. (2017). Body dissatisfaction in women's artistic gymnastics: A longitudinal study of psychosocial indicators. *Journal of Sports Sciences*, *35*(17), 1–7.

Ryan, J. (1995). *Little girls in pretty boxes: The making and breaking of elite gymnasts and figure skaters*. New York: Doubleday.

Smits, F., Jacobs, F., & Knoppers, A. (2017). Everything revolves around gymnastics: How elite athletes and their parents make sense of practices in women's gymnastics that challenges a positive pedagogical culture. *Sport in Society*, *20*(1), 66–83.

Stewart, C., Schiavon, L. M., & Bellotto, M. L. (2017). Knowledge, nutrition and coaching pedagogy: a perspective from female Brazilian Olympic gymnasts. *Sport, Education and Society*, *22*(4), 511–527. https://doi.org/10.1080/13573322.2015.1046428

Weber, J., & Barker-Ruchti, N. (2012). Bending, floating, flirting, flying: A critical analysis of 1970s gymnastics photographs. *Sociology of Sport*, *29*(1), 22–41.

P114. The emotions supporting the pre-service teachers' process of becoming a Physical Education teacher in the course of their school placement

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INTRODUCTION

The school placement experience is an emotionally challenging process for the pre-service teachers (PST). It results in, on one hand, the confrontation between their personalities and the professional practice contexts; and, on the other hand, of the management of the expectations of the people involved in their training in relation to their own interpretations and meanings attributed to the new experiences (Queirós, 2014; MacPhail et al., 2014; Meijer et al., 2011; Timostsuk & Ugaste, 2012). Recent literature has drawn attention to the importance of connecting working place experiences with emotions and, to that extent, with identity professional development (e.g., Cross & Hong, 2012; Lee et al. 2013; Timostsuk & Ugaste, 2012). However, despite these being considered as decisive elements in the process of learning to become a teacher, few studies have looked into the influence of emotions in initial teacher education (Beauchamp & Thomas, 2009; Flores & Day, 2006), specifically in the Physical Education (PE) school placement context (Alves et al, 2018).

METHODS

The goal of this study was to examine how PST built their professional identity as PE teachers through the emotions they felt in the course of their one-year school placement. Four PST from the 2017-18 PE Teacher Education Programme of the Institute University of Maia agreed to participate in this study. Data was collected throughout a timeline and a focus group in the final-term of the PST' school placement. RESULTS: An inductive thematic analysis revealed that: i) anxiety marked the beginning of the PST school placement and depicted the novelty of teaching in a real school, meeting new teachers and staff, and feelings of whether they would be fully supported by their cooperating teacher and faculty tutor; ii) frustration emerged due to the lack of support felt from the university at the beginning of the experience; iii) sadness marked the first mid-term of the PST school placement and portrays the difficulties in meeting all the students expectations and needs; iv) happiness came at a final stage when the PST felt that they had mastered their teaching skills, concurred their students and developed better relations with the school community. CONCLUSION: The initial stage of the school placement is marked by negative emotions. Ultimately, these emotions scaffold the abilities to deal with the challenges of the workplace reality and transform into a more positive path of identity development as PE teachers.

References

Alves, M., MacPhail, A., Queirós, P., & Batista, P. (2018). Becoming a physical education teacher during formalised school placement: A rollercoaster of emotions. *European Physical Education Review*. doi: 10.1177/1356336X18785333

Cross, D. I., & Hong, J. Y. (2012). An ecological examination of teachers' emotions in the school context. *Teaching and Teacher Education, 28*(7), 957-967. doi: 10.1016/j.tate.2012.05.001

Lee, J. C.-K., Huang, Y. X.-H., Law, E. H.-F., & Wang, M.-H. (2013). Professional identities and emotions of teachers in the context of curriculum reform: a Chinese perspective. *Asia-Pacific Journal of Teacher Education, 41*(3), 271-287. doi: 10.1080/1359866x.2013.809052

MacPhail, A,; Patton, K.; Parker, M. & Tannehill, D. (2014) 'Leading by example: Teacher educators' professional learning through communities of practice'. *Quest, 66*(1):39-56. doi: 10.1080/00336297.2013.826139

Meijer, P. C., De Graaf, G., & Meirink, J. (2011). Key experiences in student teachers' development. *Teachers and Teaching: Theory and Practice, 17*(1), 115-129.

Queirós, P. (2014). Da formação à profissão: O lugar do estágio profissional. In P. Batista, P. Queirós & A. Graça (Eds.), *O Estágio Profissional na (re)construção da identidade profissional em Educação Física* (pp. 67-83). Porto: FADEUP.

Timostsuk, I., & Ugaste, A. (2012). The role of emotions in student teachers' professional identity. *European Journal of Teacher Education, 35*(4), 421-433. doi: 10.1080/02619768.2012.662637

P115. Validity of Eston-Parfitt perceived exertion scale for estimation of cardiovascular effort during Physical Education classes

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INTRODUCTION

Physical education (PE) classes provide a unique opportunity for physical activity (PA) for many children (Fairclough & Stratton, 2005). Although the improvement of cardiorespiratory fitness and PA levels are PE classes goals, there is an international call for the increase of moderate-to-vigorous PA (MVPA) and vigorous PA (VPA) during these classes (Lowry, Lee, Fulton, & Kann, 2009). Few systematic assessments of the attainment of these goals have been made in Portuguese pupils (Mota, 1994; Wang, Pereira, & Mota, 2005). Perceived exertion scales (PES) constitute inexpensive, easy and fast tools to evaluate exercise intensity (Bourdon et al., 2017). Several PES specially designed for children have been developed and its validity has been determined in laboratory settings (Rodriguez, Zambrano, & Manterola, 2016). However, its validation in PE context still remains to be thoroughly investigated. This study aimed to determine if the Eston-Parfitt PES (Eston, Lambrick, & Rowlands, 2009) is a valid method to determine children's cardiovascular strain during PE classes.

METHODS

The heart rate (HR) of 48 (24 of each sex) Portuguese pupils (10 ± 2 years-old), belonging to the first, second and third levels of education, was monitored during 29 PE classes with HR monitors (Polar Team System, Polar Electro Oy), resulting in 159 valid HR recordings. At the end of each class, the pupils rated their perceived exertion using the Eston-Parfitt scale.

RESULTS

The participants spent 32.1% and 20.5% of effective class time in MVPA and VPA, respectively. Mean HR was 144 ± 16 b.min^{-1} (72 ± 8 %HRmax) and the pupils rated their effort during the PE classes as 4 ("starting to get hard"), with no significant differences between sexes (p=.51). Children from the first level of education perceived their exertion significantly higher compared to the second level pupils (p=.010). There was no significant association between pupils' perceived exertion and cardiovascular strain during the PE classes measured as time spent in intensities below MVPA (r=.36, p=.65), in MVPA (r=.09, p=.26), or in VPA (r=.03, p=.72). Mean absolute HR (r=.06, p=.43) and mean relative HR (r=.02, p=.82) were not significantly associated with children's perceived exertion.

CONCLUSIONS

Eston-Parfitt perceived exertion scale is not a valid tool to determine pupils' cardiovascular strain during PE classes. Further studies with a larger number of participants and different rating of PES developed for children in this context are needed.

References

Eston, R. G., Lambrick, D. M., & Rowlands, A. V. (2009). The perceptual response to exercise of progressively increasing intensity in children aged 7-8 years: validation of a pictorial curvilinear ratings of perceived exertion scale. *Psychophysiology, 46*(4), 843-851. doi:10.1111/j.1469-8986.2009.00826.x

Fairclough, S., & Stratton, G. (2005). 'Physical education makes you fit and healthy'. Physical education's contribution to young people's physical activity levels. *Health Education Research, 20*(1), 14-23. doi:10.1093/her/cyg101

Lowry, R., Lee, S. M., Fulton, J. E., & Kann, L. (2009). Healthy people 2010 objectives for physical activity, physical education, and television viewing among adolescents: national trends from the Youth Risk Behavior Surveillance System, 1999-2007. *Journal of Physical Activity & Health, 6*(Suppl 1), S36-45.

Mota, J. (1994). The Children Physical Education Activity Assessed by Telemetry. *Journal of Human Movement Studies, 27*, 245-251.

Bourdon, P. C., Cardinale, M., Murray, A., Gastin, P., Kellmann, M., Varley, M. C., . . . Cable, N. T. (2017). Monitoring Athlete Training Loads: Consensus Statement. *International Journal Sports Physiology Performance, 12*(Suppl 2), S2161-S2170. doi:10.1123/IJSPP.2017-0208

Rodriguez, I., Zambrano, L., & Manterola, C. (2016). Criterion-related validity of perceived exertion scales in healthy children: a systematic review and meta-analysis. *Archivos Argentinos de Pediatría, 114*(2), 120-128. doi:10.5546/aap.2016.eng.120

Wang, G. Y., Pereira, B., & Mota, J. (2005). Indoor physical education measured by heart rate monitor. A case study in Portugal. *Journal Sports Medicine and Physical Fitness, 45*(2), 171-177.

P116. Women athletes and the eroticisation of bodies in Mixed Martial Arts

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Sport is one of the most expressive phenomena of modernity, and its diversity of practice enlivens looks and meanings about bodies, masculinities and femininities. Mixed Martial Arts (MMA), a modern sport characterised by the joining of different martial arts, uses the bodies of women athletes as a strategy for expansion and social visibility. Thus, this study proposes to analyse the multiplicity of looks over the bodies of female athletes in MMA. Our research field was composed by three sites: A Dama de Ferro, MMA Space and UFC Brasil, in which there are selected posts that have as central theme the female athletes' body. Time delimitation ran from November 2012 to July 2018, summing up 66 posts. Data was examined from the content analysis. Analysis suggested that inside or outside the octagon, bodies are the main protagonists of this sporting spectacle and that MMA uses both the possible violent blows and the reality shows carried out by the fighters. But, above all, it uses their athletic bodies when displaying a representation of beauty associated to sports. Therefore, athletes' images become the centre of attention and the glances turn to the eroticisation of their bodies. Investments on the athletic bodies are in favour of a standard cis-normative body able to sell the sport and make the business moving. These are strategies based on the triad body - power – show, which is at the base of the sport spectacle. The fact is, that the insertion of women athletes in MMA had as central element the eroticisation of their bodies and, the ruptures and deconstructions made over the years reveal them as possessing beauty. Furthermore, women athletes possess abilities and singularities that can be perceived by looking at their bodies and their femininities.

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References

Awi, F. (2012). *Filho teu não foge à luta*: Editora Intrinseca.

Bardin, L. (1977). Análise de conteúdo. *Lisboa: edições, 70*, 225.

Bataille, G. (1986). *Erotism*: City Lights Books.

Batliwala, S., John, A., Schuler, S., Hashemi, S., Smith, C., McElnay, C., . . . Bernstein, J. (1995). The meaning of womens empowerment: new concepts from action. *Family planning news, 11*(1), 127-138.

Butler, J. (2003). *Problemas de gênero: feminismo e subversão da identidade*: Editora Record.

Debord, G. (2003). A sociedade do espetáculo. *Contraponto: São Paulo*.

Dunning, E. (1986). Dynamics of modern sport: Notes on achievement-striving and the social significance of sport. In: Norbert Elias & Eric Dunning (Eds.), *Quest for Excitement: Sport and Leisure in the Civilising Process* (p. 203-221). Oxford: Basil Blackwell.

Elias, N., & Dunning, E. (1986). An essay on sport and violence. In: Norbert Elias & Eric Dunning (Eds.), *Quest for Excitement: Sport and Leisure in the Civilising Process* (p.150-173). Oxford: Basil Blackwell.

Fernandes, V., Mourão, L., Goellner, S. V., & Grespan, C. L. (2015). Mulheres em combate: representações de feminilidades em lutadoras de boxe e MMA. *Revista da Educação Física / UEM, 26*, 367-376.

Follo, G. (2012). A literature review of women and the martial arts: Where are we right now?. *Sociology Compass, 6*(9), 707-717. doi:10.1111/j.1751-9020.2012.00487.x

Foucault, M. (1979). *Microfísica do poder: organização e tradução de Roberto Machado*. Rio de Janeiro: Edições Graal, 4.

Foucault, M. (1980). *Vigiar e Punir*. Rio de Janeiro: Vozes.

Foucault, M. (2013). O corpo utópico, as heterotopias. *São Paulo: n-1 edições*.

Goellner, S. V. (2003a). *Bela, maternal e feminina: imagens da mulher na Revista Educação Physica*: Editora Unijuí.

Goellner, S. V. (2005b). Mulheres e futebol no Brasil: entre sombras e visibilidades. *Revista Brasileira de Educação Física e Esporte, 19*(2), 143-151.

Goellner, S. V. (2007). Feminismos, mulheres e esportes: questões epistemológicas sobre o fazer historiográfico. *Movimento, 13*(2), 173.

Grespan, C. L. (2015). *Mulheres no Octógono: Performatividades de corpos, de gêneros e de sexualidades* (Appris Ed. 1 ed.). Curitiba Brasil: Appris.

Jaeger, A. A., & Goellner, S. V. (2011). O músculo estraga a mulher? A produção de feminilidades no fisiculturismo. *Estudos Feministas*, 955-975.

Jakubowska, H., Channon, A., & Matthews, C. R. (2016). Gender, Media, and Mixed Martial Arts in Poland: The Case of Joanna Jędrzejczyk. *Journal of Sport and Social Issues, 40*(5), 410-431. doi:10.1177/0193723516655578

Louro, G. L. (1997). *Gênero, sexualidade e educação*. Petrópolis: Vozes.

McClearen, J. (2015). The paradox of Fallon's fight: Interlocking discourses of sexism and cissexism in Mixed Martial Arts fighting. *New Formations,* (86), 74-88. doi:10.3898/NEWF.86.04.2015

Sailors, P. R., & Weaving, C. (2017). Foucault and the Glamazon: The Autonomy of Ronda Rousey. *Sport, Ethics and Philosophy*, 1-12. doi:10.1080/17511321.2017.1311368

Salvini, L., & Marchi Júnior, W. (2016). More than a "weight issue": Analysis of the content of rivalry discourses between MMA (mixed martial arts) fighters ronda rousey and cris cyborg. *Movimento, 22*(3), 795-808.

Silveira, V. T., & Vaz, A. F. (2016). Corpo feminino no esporte: entre heterossexualidade compulsória e lesbofobia. *Revista Brasileira de Ciências do Esporte, 36*.

Weaving, C. (2014b). Cage fighting like a girl: Exploring gender constructions in the Ultimate Fighting Championship (UFC). *Journal of the Philosophy of Sport, 41*(1), 129-142.

P117. Motivation to study Laws of the Game and Competition Rules – An empirical study in National Portuguese Football Referees

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INTRODUCTION

Motivation is one of the factors that can influence the individual ability to achieve success (Liu, Bridgeman, & Adler, 2012). In this sense, reducing the levels of amotivation is essential to increase results, focusing the motivation in the learning process to achieve goals (Kim & Pekrun, 2014; Pintrich, 2003). The success of soccer referees is linked to several skills, game knowledge, communication, strategic leadership, physical fitness and psychological ability (Guillén & Feltz, 2011). During the game, referees perform between three and four decisions per minute paying attention to the multiple aspects of the game which generates pressure and stress (Blumenstein & Orbach, 2014), meaning that the referees must clearly master Laws of the Game and Competition Rules. Thus, the present study aimed to understand the state of motivation in Portuguese referees to study the Laws of the Game and Competition Rules and the dimensions that affect this motivation.

METHODS

One hundred and seventy-nine referees completed the Academic Motivation Scale (Vallerand et al., 1992), adapted to the Football arbitration, in order to assess the Amotivation, Extrinsic Motivation and Intrinsic Motivation. Data was treated applying several statistical techniques that highlight Multiple Linear Regression, which allowed to test a measurement model of the referees' motivation to study and learn the LGCR according to the research stated objectives.

Table 1
The Multiple Linear Regression Model

Dimensions	Dependent variable: IMTK			
	Initial Model		Final Mode	
	B	t	B	t
(Constante)	-.017	-.059	.173	.745
AMOT	.088	1.091	.088	1.091
EMER	-.030	-.504	-.030	-2.296
EMIN	-.069	-1.722	.076**	4.367
EMID	.262***	4.450	.309***	5.766
IMTA	.331***	5.785	.460***	11.918
IMTS	.491***	11.555	.498***	.745
VIF	[1.206 – 2.842]		[1.634 – 2.721]	
R	.903		.902	
R^2	.816		.814	
R^2 a	.810		.810	
Durbin-Watson	1.771		1.750	

**p< 0.05 **p<0.001

RESULTS

The results showed that although most of the members are motivated to study the Laws of the Game and Competition Rules, there is a small group that presents a deficit in motivation. The Multiple Linear Regression Model showed that referees are more intrinsically motivated than extrinsically, showing that they are able to motivate themselves more than to undergo external influences.

CONCLUSIONS

A central finding of the paper is that the Football referees show a high degree of autonomy, self-control and determination to study the Laws of the Game and Competition Rules. However, it is necessary to promote the emergence of this behaviour in all football referees, perhaps using a different approach that differentiates from the traditional and repeated study of the book, that can help increasing the motivation of all referees. The present findings have implications to help managers and arbitration technicians to decide the best strategies for increasing referees' involvement in the study of Laws of the Game and Competition Rules.

References

Blumenstein, B., & Orbach, I. (2014). Development of Psychological Preparation Program for Football Referees: Pilot Study. *Sport Science Review*, *23*(3–4), 113–125.

Guillén, F., & Feltz, D. L. (2011). A conceptual model of referee efficacy. *Frontiers in Psychology*, *2*, 25.
Kim, C., & Pekrun, R. (2014). Emotions and motivation in learning and performance. In *Handbook of research on educational communications and technology* (pp. 65–75). Springer.
Liu, O. L., Bridgeman, B., & Adler, R. M. (2012). Measuring learning outcomes in higher education: Motivation matters. *Educational Researcher*, *41*(9), 352–362.
Pintrich, P. R. (2003). A motivational science perspective on the role of student motivation in learning and teaching contexts. *Journal of Educational Psychology*, *95*(4), 667.
Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The Academic Motivation Scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, *52*(4), 1003–1017.

P118. The length of the sport practice in swimming: A survival analysis approach

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INTRODUCTION

The main concern of a sport organisation should be creating and retaining customers, where retention is fundamental (Tharrett & Bedford, 2012) and increasing the customer lifetime value is essential for the evaluation of the performance of the organisations (Gupta et al., 2006).

Retention in sports contributes to the increase of the athletes' health promotion (Siedentop, 1983; Seefeldt & Vogel, 1986), economic benefits (Shephard, 1986; Wang, Pratt, Macera, Zheng, & Heath, 2004), and bigger capacity for the athletes to be developed into international competitors (Green & Oakley, 2001). The duration in the sport practice can be targeted using the dropout, analysed using survival analysis, which is well-suited to study the timing of events in longitudinal data (Singer & Willett, 1993). The aim of this study is to predict the survival time in the swimming practice and the factors that contribute to a longer duration.

METHODS

The duration is analysed using survival analysis, measuring the time that a swimmer practices in a sport facility. The dataset as N= 2653 customers (n=1536 female 19.62± 15.79 years) and n=1117 (20.03±16.5 years) from a Portuguese sport facility, retrieved using the e@sport (Cedis, Portugal) software, corresponding to the period from 1 June 2014 until 31 October 2017. All data was pseudonymized ensuring that it is not attributed to an identified or identifiable natural person.

RESULTS

The survival time of the swimmers during the first 12 months of practise in a sport facility, showed that there is a risk of dropout of 52% (Figure 1), with an estimated median survival of more 22 months. The multivariate Cox´s regression identified the variables "Days without frequency", "Total amount billed", "Number access", "Number of contract renewals" and "month" contributing to the increase of the time of survival.

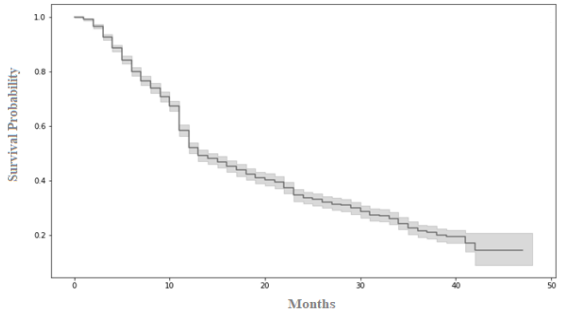

Figure 1. Kaplan- Meier survivor curve of the swimmers, between June 2014 until October 2017.

CONCLUSIONS

There is an increasing interest in the dropout problem in sports, especially in the rapidly growing children's and youth sports, in which attrition is extremely high (Salguero, Gonzalez-Boto, Tuero, & Márquez, 2003). The understanding of which factors contribute to the survival time allows to identify risk factors and when should measures to reduce the dropout be applied, giving these information to the managers to define lines of actions to reduce the dropout. The "Days without frequency", "Total amount billed", "Number access", "Number of contract renewals" and "month" increase the survival time of the swimmers giving indicators to support the development of countermeasures to reduce dropout.

References

Green, M., & Oakley, B. (2001). Elite sport development systems and playing to win: uniformity and diversity in international approaches. *Leisure Studies*, *20*(4), 247–267. doi:10.1080/02614360110103598

Gupta, S., Hanssens, D., Hardie, B., Kahn, W., Kumar, V., Lin, N., … Sriram, S. (2006). Modeling Customer Lifetime Value. *Journal of Service Research*, *9*(2), 139–155. doi:10.1177/1094670506293810

Salguero, A., Gonzalez-Boto, R., Tuero, C., & Márquez, S. (2003). Identification of dropout reasons in young competitive swimmers. *The Journal of Sports Medicine and Physical Fitness*, *43*(4), 530–534.

Seefeldt, V., & Vogel, P. (1986). *The Value of Physical Activity*. Reston, VA: American Alliance for Health, Physical Education. https://eric.ed.gov/?id=ED289866

Shephard, R. J. (1986). *Economic benefits of enhanced fitness*. Champaign, Illinois: Human Kinetics. Obtido de https://www.cabdirect.org/cabdirect/abstract/19861840075

Siedentop, D. (1983). *Developing teaching skills in physical education* (2nd ed). Palo Alto, Calif: Mayfield Pub. Co.

Singer, J. D., & Willett, J. B. (1993). It's About Time: Using Discrete-Time Survival Analysis to Study Duration and the Timing of Events. *Journal of Educational Statistics*, *18*(2), 155–195. doi:10.3102/10769986018002155

Tharrett, S. J., & Bedford, P. (2012). *Why People Join, Leave, and Stay with Health /Fitness Clubs: The Ultimate Handbook of Member Retention*. Healthy Learning.

Wang, G., Pratt, M., Macera, C. A., Zheng, Z.-J., & Heath, G. (2004). Physical activity, cardiovascular disease, and medical expenditures in U.S. adults. *Annals of Behavioral Medicine*, *28*(2), 88–94. doi:10.1207/s15324796abm2802_3

P119. Practice and conceptualisation in Football Coach Education

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INTRODUCTION

The importance of the social and economic impact of coaching activity has led, in recent years, to the analysis and description of its main functions and intervention skills (Gilbert & Trudel, 2001; Lyle, 2007; Cushion, 2007; Gilbert & Cotê, 2013). Time is a necessity proclaimed by football coaches to perform a meritorious work. The present study aims to identify, describe and understand: (1) the relation with real football coach intervention and skills dimension used in coach process; (2) the importance of the visible effects of football coach intervention on players' technical, tactical and strategic behaviour in a single training session. It is intended to understand if players in a short period of time have visible behavioural changes. The main objective was to observe what coach skill dimensions emerge, in that context, from the whole process.

METHODS

A systematic observation was carried out in 3 phases (Ph) in one single training session: (1) Ph 1 - exercises without coach intervention; (2) Ph 2 and Ph 3 - exercises with coach intervention. The participants of this study were a football coach, with the training level UEFA Pro License, his technical team (two assistant coaches) and a semi-professional football team, with 23 players.

RESULTS

From this intervention emerges a set of skills that were synthesised in a set of observed explanatory action parameters. These skills parameters are presented as a proposal for the football coach self-reflection and skills development, conscience and autonomy. The explanatory action skills parameters were synthesised as follows: (i) Have "the idea" of how we want to play (game model); (ii) Observe and analyse the opponent; (iii) Create exercises and their operation; (iv) Communicate with their athletes and empower them towards a collective behaviour, based on the exercises proposed; v) Adapt and/or adjust the exercises according to what they observe; (vi) Make decisions in real time. The training session allowed to verify that it is possible to change players pronounced behaviours, in a short time, with different requirements.

CONCLUSIONS

The football coach's skills (mention in the results) emerge from their own process (planning and operationalisation of the training). These skills allow the changing of the players' behaviours in the training in a short time (one session) and in a remarkable way, with different requirements.

References

Cushion, C. (2007). Modelling the Complexity of the Coaching Process. *International Journal of Sports Science & Coaching, 2*(2), 427-433.

Gilbert, W. & Cotê, J. (2013). Defining coaching effectiveness. A focus on coaches' Knowledge. In Potrac, P., Gilbert, W., & Deninson, J. (Eds.), *Routledge Handbook of Sports Coaching* (p. 147- 157). London: Routledge Taylor & Francis Group.

Gilbert, W. & Trudel, P. (2001). Learning to coach through experience: reflection in model youth sport coaches. *Journal of Teaching in Physical Education, 21,* 16-34.

Lyle, J. (2007). Modelling the Complexity of the Coaching Process: A Commentary. *International Journal of Sports Science & Coaching, 2*(4), 407-410.

P120. Blue Ocean Strategy - Strategic Options For Health Clubs

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INTRODUCTION

Metaphorically, the Blue Ocean Strategy considers that the market is made up of two oceans, red and blue. The red ocean represents all the industries that exist today. The blue ocean considers all industries that do not yet exist, thus representing the untapped market where demand can be created and where opportunities for high growth and profitability exist. Kim and Mauborgne (2005) point out that there are six strategic options, which are alternative paths that can lead businesses to the blue ocean corridor, namely: alternative industries, strategic groups, customer groups, products and complementary services, the functional-emotional stimulus of the industry and the temporal context. The objective of this paper is to present alternative paths for the health club sector from the six strategic options. It should be noted that these strategic options are fundamental to respond to the field of action of creation, that is, finding out which features the industry have never offered and produce it. (Vieira & Ferreira, 2017).

METHODS

As a methodology, a detailed description of each of the six strategic options is used, based on a reflection of the current situation and trends / challenges of the fitness sector.

RESULTS

In this sequence, an analysis of the alternative industries (health, entertainment), the strategic segments within the industry (elderly and obese population), the chain of buyers of the products (life insurers, medical class and companies), services (massages, cryotherapy, stretching and homeopathy), the functional / emotional stimulus offered to buyers and the temporal context of the sector, namely, new technologies (wearable technology), which have implications for the industry in terms of consumer experience (Thompson, 2016).

CONCLUSIONS

By thinking beyond the traditional boundaries of competition, you can see how strategic initiatives can be built that rebuild the frontiers of industry. These perspectives of new business ideas come from the six strategic options for formulating the blue ocean strategy, namely: analysis of the alternative industries, strategic groups within the industry, the customer chain, complementary products/services, functional and emotional stimulation and finally, the analysis of the temporal context.

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References

Kim, & Mauborgne. (2005). Blue ocean strategy: From theory to practice. *California Management Review, 47*(3), 105-121.

Thompson, W. R. (2016). Worldwide Survey Of Fitness Trends For 2017. *ACSMS Health & Fitness Journal, 20*(6), 8-17. doi:10.1249/fit.0000000000000252

Vieira, E. R. M., & Ferreira, J. J. (2017). Strategic framework of fitness clubs based on quality dimensions: the blue ocean strategy approach. *Total Quality Management & Business Excellence*, 1-20. doi:10.1080/14783363.2017.1290523.

P121. Media influence on elite football performance

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INTRODUCTION

Football is one of the most popular sports in the world. Press and global media classified some of the top players as fashion icons that, associated with big brands turned out to be renamed media sportive content. However, football players are not completed prepared to deal with this new communication reality. Therefore, they react differently to this extra pressure and do not control its interference upon their own personal and professional life, which severely affects their personality and competitive performance. Published studies since the last decade of the 20th century are conclusive about the existence of such an influence, stating that there is an important influence by the media over sportsmen in general. We consider of utmost importance to understand the factors enabling players to fix their emotionality levels, their physical and psychological stability, which contributes to a better individual performance scattering it to the whole team.

METHODS:

We did not come to know published information on this subject in Portugal, although we know there are some professional clubs with organised media departments; however, they are mostly directed to intermediate information from inside-outside the club. In this research we carried out in-depth individual interviews, half structured to obtain relevant data for understanding this relationship. After collecting the data, we needed to apply a qualitative approach to interpret each unity of decomposed initial recorded message.

RESULTS

The outcome of those 60 interviews made to professional football players and coaches of 1st and 2nd Portuguese Leagues was decomposed in several main categories chosen in order to accomplish the main categorisation: media impact on sport performance, state of mind and results; relationship between mediation athlete-news; meaning perceived by the athlete comparing known or not published news; media presence impact in real time. As secondary categorisation we also defined: media impact on sport public opinion; media impact in the future; internal communicational work within the club. The results of this analysis show evidence that we face several influential factors over sports performance and the big majority of the interviewees states *"it is fundamental the role of the media in sports environment"*.

CONCLUSIONS

We concluded there is a strong relationship between media and athlete performance; we could not prove that it is determinant; we describe some influential mechanisms of that relationship upon athlete's perspectives. There is a long way to go on dynamic partnerships among media, clubs, athletes to build an important global industry.

References

Bandura, A. Social Learning Theory. New Jersey: Prentice Hall, 1997.

Evers, J. C. (2011). From the Past into the Future. How Technological Developments Change Our Ways of Data Collection, Transcription and Analysis. *Forum: Qualitative Social Research, 12*(1).

Flick, U. (2004). Uma introdução à pesquisa qualitativa. Porto Alegre: Bookman.

Gulam, A. (2016). Role of mass media in sports communication. *International Journal of Advanced Educational Research*. 5 (1): 51-53.

Kuper, S. (2011). The Football Men, Up Close with the Giants of the Modern Game: Simon & Schuster, ISBN: 978-0-85720-160-7.

P122. Music or Noise in indoor swimming pools: an ambiguity

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INTRODUCTION

The sound pressure levels between 80 and 90 dB (A) provide a health risk. The constant exposure to high values of this dimension represents a huge risk with harmful consequences of the physiological, metabolic, psychological or psychiatric forum. There are studies that report exposure values higher than the values of action and limit established in the legislation. These values increase the risk of hearing loss, stress, cardiovascular pathologies, as well as decreasing performance in productivity. Music is an element that in its structure contemplates components of rhythm and intensity, among others and, in certain classes or activities can help to mark the pace and the intensity of the exercises, facilitating the objective of an exercise. Athletes and Physical Education professionals (PEF - Coaches, Teachers, Monitors and Personal Trainers-PT) who attend and work in indoor swimming pools are exposed to the noise which comes from various sources, caused by the constant movement of water and by the music used in classes.

METHODS

This study was developed to evaluate the sound pressure levels in class context, with the aim of investigating and understanding what noise levels, athletes, PEF and other users are exposed. The research was conducted in 2014 in indoor swimming pools in the Minho region and the Tâmega sub-region in Portugal. The selecting criteria for the indoor swimming pools to be investigated was guided by the location, architecture and operability. The research was carried in two stages, the application of a questionnaire to the PEF, the measurement of the sound pressure levels in the swimming pools and statistical treatment of the collected data (SPSS 22.0).

RESULTS

The results showed that LAeq sound pressure levels ranged from 75.5 dB (A) to 101.2 dB (A), LEX, 8h values averaged weekly between 83.0 dB (A) and 90.0 dB (A). It also showed that the source of the greatest contribution to high sound pressure levels is music (50%), whistles (28.4%) and verbalisation (10%). The high levels of sound pressure impair communication and prevent the reception and transmission of information (44%), also denouncing that it impairs concentration and performance in the class/training (27%), 48% of PEF is sensitive to noise. PEFs use very high volume in class, they believe the class performance improves for the group, but does not take into account the risks that follow it. There isn't any concern on the part of the management regarding the sound pressure levels. The scrutinised values of sound pressure are unhealthy for health, these high values impair intelligibility and may impair the vocal health of athletes and PEFs.

CONCLUSIONS

The high values of sound pressure are induced mostly by music and whistles. The communication and understanding between PEFs and athletes is hampered by high levels of noise. The concentration and performance in class/training is affected by the presence of music in loud volume.

References

Afonso, J. L., & Dias, M. (2001). Noise Levels In The Hospital Environment. *Tecnohospital - Revista de Instalações E Equipamentos de Saúde*, 30–40.

Kristiansen, J., & Peter, S. (2014). A study of classroom acoustics and school teachers ' noise exposure , voice load and speaking time during teaching , and the effects on vocal and mental fatigue development, 851–860. https://doi.org/10.1007/s00420-014-0927-8

Mahendra Prashanth, K., & Sridhar, V. (2008). The relationship between noise frequency components and physical, physiological and psychological effects of industrial workers. *Noise and Health*, *10*(40), 90. https://doi.org/10.4103/1463-1741.44347

Teixeira, F., & Arezes, P. (2015). Avaliação e caracterização da exposição ocupacional ao ruído em piscinas cobertas. *International Jounal On Working Conditions*, *9*, 161–177.

P123. Segmentation for retain at fitness centres: Contribution of service quality, expectations and satisfaction in the club

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INTRODUCTION

How segmentation helps member retention is essential to increase the organisation's profitability. Health clubs focus on understanding their members behaviour about service quality (Fernandéz et al., 2018), expectations (Robinson, 2006) and satisfaction in the club (Gonçalves et al., 2014), detecting risk members to try to repurchase (Ferrand, Robinson, & Valette, 2010). The aim of this study is to understand the type of members that retain in the fitness organisations, regarding service quality, expectations and satisfaction in the club.

METHODS

Questionnaires were applied to 850 members of fitness in Portugal, to test four dimensions: service quality, expectations, satisfaction in the club and retention (Gonçalves et al., 2014), using a 5-point Likert-type scale. Data analysis was performed using SPSS through clusters analysis's using Ward methods (Hair et al., 2005), having the dimensions as segmentation variables of service quality (α=0,911), expectations (α=0,902), satisfaction in the club (α=0,799) and retention (α=0,909).

RESULTS

It is possible to highlight 3 groups with greater differentiation between the clusters. Group 1, the new-satisfied members, have the shortest time of enrolment in the club but they have a high degree of satisfaction in the club and with service quality, greater involvement in the gym and retention. It is the youngest group, with less academic degree, predominantly female and it is the group with the highest proportion of public employees. Group 2, the loyal members, have least involvement with gym, however, the employees frequently approach this group of members and present reasonable levels of retention and expectations. This group is the most represented in the sample and with longer registration time in the club. It is a predominantly female group and stands out for being the oldest and with more academic formation. Group 3, the permanent unsatisfied members, have been for some time enrolled in the club but have low levels of involvement, expectations, retention, satisfaction with the club and a poor perception of the quality of the service. It is a group predominantly male and with a higher proportion of active professional status with a high level of schooling.

CONCLUSIONS

Results show that women are more loyal than men. This indicates that health clubs need to focus on men to increase their repurchasing possibility intentions and consequently, their retention. These specific results suggest the continuous study of these dimensions and the relation with members' segmentation and consumer behaviour in a larger number of fitness organisations.

References

Fernández, J., Ruíz, P., Gavira, J., Colón, L., Pitts, B., & García, A. (2018). The effects of service convenience and perceived quality on perceived value, satisfaction and loyalty in low-cost fitness centers. *Sport Management Review,* 21, 250-263.

Ferrand A., Robinson, L. & Valette-Florence, P. (2010) The Intention-to-Repurchase Paradox: A Case of the Health and Fitness Industry, *Journal of Sport Management*, 24 (1), pp. 83-105.

Gonçalves, C.; Biscaia, R.; Correia, A.; Diniz, A. (2014). An examination of members' intentions to recommend fitness centres. *Motriz. Journal of Physical Education*, *20*(4), 384-391.

Hair, F. J., Black C. W., Badin, N. J., Anderson, E. R., Tatham, R. L. (2005). *Multivariate Data Analysis*. New Joursey: Pearson Education Inc.

Robinson, L. (2006). Costumer expectations of sports organizations. *European Sport Management Quarterly, 6*(1), 67-84.

P124. Sport for Development Center: integrating Sport for Development and Peace initiatives in a Portuguese Sport and Leisure Higher Education Institution

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This poster focuses on the experience of the School of Sport and Leisure from the Polytechnic Institute of Viana do Castelo in the area of Sport for Development and Peace (SDP) and the launch of the Sport for Development Center (S4DP) in early 2018.

The SDP field is characterised by theoretical pluralism and can be defined as "the use of sport to exert a positive influence on public health, the socialisation of children, youths and adults, the social inclusion of the disadvantaged, the economic development of regions and states, and on fostering intercultural exchange and conflict resolution" (Lyras & Welty Peachey, 2011, p. 311).

The poster explores the theory and praxis (understood as instructed action) of the School of Sport and Leisure from the Polytechnic Institute of Viana do Castelo in the SDP terrain.

Drawing attention to the potential role that sport has to strengthen the capacity of young people to shape their future and become active citizens the poster highlights the innovations introduced. It also highlights the S4DP mission, objectives, values, strategic areas for the next biennium and the achievements so far.

References

Lyras, A., & Welty Peachey, J. (2011). Integrating sport-for-development theory and praxis. *Sport Management Review, 14*(4), 311-326. doi:https://doi.org/10.1016/j.smr.2011.05.006

P125. The sport and the national education policy

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INTRODUCTION

The sport, long past being a simple practice of competition and, currently being more notoriously a practice to improve the health and quality of life, replaced high social and economic importance. Ask yourself, however, when will the leaders and subjects of the government have the awareness of the range of sport in order to improve national education policy, and if the same leaders know what would be the best way to manage sport for obtaining a national environment of full integration between these two social elements.

METHOD

We analysed 13 documents, among them articles and political projects, according to a qualitative systematic review of the literature found on this respect. In this context, the study aims to analyse and systematise the articles about the integration between education and sport, as well as on what is or would be the role of the government for this to occur fully and satisfactorily. This study focus on finding a path on the best way to manage the sport in direct relation with the education, from primary schools to universities, as a key factor for the elaboration of a national policy capable of generating an inclusive environment of national education.

RESULTS

A total of 12 documents were analysed. 01 Ireland's national political project from year 2018 and 04 articles, 02 of them from the year 2014 and other 02 from 2002 and 2007 were in fact used. The results showed a fragile and scarce approach on a national policy of integration between sport and education, as well as the need of the subjects of this relationship, in particular the government, to actively participate in the implementation of social educational value of sport.

CONCLUSION

This study, according to the flaws found in the reviews, articles and results analysed, intends, in addition to a conclusion on the scope of the analyses, to define a strategic line relevant to the management of sport directly linked to national education policy.

References

Alves, J. A. B., & Pieranti, O. P. (2007). O estado e a formulação de uma política nacional de esporte no Brasil. *RAE Eletrônica*, *6*(1), 0–0. https://doi.org/10.1590/S1676-56482007000100002.

Dumith, S. C., Gigante, D. P., Domingues, M. R., & Kohl, H. W. (2011). Physical activity change during adolescence: A systematic review and a pooled analysis. *International Journal of Epidemiology*, *40*(3), 685–698. https://doi.org/10.1093/ije/dyq272.

Keegan, L. (2002). *Equal opportunity in education and sport*. *Gender Issues*, *20*(2–3), 61–64. https://doi.org/10.1007/s12147-002-0016-2.

Mitchell, J. (2004). The case for revolutionin school sports. *Journal of the Philosophy of Sport*, *31*(1), 64–77. https://doi.org/10.1080/00948705.2004.9714650.

Pomohaci, M., & Sopa, I. S. (2016). Study Regarding Socialization and Social Integration of Students. *Scientific Bulletin*, *21*(1). https://doi.org/10.1515/bsaft-2016-0036.

P126. Determining factors for excellence in an adapted sport: a life story study

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INTRODUCTION

Adapted sport (AS), emerged from physical activity adapted for purely therapeutic, recreational and social empowerment purposes, through the strength and longings of its athletes, has become a sporting practice with identity traits to the exceptional income being materialised in the Paralympic Games (Brittain, 2010, Howe, 2008). Despite the understanding and identification of processes, factors underlying excellence in regular sport, the knowledge about these processes is still limited in the context of adapted sport (Dehghansai, Lemez, Wattie, & Baker, 2017; Houlihan & Chapman, 2016; Wattie & Baker, 2017). Effectively, the scarce literature in this field of study shows the dimensions associated with the practice/training as possible co-responsible for the performance of excellence in AS, evidencing itself to a gap in identifying the determinants and directives underlying the acquisition, development and maintenance of excellence in this specific context (Dehghansai, et al., 2017). Thus, the objective of this exploratory study was to identify the determinants underlying the excellence in AS, based on the analysis of the life course of a Paralympic athlete.

METHODS

Our study was centred in Mário Trindade, adapted athlete in the T52 class, winner of the gold medal in the 100 meters in the European Championship IPC Berlin 2018. To accomplish it, we used the Life Histories methodology to collect the data and analyse it using the software Nvivo 11.

RESULTS

With a direct influence on performance, the primary factors associated with deliberate practice, diversification of sports practice, free practice and psychological skills were the main factors behind excellence performance in this athlete. In the same way, due to its mediating action between these variables and performance, sociocultural constraints, as well as significant people (coach and wife) were identified as important modellers in relation to acquisition development and maintenance of excellence.

CONCLUSIONS

The results of this exploratory study show that excellence in AS has underpinned the need for involvement throughout the training process in a diversity of physical sports experiences. Likewise, it is evident the need for the specific structuring and qualified technical supervision of this process. On the other hand, we also concluded that it is essential that this process is based on a multidisciplinary support structure, in order to mitigate the constraints and barriers that still exist with regard to sport for people with disabilities.

References

Brittain, I. (2010). *The Paralympic Games Explained*. New York: Routledge.

Dehghansai, N., Lemez, S., Wattie, N., & Baker, J. (2017). A systematic review of influences on development of athletes with disabilities. *Adapted physical activity quarterly, 34*(1), 72-90. doi: org/10.1123/APAQ.2016-0030

Houlihan, B., & Chapman, P. (2016). Talent identification and development in elite youth disability sport. *Sport in Society, 20*, 107-125. doi: org/10.1080/17430437.2015.1124566

Howe, P. D., Jones, C. (2006). Classification of Disabled Athletes: (Dis) Empowering the Paralympic Practice Community. *Sociology of Sport Journal 23*, 29-46. doi: org/10.1123/ssj.23.1.29

Wattie, N., & Baker, J. (2017). Why conceptualizations of talent matter: Implications for skill acquisition and TID. *The Routledge Handbook of Talent Identification and Development*. London: Routledge.

P127. Dual-task exercise for children with Autism spectrum disorders – Project Games_4_Socialization

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INTRODUCTION

Autism spectrum disorder (ASD) is a neurological disorder that is characterised by impairments in communication and social skills, and it is associated with repetitive behaviour and stereotypical movements (Dillon, Adams, Goudy, Bittner, &McNamara, 2017). Research suggests that exercise is beneficial for improving children with ASD motor coordination, balance, and flexibility. It also reduces their stereotypical behaviour and it has positive effects on socialisation and communication. (Bremer, Crozier, & Lloyd, 2016; Lang, Liu, &Ledbetter-Cho, 2018; Lourenço, Esteves, Corredeira, &Seabra, 2015; Sam, Chow, &Tong, 2015). Deficits in socialisation and communication may negatively impact children with ASD physical activity participation (Clare, Wong, Lo, So, & Chan, (2018) . Clare et al. suggested that traditional physical activities could not cater to the different interests of children with ASD. It is recommended to create game-based exercises that are tailored to the development of motor and social/communication skills. Similarly, Sutton, Webster, and Westerveld (2018) concluded that initiating and responding to peers could be challenging for children with ASD and physical activity interventions were recommended to motivate children's participation in classroom and promote social interaction Therefore, an innovative dual-task exercise program, called GAMES_4_SOCIALIZATION, was developed and implemented in this study to examine the effectiveness of the program on social and communication skills of children with ASD –.

METHODS

1. A systematic review was conducted on Web of Science and Scopus. The review inclusion criteria included the key words in (1) dual task exercise and autism; (2) exercise, socialisation and autism, and (3) exercise, communication and autism. Articles that did not describe the exercise program were excluded from the literature search.

2. Based on the literature search, the GAMES_4_SOCIALIZATION program was designed by a multidisciplinary team including paediatrics, physical educator, classroom teacher, special education therapist and parents.

RESULTS

Of the 63 articles retrieved, 12 met the inclusion criteria. The main operative principles for designing dual-task exercise programs for children with ASD are: (1) games with well-established rules that require logic thinking to motivate participation; (2) exercises that are implemented to a small group (< 5);Verbal description of other children action should be solicited and all children should have the opportunity to win or lose; (3) Circuits with different games that incorporate motor tasks; (4) sufficient variety of exercises to promote motor development; and (5) motivating participates in aliment with enjoyment and self-esteem.

GAMES_4_SOCIALIZATION
INCLUSÃO EM MEIO ESCOLAR

CONCLUSIONS

GAMES_4_SOCIALIZATION, program with a social/communicative stimulation component (dual-task program) for children with ASD, was designed and it is being applied.

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References

Bremer, E., Crozier, M., & Lloyd, M. (2016). A systematic review of the behavioural outcomes following exercise interventions for children and youth with autism spectrum disorder. *Autism*, 20(8), 899-915. doi:10.1177/1362361315616002

Clare, C. W., Wong, S. W., Lo, F. S., So, R. C., & Chan, D. F. (2018). Study protocol: a randomized controlled trial study on the effect of a game-based exercise training program on promoting physical fitness and mental health in children with autism spectrum disorder. *BMC psychiatry*, 18(1), 56. doi: 10.1186/s12888-018-1635-9

Dillon, S. R., Adams, D., Goudy, L., Bittner, M., & McNamara, S. (2017). Evaluating Exercise as evidence-based practice for individuals with autism spectrum disorder. *Frontiers in public health*, 4, 290. doi: 10.3389/fpubh.2016.00290

Lang, R., Liu, T., & Ledbetter-Cho, K. (2018). Exercise in Autism. *In Encyclopedia of Autism Spectrum Disorders* (pp. 1-6). Springer New York.

Lourenço, C., Esteves, D., Corredeira, R., & Seabra, A. (2015). The effect of a trampoline-based training program on the muscle strength of the inferior limbs and motor proficiency in children with autism spectrum disorders. *Journal of Physical Education and Sport*, *15*(3), 592. doi: 10.7752/jpes.2015.03089

Sam, K. L., Chow, B. C., & Tong, K. K. (2015). Effectiveness of exercise-based interventions for children with autism: a systematic review and meta-analysis. *Int J Learn Teach*, 1(2), 98-103. doi: 10.18178/ijlt.1.2.98-103

Sutton, B. M., Webster, A. A., & Westerveld, M. F. (2018). A systematic review of school-based interventions targeting social communication behaviors for students with autism. *Autism*, 00(0), 1-13. doi: 10.1177/1362361317753564

P128. Alexithymia and sports performance

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INTRODUCTION

Alexithymia is characterised by great difficulty in identifying and verbalising emotions (Nemiah, Sifneos 1970). In sport, most studies have applied to a population engaged in extreme sports and have highlighted reinforcement between the link of this character trait with depression and anxiety. We have investigated alexithymia in a new light by considering it as a potential psychic factor facilitating sports performance.

METHODS

This research was conducted in four phases between 2016 and 2017, witch have included 509 participants living mainly in Champagne Ardennes. All participants in Phase 1, 2, 3 responded to the Toronto Alexithymia Scale (TAS20) evaluating alexithymia, the Spielberger's STAI-Y Form B trait inventory assessing anxiety and the BECK Abbreviated Depression Inventory (Anxiety and depression influencing the outcome of the TAS), a questionnaire specifying their sports practice (type of sport, etc.) has been given to the athletes to complete in phase 2 and 3.

Phase 1: Evaluation of the prevalence of Alexithymia in a population of 253 adult students (recent figures are from 1995). Phase 2: Verification of the current theories about the link alexithymia / anxiety / depression, and compare if it relates to sports activity. Phase 3: Determination of intrinsic sport factors discriminating alexithymia. Phase 4: Prevalence of alexithymia in high-level sport and longitudinal analysis of the psychological processes observed in high-level athletes during a season.

RESULTS

Results revealed an increase of the proportion of alexithymic students with 30% against 17.1% in 1995 (Loas) $p < 0.05$ IC = (0.26, 0.34), margin of error 0.04. Phase 2 Despite the small sample, we nevertheless observe the alexithymia / anxiety link, unlike the sport / alexithymia link. According to the literature, sports participants are less depressed than the other groups $p < 0.067$. In phase 3, alexithymic athletes are 61% competing against 39% in non-alexithymic $p = 0.002$. Combat sport athletes are significantly more alexithymic than group sports athletes $p = 0.05$, $d = 0.76$ and individual sports athletes ($p = 0.04$, $d = 0.68$). Phase 4 reveals that 7 of the 8 top athletes are alexithymic. The monthly interviews were able to highlight the defence mechanisms as well as the strategies used during the competitions and the provision of a psychological follow-up with an emotion-centered therapy.

CONCLUSIONS

Competitive and even observed in high level, alexithymia is presented here as beneficial to performance, it deserves to be more in depth in future research.

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References

Collins, D., MacNamara, A., (2012). The rocky road to the top: why talent needs trauma. *Sports Medicine, 42*, 907–91

Lafollie, D. & Le Scanff, C. (2007). Détection des personnalités à risque dans les sports à sensations fortes. *L'Encéphale, 33*, 135-141.

Lane R. D, & Schwartz G. E. (1987) Levels of emotional awareness: A cognitive-developmental theory and its application to psychopathology. *American Journal of Psychiatry, 144*(2), 133-43

Loas, G., & Fremaux, D., & Marchand, M. P. (1995). Étude de la structure factorielle et de la cohérence interne de la version française de l'échelle d'alexithymie de Toronto à 20 items (TAS-20) chez un groupe de 183 sujets sains. *L'Encéphale: Revue de psychiatrie clinique biologique et thérapeutique, 21*(2), 117-122.

Hardy. L., & al (2017). Great British medalists: psychosocial biographies of Super-Elite and Elite athletes from Olympic sports. *Progress in brain research, 232*, 1-119.

Sifneos. N. (1970). Affect and fantasy in patients with psychosomatic disorders, in O.W. Hill, (dir.), *Modern Trends in Psychosomatic Medicine*, Boston, Butterworth, p. 12

Speranza M., & Atger F. (2003). Approche développementale de l'alexithymie. In: Corcos M, Speranza M, (eds.), *Psychopathologie de l'alexithymie* (p. 65-75). Paris : Dunod.

Woodman T., Michelle H., Christine Le S., & Nicolas C. (2009). Alexithymia determines the anxiety experienced in skydiving. *Journal of Affective Disorders, 116*, 134–138

P129. Motor performance of children with and without autism spectrum disorders: preliminary studies of Motor Screening

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INTRODUCTION

Autism Spectrum Disorder (ASD) is defined as a neurological disorder that, according to the Diagnostic and Statistical Manual of Mental Disorders - Fifth Edition (DSM-V), is characterised by deficits in communication and socialisation, presenting restricted and repetitive behaviours (American Psychiatric Association, 2013). Children with ASD display motor difficulties (McPhillips, Finlay, Bejerot, & Hanley, 2014), both at the level of fine motor skills (Thompson et al., 2016) and in the gross abilities (Mody, Shui, Nowinski, Golas, Ferrone, O 'Rourke & McDougle, 2017). Given the characteristics of this population, assessing motor skills is not always easy and can take some time because the instruments are extensive and sometimes difficult to apply. Therefore, the objective of this study was to understand and compare the motor performance of children with and without ASD, using a new motor triage evaluation.

METHODS

Twenty children participated in this study, 10 with ASD and 10 children without ASD who presented a typical growth development. They were both male and female and between the ages of 6 and 11 years old. All of the participants were evaluated through the motor screening assessment.

RESULTS

The expected results using the Mann-Whitney test show statistically significant differences in motor performance between the evaluated groups. This difference indicates that it will be necessary to carry out an invariance test for future validation of the instrument used for the Portuguese population. However, in this preliminary study there were statistically significant differences in balance ($p = 0.00$) and motor performance ($p = 0.02$).

CONCLUSIONS

Children with ASD have lower motor performance and balance levels compared to those typically developed. As the literature points out, future analysis should be performed to verify the consistency of the evaluation applied in the different groups.

References

American Psychiatric Association (2013). Diagnostic and statistical manual of mental disorders. 5th edition. Washington, DC: American Psychiatric Publishing.

McPhillips, M., Finlay, J., Bejerot, S. and Hanley, M. (2014). Motor Deficits in Children With Autism Spectrum Disorder: A Cross-Syndrome Study. *Autism Research*, 7(6): 664–676. Doi: 10.1002/aur.1408.

Mody,M., Shui,A., Nowinski, L., Golas, S., Ferrone, S., O'Rourke, J. & McDougle, C. (2017). Communication Deficits and the Motor System: Exploring Patterns of Associations in Autism Spectrum Disorder. *Journal of autism Development Disorders*, 47(1): 155-162. doi: 10.1007/s10803-016-2934-y.

Okuda, P., Pangelinan, M., Chiorri, C., Capellini, S. & Cogo-Moreira, H. (2018). A new motor screening assessment for children at risk for motor disorders: construct validity. *Arquivos de Neuro-Psiquiatria*, 76(2), 104-112. Doi.org/10.1590/0004-282x20170183

Thompson, A., Murphy, D., Dell'Acqua, F., Ecker, C., McAlonan, G., Howells, H., Baron-Cohen, S., Lai, M., Lombardo, M. & Catani, M. (2016). Impaired Communication Between the Motor and Somatosensory Homunculus Is Associated With Poor Manual Dexterity in Autism Spectrum Disorder. *Biological Psychiatry*, 81(3), 211-219. doi: http://dx.doi.org/10.1016/j.biopsych.2016.06.020