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ABSTRACTS

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THE MARCELLO FAINA LECTURE

Citius, altius, fortius: beneficial effects of resistance training for children and adolescents

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The motto of the Olympic Games is Citius, Altius, Fortius which is Latin for "Faster, Higher, Stronger". It is a call to all competitors, not just the elite, to engage in training strategies that enhance muscular fitness and physical prowess. Today, global health recommendations aim to increase the number of children and adolescents who participate in resistance training activities. Regular participation in a developmentally appropriate resistance training program that is purposely designed to enhance neuromuscular fitness (eg. muscular strength and power) and function (eg, agility, balance, coordination, reaction time and speed) is the foundation of physical development for all youth. A developmental approach to physical conditioning can enhance the health and fitness of youth and data indicate that young athletes who engage in multifaceted strength and conditioning programs are more resistant to sports-related injuries. A compelling body of evidence has found that resistance training can be a safe, effective, and worthwhile method of conditioning for children and adolescents if qualified instruction is available and the focus of the program is on developing resistance training skill competency. A strategy of deliberate preparation characterized by planned training and qualified instruction is needed to improve a participant's skill competency and prevent the accrual of neuromuscular deficits during the growing years. From a sports performance perspective, stronger young athletes will be better prepared to learn complex movements, master sport tactics and withstand the demands of long-term sports training and competition. New perspectives for promoting resistance exercise as part of a long-term approach to youth physical development highlight the importance of integrating resistance training into youth fitness programs. Youth who do not enhance their muscular strength and motor skill proficiency early in life may not develop the prerequisite skills and abilities that would allow them to participate in a variety of activities and sports with competence and confidence later in life. A systematic approach to physical conditioning that includes resistance training and begins during childhood is needed to attain a level of athleticism that is consistent with the Olympic motto. Concerted efforts among physical education teachers, youth coaches, and health care providers are needed to ensure that all children and adolescents are prepared for the demands of physical activity and sport.

INVITED LECTURE

Integrated policies for enhancing active lifestyles in children and adolescents: the Finnish case

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The aim of the study is to follow physical activity trends in children and adolescents in Finland with the purpose of outlining policies and actions.

On the frame of the longitudinal study, quantitative data have been collected since spring 2014 from the fifth, seventh, and ninth grades students (eleven to sixteen years old) of comprehensive schools. Along with this, the study is examining related factors such as the opportunities and venues for physical activity, the meanings of the activity, the perceptions of physical competence, the barriers to practice, the physical education at school, the sport clubs as well as other aspects related to the roles of friends, classmates, and parents. The study is carried out in connection with the data of the Health Behavior in School-aged Children (HBSC) Study. In total 3071 children and adolescents provided responses: 916 fifth graders (448 boys, 268 girls), 935 seventh graders (467 boys, 468 girls), and 951 ninth graders (455 boys, 496 girls). In the follow-up study, material will be collected at two-year intervals (2016, 2018, 2020, etc.). Every four years (2016, 2020 etc.) a broader research will be carried out involving a larger sample.

The section of the study concerning venues and facilities for sport (33.000 in Finland) is sustained by the geo-referenced database mapped through GIS-system developed since 1989. The database is part of the collaborative planning strategy—above all for planning neighbourhood sport facilities—making the planning process more transparent and open to public, private and non-governmental stakeholder organizations. The aim is to put people first instead of facilities taking account of the relationship between Habermas' world of systems (official planning) and world of experience (unofficial planning).

Physical activity among children and adolescents is at an alarmingly low level. Only one fifth of the children and adolescents self-reported to achieve the recommended weekly amount of physical activity. Physical activity was at a lower level in the higher classes suggesting that the importance to promote it during adolescence. One positive aspect is that a large majority of the young people intended to increase their physical activity in the coming years.

In order to promote physical activity there is a need for comprehensive actions extending across administrative sectors' boundaries.

This applies to decision-making and to practical measures to be implemented in municipalities, schools, homes, and sports clubs.

The intention of children and adolescents to increase their physical activity should be built upon to make it real. In drawing up measures to promote physical activity in accordance with sex, age, and current activity levels, the 'voice' of children and adolescents should be listened at an earlier stage. About half of the children and adolescents exceed the recommended 'screen time' (i.e. time spent with computers/TVs/tablets/phones) on an almost daily basis making it an important challenge. Only a small part (5 %) of the respondents fulfilled the recommendation of less than two hours of screen time per day, every day of the week. Strategies need to be found to decrease sitting and screen time. The main challenge is that young people themselves do not see a need to decrease sitting and screen time and only one third of the respondents is sure to be able to decrease screen time. Furthermore, the majority of school lessons are spent in a sitting position.

The challenge from screen time and excessive sitting implies a need for far reaching discussion, and it will be necessary to consider how screen time—and especially sitting—could be replaced by physical activity in all everyday environments.

Further researches are required on screen time and passive use of time among children and adolescents. In addition, more studies are needed on the effects of sedentariness on well-being and health.

The recommendations on screen time and sitting should be more precise as the research evidence becomes stronger.

SESSIONS

ABBREVIATION SESSION

AP ADAPTED PHYSICAL ACTIVITY
EP EXERCISE PHYSIOLOGY
HF HEALTH, FITNESS AND NUTRITION
ME BIOMOLECULAR ASPECTS OF EXERCISE AND SPORT
ML MOVEMENT LEARNING AND PSYCHOPHYSIOLOGICAL DEVELOPMENT
MS MORPHOLOGICAL SCIENCE IN EXERCISE AND SPORT
PE PHYSICAL EDUCATION AND SPORT PEDAGOGY
PO POSTURAL APPROACH TO SPORT AND EXERCISE
SB SPORT BIOMECHANICS AND TECHNOLOGY
SL MOVEMENT AND SPORT ACTIVITY IN A SOCIOECONOMIC AND LEGAL CONTEXT
SM EXERCISE, DISEASES AND SPORT MEDICINE
SP EXERCISE AND SPORT PSYCHOLOGY
TP1 TRAINING, PERFORMANCE AND EVALUATION METHODS 1
TP2 TRAINING, PERFORMANCE AND EVALUATION METHODS 2
TR TRANSLATIONAL APPROACH IN MOVEMENT SCIENCE

PRESENTATION TYPE

K KEYNOTE ORAL PRESENTATION
O ORAL PRESENTATION
P POSTER

EXERCISE PHYSIOLOGY

1 EP K
Muscle plasticity and adaptation to disuse and training

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Adult human skeletal muscles are composed of three major fiber types and their selective recruitment allows muscles to optimize their response to diverse functional tasks. The structural and functional properties of skeletal muscles, however, are not fixed but can be modified to perform new tasks or respond to new conditions. The adaptive changes of muscle fibers are induced by variations in the pattern of neural stimulation, loading conditions, availability of substrates and hormonal signals. The new functional conditions are detected by multiple sensors, ranging from membrane receptors for hormones and cytokines, to metabolic sensors, which detect high-energy phosphate concentration, oxygen and oxygen free radicals, to calcium binding proteins, which sense variations in intracellular calcium induced by nerve activity, and to load sensors located in the sarcomeric and sarcolemmal cytoskeleton. The sensors trigger signaling pathways which may ultimately lead to changes in fiber size and fiber type. Changes in fiber size, i.e. atrophy or hypertrophy, reflect an imbalance in protein turnover with either protein accumulation, leading to muscle hypertrophy, or protein loss, with consequent muscle atrophy. Changes in fiber type reflect a reprogramming of gene transcription leading to a remodeling of fiber contractile properties (slow-fast transitions) or metabolic profile (glycolytic-oxidative transitions). In addition, variations in fiber size can be accompanied by changes in myonuclei number. While myonuclei are in post mitotic state, satellite cells represent a reserve of new nuclei and can contribute to the adaptive response.

2 EP O
Gender differences in neuromuscular fatigue after 21 km run

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Aim: This study investigated possible gender differences in central and peripheral fatigue and in the rate of force development in the knee extensor muscles after 21 km run.
Methods: Ten males and eight females amateur runners (aged 25 to 50 years) were evaluated before and immediately after the "Run for Science" 21 km race. Knee extensors forces were obtained under voluntary and electrically evoked isometric contractions. Maximal voluntary isometric contraction (MVC), rate of force development (RFD), and relative RFD (i.e. RFD/MVC) were obtained. Electrically elicited twitches were recorded during MVC [interpolated twitch (IT)] and at rest [resting twitch (RT)], and the level of voluntary activation (VA) during each MVC was calculated as VA (%) = 100(1 − IT/RT). Electromechanical delays (EMD) were calculated as the difference between the onset of electromyographic activity in vastus lateralis and the onset of force production.
Results: Before the effort, men showed higher MVC, RFD, and resting twitch than women, whereas no difference in VA and relative RFD was found between groups. After the effort, changes in most neuromuscular variables were found similar between males (former values) and females (latter values), such as MVC (−14 %,–11 %, $p = 0.41$), RFD (−20 %, −11 %, $p = 0.24$), relative RFD (−1 %, −7 %, $p = 0.14$), voluntary activation (−7 %, −4 %, $p = 0.54$), and resting twitch (+ 2 %, −8 %, $p = 0.20$). The EMD showed different behaviours between genders ($p = 0.02$) since were found increased in females (+20 %) and decreased in males (−19 %).
Conclusions: Contrary to the expectation, the changes in voluntary force expressions (MVC and RFD) were found similar between genders. Central and peripheral fatigue were also found similar between genders. The greater impairment of electromechanical delay in females than in males was a novel results for this type of prolonged running. The small sample size may have limited the capacity to distinguish between groups.

3 EP O
Peripheral fatigue: partitioning the contributors during muscle contraction

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Aim: Peripheral fatigue is a phenomenon involving mechanisms that are synaptic, electrochemical and mechanical in nature. An electromyographic (EMG), mechanomyographic (MMG) and force (F) combined approach may allow the evaluation of the changes in the synaptic, electrochemical and mechanical components. Since prior investigations evaluated only the acute effects of a fatiguing protocol, the effects of fatigue on the different components during a fatiguing protocol were evaluated.
Methods: EMG, MMG and F signals were detected in the medial gastrocnemius muscle in eighteen male participants (age: 25 ± 3 yrs; body mass: 77 ± 4 kg; stature: 1.81 ± 0.06 m; mean ± SD) during a fatiguing protocol (twelve continuous stimulations at 35 Hz, 9.5 s on/0.5 s off; total time: 120 s). Stimulation (Stim), EMG, MMG and F signals were recorded during contraction. The electromechanical delay during contraction ($Delay_{TOT}$) and its three components (between Stim and EMG: Δt Stim-EMG, synaptic component; between EMG and MMG: Δt EMG-MMG, electrochemical component; and between MMG and F: Δt MMG-F, mechanical component) were calculated.
Results: Before fatigue $Delay_{TOT}$ was 22.3 ± 0.9 ms. Δt Stim-EMG, Δt EMG-MMG and Δt MMG-F contribution was 6 %, 48 % and 46 %, respectively. During fatigue, $Delay_{TOT}$ and Δt MMG-F increased significantly in the first 40 s, then remaining stable, whereas Δt Stim-EMG and Δt EMG-MMG increased until the 10th and 30th s, respectively. At the end of the fatiguing protocol, F decreased by 44 %. $Delay_{TOT}$ was 31.2 ± 1.6 ms. Δt Stim-EMG, Δt EMG-MMG and Δt MMG-F significantly changed their contribution to 5 %, 43 % and 53 %, respectively.
Conclusions: The EMG, MMG and F combined approach permitted to follow the changes in the synaptic, electrochemical and mechanical components during a fatiguing protocol.
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4 EP O
Peripheral fatigue in patients with myotonic dystrophy type 1: an EMG, MMG and force combined approach

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Aim: Clinical manifestations of myotonic dystrophy type 1 (DM1) involve myotonia and progressive muscle weakness. Moreover, an early onset and persisting muscle fatigability are often reported. The mechanisms underpinning this phenomenon are not completely clear. The assessment of the electromechanical delay during muscle contraction ($Delay_{TOT}$) can provide deeper insights on the relative contribution of the electrochemical and mechanical events to muscle fatigue at peripheral level.
Methods: $Delay_{TOT}$ components were assessed by an electromyographic (EMG), mechanomyographic (MMG), and force (F) combined approach in thirteen patients with DM1 (age: 38 ± 15 yrs; body mass: 75 ± 14 kg; stature: 1.78 ± 0.07 m; mean ± SD) and in thirteen age- and body-matched healthy controls (HC) from *tibialis anterior* muscle during electrically evoked isometric contractions. Measurements were taken before, at the end of a fatiguing protocol (50 % maximum voluntary contraction, 6 s on/4 s off, until exhaustion), and after 2, 5 and 10 min during recovery. During contraction, stimulation (Stim), EMG, MMG and F signals were

recorded. $Delay_{TOT}$ and its three components (between Stim and EMG: Δt Stim-EMG, synaptic component; between EMG and MMG: Δt EMG-MMG, electrochemical component; and between MMG and F: Δt MMG-F, mechanical component) were calculated. The peak force (pF) was also determined.
Results: No differences were found between DM1 and HC for fatiguing protocol duration. After fatigue, the reduction in pF and delays components were significantly larger in DM1 than in HC. While in HC the pF and delays components recovered within 5 min, in DM1 the pF, $Delay_{TOT}$, Δt Stim-EMG and Δt EMG-MMG did not recover.
Conclusions: The present findings suggest that the higher muscle fatigability in DM1 could be mainly related to the pathologic alterations at the synaptic and electrochemical level during muscle contraction.
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5 EP O
Muscle fatigability in type 2 diabetes

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Aim: Type 2 diabetes (T2D) is associated with high risk of developing physical disability, at least in part, related to neuromuscular dysfunction. Although the deficit in muscle strength with T2D has been well characterized, the information on the impairment in muscle fatigability is scarce and conflicting [1, 2]. With this in mind, we investigated the impact of T2D and motor nerve impairment on muscle fatigability in both upper and lower limbs.
Methods: Three groups were included (n = 15 each): sedentary patients with T2D in the first (lower) and fourth (higher) quartile of motor nerve conduction velocity (T1 and T4, respectively) and healthy control subjects (C). The distal latencies, amplitudes, and conduction velocities of the peroneal motor and sural sensory nerves were obtained by electromyography (EMG). Muscle function was evaluated measuring the maximal voluntary isometric contraction (MVIF) and the endurance time at an intensity level of 50 % of the MVIF in both upper and lower limb muscle districts.
Results: Diabetic and control groups were similar with respect to age, BMI and body composition. Upper and lower muscle strength was significantly lower in T1 than T4 and C group. Moreover, a significantly lower muscle strength was found in T4 compared with C group only at the lower limb. Muscle fatigability was significantly higher in T1 than T4 and C group in both upper and lower limb. Compared with the control group, T4 had a lower muscle endurance in both upper and lower limb.
Conclusions: T2D patients are characterized by an increase in muscle fatigability in both upper and lower limb muscles, which is further aggravated by the presence of diabetic peripheral neuropathy. However, our data suggest that factors other than motor nerve impairment play a major role in the pathogenesis of muscle fatigability in T2D.
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6 EP O
Static stretching negatively affect exercise endurance via reducing functional sympatholysis

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Aim: Exercise results in an increase in metabolism and the favorable redistribution of blood flow to the active area, by locally attenuating the vasoconstriction caused by the global increase in muscle sympathetic nerve activity, a process known as "functional sympatholysis". The recent recognition that passive leg stretching (PLS) negatively affect exercise endurance by reducing mechanical efficiency and increasing accumulation metabolism byproducts, instigates the question does PLS affect functional sympatholysis?
Methods: Therefore, in 8 healthy subjects (25 ± 3 yr) femoral artery blood flow (FBF) was measured during a time to exhaustion (85 % of maximal work rate) of a dynamic knee extension (KE) exercise. The measurement was repeated during the same exercise executed immediately after 5 min of passive leg stretching (KE+PLS).
Results: Time to limit during the KE+PLS was decreased by 26 %. Similarly FBF during KE+PLS was also reduced by the 26 %.
Conclusions: These data reveal that 5 minutes of passive leg stretching does result in a extensive reduction ∼26 % in femoral blood flow. Interestingly, the time to limit was decreased by the same extend, implicating a possible association between the reduction of functional sympatholysis and the decrease of endurance performance. This PLS-induced reduction in oxygen delivery to the exercising skeletal muscle was likely determined by mechanical, neuromuscular, and biochemical factors, but other studies are needed to extend these preliminary results.

7 EP O
Endless diving project: step 36. Successfully completed

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Aim: Endless Diving project's a complex and articulated idea moved through several progressively deeper levels and mainly aimed to determine positive and negative factors in the relationship between man and subaquatic environment.
A program tailored through the years upon an athlete's health conditions; a tight pairing of sporting achievements and scientific research. This final step has been the actual fulfillment of a promise and, but just incidentally, an incredible world record.
Materials: A no-stop underwater endurance performance, lasting 36 hours at 10 swm (33 feet), wearing a wet-suit. It took place into the

Maratea harbour waters on Sept 12th–13th, 2014. The challenge stood in not having possibilities to take a resting sleep and in some necessary feeding limitations, merely freeze-dried foods and juices to keep hydroelectrolytic balance unchanged. A spirometry has been taken at the pre- and post-dive phase, as well as basal measurements (weight, BP/HR, BT), blood and muscle samples.

Results: Where compared our pre- to post-dive findings, Francesco Colletta showed: unchanged both muscle conditions and Body Temperature (36.5 vs. 36.8) and spirometry reports as well, nevertheless there were interesting changes in some other physical, haematological and haematochemical responses to this challenging test. We registered a weight loss of 5.5 kgs, and an increase in: hepatic functional indexes, LDH (650 U/I), CK 892 (0–190 U/L), c-reactive protein (2.435 mg/dL), insulin (33.5 μUI/ml), cortisol (0.95 μg/dL), ACTH (2.6 pg/ml) and WBC count (11.200). Any value returned to its range by few days from the end of the "STEP-36" attempt, but a slight decrease in PLTs volume at 12 days (6.7 fl).

Conclusions: A well-prepared athlete and a specialized team, with expertise in the field and a careful preparation on the ground, have made possible that this new challenge to human limits can be said definitely won, and "STEP-36" as successfully completed.

TRAINING, PERFORMANCE AND EVALUATION METHODS: 1

8 TP1 K

Use of session-RPE in youth basketball training: session duration, workout typology, and tactical role effects

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Aim: Although the Borg 10-point scale modified by Foster et al. (1996) has been demonstrated to be a reliable method to assess the internal training load (ITL) in elite basketball training (Manzi et al. 2010), no studies investigated the use of this method for youth basketball players. Thus, this study aimed to evaluate youth basketball trainings, verifying the reliability of session-RPE method in relation to session duration, workout typology, and tactical role/stature.

Methods: Six male youth basketball players (age = 16.5 ± 0.5 yrs; stature = 195.5 ± 6.75 cm; weight = 93.90 ± 10.94 kg) were monitored (HR, type and duration of workouts) during 15 (66 individual) training sessions (80+26 minutes). The Edwards' HR method (Edwards, 1993) was used as reference measure of ITL; the CR-10 RPE scale was administered 30 minutes after the end of each session.

Results: High relationships between Edwards and session-RPE methods emerged for all sessions (Edwards: 192 ± 90 AU; session-RPE: 542 ± 227 AU; $r = .85$, $p < .001$), player's sessions (r range = .79-.95, $p < .001$), and tactical role/stature (small players: $r = .85$, $p < .001$; tall players: $r = .93$, $p < .001$). However, heterogeneous reliabilities were reported in terms of session duration (<80 minutes: $r = .66$, $p < .001$; >80 minutes: $r = .75$, $p < .001$), and section of tactical (0–30 %: $r = .65$, $p = .009$; 30–60 %: $r = .89$, $p < .001$) and game (0–12.5 %: $r = .88$, $p < .001$; 12.5–25 %: $r = .63$, $p = .007$) workouts over the duration of each session.

Conclusions: Findings indicated that coaches of youth basketball players can successfully use session—RPE to monitor the ITL. However, short training sessions, and the low and high presence of tactical and game workouts, respectively, seem to provide less adequate conditions for a highly reliable perception of ITL.

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9 TP1 O

The individual rate of perceived exertion: an efficient method for monitoring training intensity in runners

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Aim: Blood lactate concentration (BLC) and rating of perceived exertion (RPE) have been shown to be good markers of metabolic demand during exercise. The BLC can be anchored to intensity parameters (e.g., heart rate (HR) or running speed (S)) for runners in order to prescribe and to control training intensity. The aim of this study was to determine the agreement between intensity parameters predicted by BLC and individual rating of perceived exertion (RPE_i) in amateur runners.

Methods: Ninety-five amateur runners performed a test on a treadmill to determine intensity parameters at 2 mmol.L^{-1} (BLC_2) and 4 mmol L^{-1} (BLC_4) as tested levels (stage duration = 4'; pauses = 1' to measure BLC; speed increment = 1.5 km.h^{-1}/stage). The test started with an initial speed corresponding to the 70 % of the average speed attained during the last competition, while criterion to interrupt the test was the achievement of a BLC ≥ 4 mmol.L^{-1}. BLC, HR, S and RPE were recorded in every stage. RPE_i corresponding to BLC_2 (RPE_{i2}) and BLC_4 (RPE_{i4}) were predicted for each volunteers. Subsequently, HR (bpm) and S (km.h^{-1}) were predicted through the equation obtained from linear regression using fixed BLC and RPE_i values as independent variables. Coefficient of determination (R^2) was used to verify the goodness of fit of regressions. Bland and Altman plot was used to verify the agreement of the predicted values. Data are showed as mean ± SD.

Results: The individual regressions between BLC and RPE showed high R^2 (0.94 ± 0.065). Thus, RPE_{i2} (4.2 ± 1.0 a.u.) and RPE_{i4} (6.8 ± 1.1 a.u.) could be adequately predicted by the linear regression. The Bland and Altman showed that HR predicted by BLC_2 and RPE_{i2} (bias = −0.07 ± 0.34 bpm; CL 95 % = ± 0.7 bpm), as well as by BLC_4 and RPE_{i4} (bias = −0.5 ± 2.0 bpm; CL 95 % = ±3.9 bpm) showed excellent agreement. In the same way, S predicted by BLC_2 and RPE_{i2} (bias = −0.01 ± 0.04 km.h^{-1}; CL 95 % = ± 0.08 km.h^{-1}), as well as by BLC_4 and RPE_{i4} (bias = −0.05 ± 0.35 km.h^{-1}; CL 95 % = ± 0.69 km.h^{-1}) also showed excellent agreement.

Conclusions: RPE_i showed comparable accuracy in relation to its correspondent BLC to predict intensity parameters (HR and S). This is significant evidence since RPE correspondent to fixed BLC do not change after training period.

10 TP1 O
Agility and change of direction speed in soccer players: differences through the ages and indications for training

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Aim: The aim of this study was to examine the relationships between pre-planned change of direction speed (CODS) and reactive agility performances in soccer players of different ages.
Methods: One hundred eighty-seven players, classified in four age categories, KIDS, PRE-ADOLESCENTS, ADOLESCENTS, and ADULTS, performed three CODS and agility tests: the Modified Illinois for Change of Direction Test (MICODT), Y-planned test, and Y-reactive test Differences between Y-REAC minus Y-PLAN represent the index of reactivity (REAC-INDEX) (Hachana, 2014).
Results: Significant Pearson's correlations ($p < 0.01$), between agility and MICODT, for the three categories of young players were found, whereas no correlation was found for ADULTS. No correlation between MICODT and REAC-INDEX were found in any groups. MANOVA showed significant differences between the groups ($F3,185 = 14.591$; $p < 0.01$) in the 4 test scores: ADULTS reached the lower execution time, both in Y-REAC and REAC-INDEX, KIDS were slower in all tests($p < 0.01$). MICODS scores increased through the age groups, whereas no significant differences were found in Y-REAC scores amongst groups.
Conclusion: the main result of this study is that significant good correlations between CODS and Agility were found in young soccer players, whereas, in the adult players the very low and no significant correlation confirmed the previous findings about this topic (Young et al. 2015). Agility and CODS represent independent skills only when athletes reached the physical maturation and good soccer experience. This consideration differentiates the two skill training (Holmberg, 2009)
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11 TP1 O
Electromyographic activity of biceps brachii and brachioradialis in three different variants of curl

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Aim: Dumbbell curl (DC) and barbell curl in its two variants with straight (BC) or undulated bar (EZ) are typical exercises proposed for elbow flexors training. The aim of the present study was to verify if the execution of these three variants could induce a selective electromyographic activity concerning biceps brachii (BB) and brachioradialis (BR).
Method: Twelve resistance training experienced subjects were asked to perform one set of ten repetitions for each variant of curl. The load employed was the 65 % of one repetition maximum (1-RM) for each of the three exercises. Sets were separated by 4 minutes of rest. A PDA PocketEMG (BTS Bioengineering-Italy) was employed to collect surface EMG raw signals of biceps brachii and brachioradialis. The sampling frequency was set at 1Khz.
Results: Results showed a higher activation of both BB ($p < 0.05$) and BR ($p < 0.01$) in the EZ variant with respect to the DC one. No differences were detected between EZ and BC variants.
Discussion: and conclusion: Considering the whole range of movement EZ variant should be preferred to DC variant to enhance both BB and BR muscle activity. The small difference between BC and EZ variants concerning BB and BR muscle activity makes the choice between these two exercises a matter of subjective comfort referred to the handgrip
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12 TP1 O
Temporal expectation in swimming

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Aim: The processing of time-dependent features of movement has a crucial role in predicting whether the outcome of a complex motor sequence is consistent with its ultimate goal or results instead in an execution error (Avanzino et al., 2013; Avanzino et al., 2015). Aim of this study was to assess whether the ability in predicting the temporal outcome of sport motor actions (e.g., in swim sport) is influenced by the motor skills learnt by specific sport training.
Methods: Thirty swimmers (mean ± SD age 15 ± 2 years) and 30 control subjects (16 ± 1.2 years) were recruited for the study. The experimental session consisted of watching a video showing a swimmer doing two laps in crawl style. This video was presented on a computer screen for 36 times. Each time the video was interrupted after a variable interval from its onset by a dark window of variable duration (3, 6 and 12 s) randomized across trials. During the dark interval, subjects were asked to indicate when the subject in the video reached the poolside by clicking on any button of the laptop keyboard.
Results: The absolute value of timing error, representing the temporal prediction, was significantly lower in swimmers with respect to control group only for the 3 s-dark interval. No difference in coefficient variability and in the percentage of anticipatory responses was found between the two groups.
Conclusions: Our findings show that the ability to extract temporal patterns of a sport motor act is strongly influenced by subjective expertise, suggesting that sport acquired sensorimotor skills impact on the temporal representation of action.

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13 TP1 O
Differences between female and male young athletes in performance capacity and body composition: preliminary results from the Talent Development Project "Trentino 2020"

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Aim:s: This study aims at analyzing the differences between female (F) and male (M) young athletes that get involved in an Italian Talent Development Program which has been developed during last two years by the CONI under the scientific support of University of Verona. The athletes belonged to eight different Italian sport federations (FIPAV, FIN, FICK, FITARCO, FIH, FISG, FISO and FITRI).
Methods: We evaluated 326 female (age 12.1–19.1 years) and 124 male athletes (age 12.6–20.2 years). The difference between chronological and skeletal age (Delta_SA) and the percentage of fat mass (%FM) were considered. Furthermore, Squat Jump (SJ), Countermovement Jump (CMJ), Star Excursion Balance Test (SEBT), Sit and Reach Test (S&R), Core stability Test (Core) and 20-m sprint (20-m) performances were assessed. To verify gender differences, One-Way ANOVA test was used for parametric data, while Leven's Test for non-parametric data.
Results: The results are presented as mean ± standard deviation for M and F respectively and the statistical difference is considered for p value <.01. %FM was 9.05 ± 3.19 % and 17.42 ± 4.75 % ($p < .01$) in M and F respectively, Delta_SA 1.5 ± 1 and 1 ± 0.8 years ($p < .01$), SJ performance 4000 ± 917 and 2797 ± 641 W ($p < .01$), while CMJ performance 4262 ± 1021 and 2968 ± 660 W ($p < .01$). The 20-m were ran in 3.31 ± 0.17 and 3.6 ± 0.17 s ($p < 0.1$) while SEBT, Sit and Reach and Core Tests didn't show any difference between the groups.
Conclusions: This analysis shows that male athletes seem to have an early maturation and better performances in tests in which the strength is very relevant. When we consider neuromuscular control or flexibility this gender differences disappear.

14 TP1 O
Dynamic and static stretching in fencing motor capacity performance

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Aim: To investigate the acute effects of dynamic (DS) and static stretching (SS) in fencing. Motor capacity performance.
Methods: The first group (AG) consisted of 28 amateur male athletes (age 23 ± 1 years, weight of 73 ± 8 kg, height 175 ± 6 cm, 3 ± 1 years of training), and the second group (PG) was composed of 10 professional athletes, 8 males and 2 females (age 19 ± 6 years, weight 67 ± 7 kg, height 176 cm ± 7 and 10 ± 6 years of training). Two different warm-ups were performed, one with static stretching exercises (SS) and the other with dynamic stretching exercises (DS), seven days apart. All athletes were divided into two groups which performed the different warm-ups in the same training session. After seven days the warm-ups were inverted according to a counterbalance design.

After each warm-up, the athletes performed the following tests: the Time Lunge (TL) for the evaluation of explosive strength in technical movements, the Shuttel Time (ST) for the evaluation of explosive strength and speed in technical movements; the squat Jump (SJ) and the Counter Movement Jump (CMJ) for the measurement of vertical jumps and the Sit and Reach test (S&R) for flexibility assessment.
Results: SJ, CMJ, TL, ST and S&R performed after warm-up with dynamic stretching (DS) and static stretching (SS) showed the following significance:
AG: DS>SS, SJ, Wilcoxon Test, $p < 0.05$, +6 %; PG: DS>SS, SJ Wilcoxon Test, $p < 0.05$, +7 %; AG: DS>SS, CMJ, Wilcoxon Test, $p < 0.05$, +5 %; PG: DS>SS, CMJ Wilcoxon Test, $p < 0.05$, +6 %; AG: DS>SS, TL, Wilcoxon Test, $p < 0.05$, −13 %; PG: DS>SS, TL Wilcoxon Test, $p < 0.05$, −19 %; AG: DS>SS, ST, Wilcoxon Test, $p < 0.05$, −6; PG: DS>SS, ST Wilcoxon Test, $p < 0.05$, −5 %. AG: DS>SS, S&R, Wilcoxon Test, $p < 0.05$, +3 %.
Discussion:/conclusion: DS can improve fencing performance, in both amateur and professional athletes.

ADAPTED PHYSICAL ACTIVITY

15 AP K
No health without mental health: no mental health without physical activity

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Introduction: Mental health is defined as a condition that permits a state of optimal physical, mental and social well-being, and not merely the absence of disease". It is related to the promotion of well-being, the prevention of mental disorders, and the treatment and rehabilitation of people affected by mental disorders (WHO, 2010). Mental disorders (MD) are common in all regions of the world, affecting every community and age groups. Worldwide epidemiological studies estimated that lifetime prevalence rates of MD in adults are 12.2–48.6 %. MD are major contributors to mortality, morbidity and disability (14 % of the global burden of disease, measured in DALYs, is attributable to these disorders), cause large economic costs and are often associated with stigma and violations of human rights (WHO, 2008). Moreover, they are frequently co-morbid with many other health conditions (e.g. CVD, cancer, diabetes, HIV,

obesity, low-back pain) and injuries. Multidisciplinary approaches and collaboration among professions are essential elements to guide the process of restoration and protection/prevention of MD.

Physical activity and mental health: Scientific evidence highlights that regular participation in physical activity (PA) is associated with improved aspects of mental well-being and reduced symptoms of several mental health disorders (USDHHS, 2008). Both biological (e.g., neurotransmitters, neuromodulators, neuropeptides, neuronal growth factors) and non-biological (e.g., self-esteem, feelings of energy, enjoyment, perceptions of social supports) mechanisms may explain the effect of PA on mental health. Biddle, Fox and Boutcher (2000) summarize five reasons why PA may be an effective mental health promotion strategy: 1) PA is potentially cost-effective; 2) it is associated with minimal adverse side-effects; 3) it can be indefinitely sustained by the individuals; 4) PA may be a cost-effective alternative for those who cannot access therapy or who prefer not to use medication; 5) regardless of whether PA provides psychological benefits, it has clear physical health benefits and should therefore be promoted on this basis.

Physical activity promotion in mental health/psychiatric care centers: Despite these positive indications and the inactive, unhealthy lifestyle of a great part of patients with mental health disorders, the inclusion of PA programmes in psychiatric care settings is not a national standard in the majority of countries, and only a little number of psychiatric institutions adopt strategies to modify PA habits and behaviors of patients.

In the universities centers of Padua and Leuven (Belgium), specific PA programs are included since 30 years in Padua and 50 years in Leuven. The aim is to take care, through a multidisciplinary approach, of different psychiatric pathologies (e.g., depression, psychotic disorders, eating disorders, alcohol and drug abuse). Today there are an increasing evidence-based research in this field.

Conclusion: PA can improve the quality of life of people with mental health problems, representing an added value in the recovery of MD. Changing the lifestyle of psychiatric patients is one of the main goal in the rehabilitation process of MD. Cooperation among PA specialists and other professionals is fundamental to achieve this goal.

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16 AP O
Traditional physical education and peer-tutoring strategy in students with ID

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Aim: Youth with intellectual disabilities (ID) generally show low levels of physical activity (PA) (Frey et al. 2008). Peer support has been shown to sustain engagement in PA (Halle et al. 1999) and efficacy of peer tutoring in exercise programs has been reported among adolescents with ID (Stanish et al. 2011). This study examined the efficacy of inclusive peer tutoring (PT) versus traditional physical education (PE) lessons on PA levels and affective response in adolescents with ID.

Methods: Twenty-five adolescents with ID (mean age 17.7 ± 1.6 yrs) participated in this study. PA has been registered during 3 PE and 3 PT interventions (1-hour length) with a triaxial accelerometer (GT3X+). Total step counts, minutes spent in moderate to vigorous (MVPA) and sedentary activity (SED) have been considered. Adapted questionnaires on enjoyment during PA (PACES), on feelings and the rate of perceived exertion (RPE) were collected at the end of each lessons.

Results: During PT interventions, participants reported higher step counts ($p < .05$) and RPE ($p < .01$), and a lower time in SED ($p < .05$). No significant differences have been reported for affective response and enjoyment.

Conclusions: The PT strategy seems to sustain PA involvement of adolescents with ID during PE lessons. Inclusive model of participation for adolescents with ID may encourage exercise participation also in community settings. However, further considerations on total PA during both PE and PT lessons could be depicted.

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17 AP O
EDUFIBES project. From physical education to inclusive teaching for the identification of SEN

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Aim: The aim of this research was to involve schools, giving them scientific criteria for the identification of SEN, and enable them to experience models of inclusive education within an action research process with physical exercises that we know can help the learning process.

Method: ICF considered the totality and complexity of the functioning of the person. Personal factors are not encoded in the ICF framework, even if they are very influential in the learning process. For this reason, we considered them as key elements on which to build our research model. This model reflected the Embodied Cognitive Science, a paradigm which highlighted the significance of emotional, sensory and motoric dimensions in the individual, global development. Moreover, recent research demonstrated that Sport Education activities provide an excellent assessment framework for the identification of SEN, because physical activity is an inclusive

disciplinary area which allows students to express their personality, build relationships, express motor behaviours, etc. The research involved 2500 students of all grades of school in many regions of Italy.

Results: The data emerging by the software has been useful for the preparation of two types of courses—one for empowerment and the other for remediation—and for the preparation of a customized teaching plan, based on ICF, that considered the global dimension of the whole class, besides SEN student, and of their personal and contextual factors.

Discussion: The theme of special educational needs (SEN) and, broadly, the question of diversity, is a central value for "innovative inclusive schools", following the neurodiversity concept. Through EDUFIBES, a software produced and validated as a tool for the detection of personal factors helpful in the identification of students with special educational needs, it has been tested strategies for inclusive practices and collected input and output monitoring data.

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18 AP O

The impacts of an outdoor education program on young disabled people's peer relationships, prosocial behaviours, and personal development

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Aim: Participation in outdoor education activities as means to build paths of integration for disable people and, more in general, for socially disadvantaged groups has often been promoted in the literature and in the strategy of social interventions. However, robust evaluation of sport-based program impacts is limited. This study reports on an evaluation of a project—known as "Compagni di Cordata" ("Rope-party Mates")—implemented in 10 Italian cities with the aim to use sport as a means to support the personal development, resilience, social inclusion and peer relationships of 120 disable young people (15–30 y.)

Methods: a mixed qualitative method design was employed. Face-to-face interviews were undertaken with a purposeful sample ($n = 30$) of participants, selected to provide a diversity of age, gender and cultural backgrounds. Focus-group ($n = 5$) were undertaken with project managers ($n = 10$), activity leaders ($n = 8$) and volunteers ($n = 10$). Direct observations of the activities ($n = 10$) were undertaken in combination with a in-depth analysis of the social and cultural background in which the activities were implemented. Finally, a survey was periodically undertaken (3 times) with project managers with the aim to monitoring the correct implementation of the actions.

Results: Interviewed participants, at the end of the activities, showed significantly higher levels of other-group orientation. They reported less peer problems and higher pro-social behaviours if compared with their aptitude before the beginning of the project. These results are supported by data analysed from the focus-groups and the direct observations. Positive changes in the personal development were associated with regularity of attendance at "Compagni di Cordata" activities.

Conclusions: The study provides evidence of the effects of the project on key domains of peer and prosocial relationships and other-group orientation for disable people in the program sites studied. The impacts of such a kind of programs on the broader process of integration require further investigation.

19 AP O

Tango, physical activity and social impact: the point of view of people with visual impairment

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Aim: Recent studies (Hackney et al. 2013) about adapted program of Tango, showed an improvement quality of life in adults with visual impairment. The aim of this study was to investigate the impression of a sample of middle-age visually impaired adults, after an Adapted Tango Program (ATP).

Methods: Nine middle-age subject with visual impairment ($M = 55.5$ years $SD = 9.9$) were engaged in ATP. Training was based on basic elements of Tango. The participant's sensation was highlighted with "Biographic Interview" (BI; Bichi, 2002). The interview's tracks was analysed drawing inspiration by "Explicative Attitude" (Demazière and Dubar 2000).

Result: The "Content Analysis" of tracks of BI, comes to light some peculiars "Themes": Motor Activity (MA) and parents/relatives/friends/; MA and daily life; MA and bio-psico-social health. For the participants it seems important to make physical activity in close relationship with seeing people. Comparison of the track's "Themes" tell us that sports and motor activity are important for improving life of people with visual impairment.

Conclusion: The analysis underscore the importance of Tango, for the improvement of social activity in people with visual impairment for daily activity and social life. The analysis of themes tell us that an ATP and Physical and Sport Activity, could change the lifestyle by fighting the physical inactivity, promoting the movement and contributing to the well-being in adults with visual impairment, encouraging the inclusion.

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20 AP O

Role of adapted physical activity (APA) in people with multiple sclerosis

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Objectives: Retrospectively evaluate the effectiveness of an intervention of Adapted Physical Activity (APA) for people with multiple sclerosis (MS) who walk independently or with support, and are autonomous in changing from upright to supine position and vice versa.
Methods: Thirteen patients with MS have agreed to undergo a APA program for 10 lessons of 60 minutes, structured following AISM Guideline (10' dynamic stretching, 15' aerobic warm-up, 20' postural and resistance exercises, 5' cool-down with respiratory exercises, 10' static-passive stretching) and to perform a protocol of daily exercises at home (30' walk, 10' dynamic stretching, 10' static stretching, 5' breathing exercises). The assessment of the training effectiveness was carried out with a retrospective questionnaire (42 Items—Likert scales).
Results: Subjects reported, in the great majority (69.2 ± 100 %), improvements (medium or high) in the control of posture, gait; speed of locomotion, in joint mobility, manipulation, breathing, balance, coordination, lymphedema and in bladder control. The 76.9 % said they had adopted, after training period, a more active life style. The 84.6 % practice physical activity daily.
Discussion/conclusion: Results tend to confirm the role of Adapted Physical Activity to improve the quality of life for people with MS. They have a long life expectancy and it is important, for them and for their loved ones, to make it better as possible. It seems reasonable to hope both new researches with quantitative assessments before and after training, and a greater physicians awareness about the role of exercise.
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EXERCISE, DISEASES AND SPORT MEDICINE

21 SM K
Heart rate variability and its adaptation to postural changes in HIV cART-treated patient

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Aim: The aim of this study was to evaluate presence of an autonomic dysfunction in HIV patients compared to healthy controls and its relationships with body fat and Protease Inhibitors (PI) treatment.
Methods: Twenty-for HIV cART-treated, non-hypertensive and non-smoker patients (M/F 19/5; 48 ± 6 yrs; BMI 24 ± 4 kg/m^2) and 24 healthy controls matched for gender, age and anthropometric features (M/F 13/7; 51 ± 12 yrs; BMI 24 ± 3 kg/m^2) were recruited. Heart rate variability (HRV) indexes of parasympathetic tone in time (RMSSD, pNN50) frequency (High Frequency [HF] and Low Frequency [LF] in absolute and normalized units [nu]) domains, and a HRV index of sympathovagal balance (LF/HF ratio), and complexity (α_1DFA) were calculated in basal condition both in supine and standing position for 5 min each, by an ECG recording.
Results: In supine position HIV patients have a lower parasympathetic tone respect to healthy controls (HR: 72 ± 9 vs 64 ± 10 bpm, $p < 0.05$; LnRMSSD: 1.27 ± 0.21 vs 1.45 ± 0.25 ms, $p < 0.05$; LnpNN50: 0.47 ± 0.59 vs 0.73 ± 0.69 %, $p < 0.05$; LnHF: 1.49 ± 0.20 vs 1.56 ± 0.25 ms^2). The postural change in standing position significantly improved the α_1DFA of HIV patients (1.27 ± 0.21 vs 1.51 ± 0.15, $p < 0.05$), significantly reduced LnpNN50 (0.73 ± 0.69 vs 0.49 ± 0.63, $p < 0.05$) and improved α1DFA (1.11 ± 0.28 vs 1.27 ± 0.32) in healthy controls. LFnu and HFnu did not show significant difference in basal condition for HIV and control group, and both react significantly to the postural change. LF/HF showed an increased activation in the HIV group, with significant interaction between position and pathology ($p = 0.0476$). In supine position LnHF power significantly correlated with the superficial fat and α_1DFA significantly correlated with visceral fat. Total fat mass and trunk fat mass were significantly higher in patients taking PI.
Conclusions: HIV HAART-treated patients showed and impaired parasympathetic controls respect to healthy controls, which is more evident in the postural change. The PI-treatment was related to superficial and visceral fat, probably connected to an excess of body fat.

22 SM O
Vascular health: can we measure it with NIRS?

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Vascular impairments at the macro- and micro-circulatory level are associated with increased risk for cardiovascular disease (CVD). Flow-mediated dilation (FMD), although characterized by poor repeatability, is a commonly used noninvasive technique to assess vascular endothelial function. Recently, near-infrared spectroscopy (NIRS)-derived measures of tissue oxygen saturation (StO_2) have been used to characterize the dynamic response of local tissue perfusion to a brief period of ischemia.
Aim: The purpose of this study was to establish correlations between the reperfusion rate of StO_2 and FMD.
Methods: Ultrasound-derived FMD was quantified following 5 minutes of distal cuff occlusion of the popliteal artery in 20 healthy young men (26 ± 3 yrs). Triplicate measures of end-diastolic arterial diameter were taken every 15 seconds following cuff release and

FMD response was calculated as the greatest percent change in diameter from baseline (%FMD). StO_2 was measured using NIRS throughout the duration of each test and the reperfusion slope of StO_2 after cuff release (Slope 2 StO_2) was calculated by linear interpolation. Two consecutive FMD tests were performed separated by 30 minutes of rest and were averaged for %FMD and StO_2.
Results: In this group of young healthy individuals the %FMD was 6.7 ± 3.4 % while Slope 2 StO_2 was 1.63 ± 0.5 % s^{-1}, the coefficient of variation being 29.3 ± 13.3 % and 11.0 ± 7.8 %, respectively. %FMD was significantly correlated with Slope 2 StO_2 ($r = 0.63$, $p = 0.003$).
Conclusions: this study established a correlation between Slope 2 StO_2 and %FMD in healthy young men. The data support the notion that NIRS-derived measures of StO_2 obtained directly at the microvascular level are reflective of the microvascular reperfusion and reactivity as measured via FMD in the conduit artery. The ease of use, good reproducibility, cost-efficiency and low invasiveness of this technique make it a promising application for the assessment of vascular responsiveness and its monitoring in response to various interventions.

23 SM O
Maternal physical inactivity before pregnancy as a predictor of gestational diabetes and large for gestational age babie

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Background and aim: Physical activity before and during pregnancy has been associated with decreased risk of gestational diabetes (GDM) (Tobias DK et al, 2013). However, it is unclear whether pre-pregnancy physical exercise is associated with newborn birth weight. The aims of this study were to assess whether physical activity levels before pregnancy are associated with gestational diabetes risk and newborn weight.
Methods: In 259 pregnant women (mean ± SD: 33.2 ± 4.0 yr, 99.2 % Caucasian) maternal medical history and anthropometry, glucose tolerance (by OGTT at 15–16 and 24–28 wk and by fasting glucose at 30–32 wk) and pregnancy complications were recorded. Pre-pregnancy physical activity was evaluated by the Kaiser questionnaire. GDM diagnosis was performed by the IADPSG criteria. GDM was treated with lifestyle changes and, when necessary, with insulin therapy.
Results: GDM was found in 36 (15 %) women. After delivery, 6.6 % of the newborn were small for gestational age (SGA) and 16.4 % were large for gestational age (LGA). Logistic regression analysis showed that total physical activity before pregnancy was a predictor of GDM risk, independently of age, parity, pre-pregnancy BMI and family history of diabetes [OR (95 % CI): 0.77 (0.59–0.98), $p = 0.04$]. In addition, risk of LGA babies was predicted by maternal weight gain, pre-pregnancy physical activity and occurrence of other diseases during pregnancy, independent of age, pre-pregnancy BMI and GDM diagnosis [OR (95 % CI): 0.75 (0.58–0.97), $p = 0.03$].
Conclusions: Maternal physical activity before pregnancy is associated with reduced risks of GDM and large for gestational age babies.
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24 SM O
Exercise therapy as treatment for oncologic disease after a diagnosis of early-stage cancer: effects on lifestyle

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Aim: The asthenia is one of the symptoms of the oncological patients, that may influence their lifestyle, reducing the quality of life. The aim of this study is to reduce the asthenia, overall regard to the motivation at physical activity, performing by an eccentric-concentric weekly work-out.
Methods: After the IRB approval, 16 oncological patients: 10 group A undergone to medical therapy and 6 group B: no treatment (20–60 yrs.) were involved. Inclusion criteria: patients in neoadjuvant treatment at t_0 or at first treatment session; patients affected by a not advanced malignant lesion or "end of life" patients; motivation to treatment. All patients performed a specific training (muscles relaxation, respiratory and aerobic exercises) for 4 weeks consequently, 2 sessions/week of one hour for 2 weeks and 3 sessions/week for other 2 weeks, every session last 10 m. at low intensity for the first 2 weeks. In the other 2 weeks every session last 15 m. at a moderate intensity and concentric and eccentric exercises with rubber band and dumbbells. To evaluate the effects of this specific work-out, we administered to every patients the following questionnaires before the beginning of the work-out and after 4 weeks: ICF-check-list, Patients Heath Questionnaire (PHQ), Hospital and Anxiety Depression Scale (HADS), Functional Independence Measure (FIM), Surface Electromyography (EMG_s), Fatigue Severity Scale (FSS). The statistical analysis was conducted using a no parametric test *(Wilcoxon's Ranks: $p = 0.149$).*
Results: We noted an improvement of the physical performance in all oncological patients. At the EMG_s a relationship between the "muscle tireness" and "peripheral neuropathy by chemotherapy" was observed, but not statistical significant. The T-test was significant for the group A: HADS T1 mean 5.71 Sd 2.50 ($p \leq 0.0045$), FIM T1 mean 122.71 Sd 2.06 ($p \leq 0.0018$), FSS T1 mean 17.71 Sd 5.22 ($p \leq 0.0074$), PQ mean 4.43 Sd 2.37 ($p \leq 0.0070$).
Conclusions: Basing on our data, we think the importance of a specific workout in oncologic patients, because it reduces the asthenia and increases the physical performance permitting an improvement of the lifestyle.
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25 SM O
Effects of combined training in type 2 diabetes mellitus

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Aim: Whole body vibration (WBV) is a training methodology used both for the improvement of neuromuscular performance in healthy

subjects (Sitjà-Rabert et al., 2012) and as an instrument in the treatment of osteoporosis, sarcopenia and metabolic syndrome (Albasini et al., 2010).

The aim of the study was to investigate the effects of an intervention protocol on a sample of patients with type 2 diabetes.

Methods: A total of 24 patients (8F; 16M) aged between 46 and 76 years (M = 63) were involved in a specific 3-month program consisting of 3 one-hour sessions per week. For the case history a Personal File was used. The data relating to the parameters Body Mass Index (BMI), Maximum Oxygen Consumption (VO2max), Weight and Glycated Hemoglobin (HbA1c) were collected at T0 and at T1. The training protocol included the alternating combination of aerobic exercise and WBV.

Results: at this initial stage of data processing, the BMI and HbA1c were more sensitive to any changes. The median value of both variables decreased as follows: BMI (= 33.00; = 32.50), HbA1c (= 8.00; = 7.00). In male compared to female examinees the median value decreased by 1 point.

Conclusions: The alternating combination of aerobic exercise and WBV proved effective for the two parameters. It would be desirable in the future to increase the sample and evaluate gender differences.

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26 SM O
Effects of resistance training in peripheral artery disease treatment

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Aim: Although the Borg 10-point scale modified by Foster et al. (1996) has been demonstrated to be a reliable method to assess the internal training load (ITL) in elite basketball training (Manzi et al., 2010), no studies investigated the use of this method for youth basketball players. Thus, this study aimed to evaluate youth basketball trainings, verifying the reliability of session-RPE method in relation to session duration, workout typology, and tactical role/stature.

Methods: Six male youth basketball players (age = 16.5 ± 0.5yrs; stature = 195.5 ± 6.75 cm; weight = 93.90 ± 10.94 kg) were monitored (HR, type and duration of workouts) during 15 (66 individual) training sessions (80+26 minutes). The Edwards' HR method (Edwards, 1993) was used as reference measure of ITL; the CR-10 RPE scale was administered 30 minutes after the end of each session.

Results: High relationships between Edwards and session-RPE methods emerged for all sessions (Edwards: 192 ± 90AU; session-RPE: 542 ± 227AU; $r = .85$, $p < .001$), player's sessions (r range = .79–.95, $p < .001$), and tactical role/stature (small players: $r = .85$, $p < .001$; tall players: $r = .93$, $p < .001$). However, heterogeneous reliabilities were reported in terms of session duration (< 80 minutes: $r = .66$, $p < .001$; >80 minutes: $r = .75$, $p < .001$), and section of tactical (0–30 %: $r = .65$, $p = .009$; 30–60 %: $r = .89$, $p < .001$) and game (0–12.5 %: $r = .88$, $p < .001$; 12.5–25 %: $r = .63$, $p = .007$) workouts over the duration of each session.

Conclusions: Findings indicated that coaches of youth basketball players can successfully use session-RPE to monitor the ITL. However, short training sessions, and the low and high presence of tactical and game workouts, respectively, seem to provide less adequate conditions for a highly reliable perception of ITL.

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27 SM O
Track motorcycling: analysis of Mugello International Circuit and trauma emergencies management

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Aim: To assess risk management for riders considering the following components: motorbike, rider, circuit design and finally management of medical care in case of accidents and organization of the Medical Centre (CMO).

Methods: analysis of literature, international quality standards of medical care for track motorcycling and CMO's reports data base.

Results: Racer motorbike control was strongly improved by electronics that continuously monitors the rider-motorcycle unit road-holding. Track protection devices were also strongly improved. The modern driver needs a highly training to maintain homeostasis, strength to seat, precision in fine movements, visual perceptual special ability (field of vision rotated by 90° relative to frontal at speeds of 200 km/h). The track of Mugello circuit, used both at a competitive and amateur level, has technical difficulties of high level with slopes requiring substantial speed increases and a long straight allowing further accelerations. The circuit has high safety standards: wide escape routes at each slope, service roads bordering the circuit allow quick and effective intervention of emergency vehicles. A Standing Medical Centre assures for all races specialized medical intensive care on the track, diagnostic and therapeutic management on site and urgent transfer when needed. Circuit organization and great experience of the care team result in short intervention times: fire-fighters by outlander vehicle 16".77, first medical car 34".71, ambulance 02'48"05. The CMO is equipped with diagnosis-treatment tools for lesser and serious trauma, and the medical care staff has multi-specialist composition and receives continuous and controlled training. The number of interventions in the 2012/2013 was 626 in 211 days of assistance and in the next season the trend was similar with 600 interventions, 426 treated in CMO; trauma to the arms, prevalently the right one, were 170. In all cases of trauma the staff takes care of the patient and in case of severe trauma organizes quick and protected transfer.

Conclusions: In Mugello Circuit racers can trust on management of the medical care, essential in primary and secondary surveys and treatments of lesser or life-threatening injuries.

EXERCISE AND SPORT PSYCHOLOGY

28 EP K
The influence of affective pictures on cycle-ergometer endurance performance

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Aim: Health-behavioral research has been focused on the influence of physical activity on affect, mood, and emotion (Ekkekakis, 2013). In the current study, we examined the influence of *core affect* on cycle-ergometer endurance performance.
Methods: Participants were 10 sport science students, aged from 20 to 28 years. Core affect was randomly elicited by two sets of pictures, one positive and another negative, chosen from the International Affective Picture System (IAPS, Lang et al., 2008), during cycle-ergometer performance. In a preliminary visit, participants rated the pictures in terms of affective valence, arousal, and dominance and undertook a ventilatory threshold assessment. Afterward, pictures were shown to the participants during their performance. ECG was continuously recorded before, during, and after performance using a Bioharness (Zephyr technology), in order to assess the influence of positive and negative pictures on HRV and related parameters (e.g. HF, LF). Scores of perceived effort (Borg scale, CR-10) and ratings of arousal and hedonic tone (affect grid) were collected every minute during performance.
Results: Core affect elicited idiosyncratic responses that resulted in different performance effects. Compared to positive pictures, negative pictures had a positive effect on time spent on the cycle-ergometer mainly in unfit participants, likely because of their impact on HF parameter. In contrast, positive pictures had beneficial effects on fit participants. Furthermore, negative pictures exerted a stronger impact on hedonic valence intensity in both groups of participants.
Conclusions: In summary, positive and negative core affect was found to exert beneficial effects on cycle-ergometer endurance performance as a function of the physical fitness level.
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29 EP O
Martial Arts and Emotions

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Aim: One of the most frequent aspects about emotion is the production of some changes really visible in those who receive it; facial expressions related to emotions can be considered innate and they are used as a non-verbal language to communicate with other organisms. Usually these informations, compared to the voice, and body, are a privileged way to express emotions, because they are ductile, controllable and informative for both, the decoder and the encoder.
Method: The research was conducted by collecting 53 "frames" before performances, arising from photographic expressions captured, from February 2008 to December 2010, about Karate, Judo and Taekwondo fighting competitions. The sample consists of 106 athletes, all aged between 18 and 35 years (senior category), so broken down by gender differences: 72 males and 34 females. The study had two steps: first, plebiscitary identification of 4 most significant images that exist between the 53 frames before contest, second the presentation of the 4 selected images to two different groups, each consisting of 50 individuals.
Results: From the observation of the 4 pictures, the students recognized the emotion of Fear 62 times (39 %), followed by Joy, 48 times (30 %), by Sadness, 20 times (13 %), Anger, 18 times (11 %), Surprise, 11 times (7 %) and Disgust, 0 times (0 %).
Conclusions: In conclusion, fear and Joy are the emotions most recognized before a competition, with their particular intensity.
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30 EP O
Psychological features in different groups of athletes

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Aim: A deep understanding of psychological features related to sport in female and male athletes practicing different types of sport is useful to develop individualized programs improving the performance. The study was designed to: 1) explore gender and types of sport differences in psychological features (anger, locus of control, trait and competitive anxiety); 2) assess psychological features characterizing different field positions in soccer, since it is one of the most popular sports in Italy.
Methods: A battery of self-report questionnaires assessing psychological features related to sport were administered to: a) 156 athletes (78 males and 78 females) practicing rugby, track and field, volleyball, soccer, riding, and figure skating to assess the first aim; b) 45 male soccer players divided in forwards, midfielders, and defenders to test the second aim.
Results: Concerning the first aim, track and field athletes showed higher levels of physical anxiety compared to soccer and volleyball players; a significant interaction on this subscale emerged between gender and type of sport. Figure skating players showed lower scores of cognitive anxiety than track and field and volleyball players. Female athletes scored higher in angry reaction and temperament than males. Finally, females scored higher than males in trait anxiety, and a significant interaction between gender and type of sport emerged.

Regarding the second aim, midfielders showed more angry reactions and trait anxiety than forwards, and a more internal locus of control than defenders.

Conclusions: Consistently with literature evidence (e.g. Schaal et al., 2011), present results highlighted that different psychological features are related to gender and types of sport, as well as to positioning in soccer.

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31 EP O

Influence of acute high-intensity interval training bout on cognitive performance

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Aim: Acute bouts of exercise have an influence on cognitive function even if the exercise-cognition relation is complex. The aim of this study was to analyze the influence of an acute bout of high-intensity interval training (HIIT) on visual-spatial ability.

Methods: 36 healthy active young women (age: 22 ± 1 yr; BMI: 21 ± 2 kg/m^2) engaged in (1) a HIIT session, consisting of 4 repeated 30s Wingate against a resistance equivalent to 0.075 kg/kg body mass interspersed by 4 min of active recovery or (2) a control session, consisting of a same time period of listening to music. Both groups performed the same cognitive training. The day before and immediately after each experimental session, cognitive performance was assessed by the Paper Folding and Cutting Test (PFC)[1] and Mental Rotation Test (MS, MRT)[2,3].

Results: A significant ($p < 0.01$) decrease in mean power output and a significant ($p < 0.0001$) rise in Borg Scale were found (mean power: Bout1 397 ± 54, Bout2 379 ± 50, Bout3 331 ± 59, Bout4 324 ± 60 W; Borg Scale: Bout1 4 ± 2, Bout2 5 ± 2, Bout3 6 ± 2, Bout4 8 ± 2 RPE), detecting an increased fatigue state in the HIIT group. No significant between-group differences were observed neither in pre nor in post test. The time to complete the PFC, MS and MRT tests was significantly ($p < 0.05$) lower (pre: PFC 462 ± 184, MS 234 ± 83, MRT 239 ± 7; post: PFC 241 ± 91, MS 198 ± 51, MRT 230 ± 26 s) and the number of errors significantly ($p < 0.001$) decreased for PFC test in the post test (pre: 9 ± 3; post: 12 ± 3 n) compared with pre test.

Conclusions: The present results showed that HIIT seems to be able to improve the cognitive performance on visual-spatial ability in healthy active young women when mediated by cognitive training, hindering previous speculations that asserted exercise intensity could affect cognition in a U-shaped fashion.

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32 EP O

Muscle dysmorphia and physical activity, preliminary results of an italian multicentric study

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Aim: Muscle dysmorphia (MD) is a psychological condition classified as a body dysmorphic disorder. People with MD are generally obsessed with developing muscles, overtrain, and overuse dietary supplements (Hepworth, 2010; Ferrari and Ruberto, 2012). MD may: (1) cause risk behaviors such as the use of anabolic steroids; (2) be associated with eating disorders, and (3) result in suicide attempts (Hepworth, 2010; Leone et al., 2005). Within this picture it is necessary to analyze prevalence and signs of MD, in order to make aware healthcare providers. This process will help to early detect subjects at risk.

Method: 1668 undergraduate students were enrolled in this multicentric study, specifically n = 227 students were from Pavia; n = 510 from Napoli Parthenope; and n = 1141 from Torino. The following instruments were used: the Muscle Dysmorphic Disorder Inventory (MDDI), for the identification of MD subjects; Orto-15, for orthorexia nervosa; and the EAT-26 for eating disorders. The study is currently on course and the full results will be available for the SISMES congress.

Results: the preliminary analysis have taken into account data from 360 students (n = 227 from Pavia and n = 133 from Torino; men = 52.6 %). Subjects at risk of MD were 25 (7.0 %). The one way ANOVA showed a significant relationship between the level of physical activity (hours/week) and the score in the MDDI total ($F(1–304) = 1.492$; $p = 0.043$; $\eta 2 = 0.143$); MDDI Functional Impairment ($F(1–306) = 2.037$; $p = 0.001$; $\eta 2 = 0.185$) and MDDI Appearance Intolerance ($F(1–308) = 3.924$; $p < 0.001$; $\eta 2 = 0.302$), controlling for age, gender and BMI.

Conclusions: from the completion of the study and data analysis it will be possible to have a wider picture about the relationships between physical activity and MD in a wide sample of Italian students.

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33 EP O
Emotional feedback in physical activity improves executive functions in 5 years old children

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Aim: a) To investigate which kind of physical activity may provide motor and cognitive development in 5 y old children; b) To understand the role of scaffold and emotional feedback in improving executive functions and motor skills.
Methods: We recently studied the effect of different kinds of scaffold and feedback during physical activity in 5 y old children (110 children of 4 kindergartens in Treviso, northern Italy). Three groups of children attended a playground for 10 times, once a week, for 1 hour of training, each time, following a controlled program of structure physical activity and free play. They were tested (2 experimental groups, 1 control group), before and after the training period with tests of motor competence, physical fitness and executive functions.
Results: we found significant improvement of motor skills (balance and manuality) and of executive functions (inhibition) in children of the experimental groups only, scaffold by educator with emotional feedback.
Conclusions: The results encourage more research relative to different kinds of scaffold, emotional feedback by educators and perception of competence of children.
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34 EP O
Personological aspects in Sport Science students and Physical Education teachers

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Aim: The aim of the study is to trace the personological profile of individuals involved in Sport Science and Sport Pedagogy fields (students and teachers) in order to identify their specific personality traits.
Methods: A sample of 147 individuals (mean ± SD age: 30 ± 6.8 years, range 23–53 years, 53.7 % females and 46.3 % males) following a Master's degree in Sport Science (36.7 %) or enrolled in PE Teaching specialisation courses for Secondary School (TFA 42.9 %; PAS 20.4 %) at the Catholic University of Milan, were recruited for this study. The participants completed a socio-anagraphic questionnaire—evaluating education and experience both in school teaching and in sports context as fitness centers and sports teams—and the BFO (Big Five Observer), a questionnaire designed to investigate the main dimensions of personality (Energy/extraversion, Agreeableness, Conscientiousness, Emotional Stability, Mental Openness) through a list of 40 pairs of bipolar adjectives.
Results: The sample—comparing to general population's standardized values—shows high levels of emotional stability (T points mean 57; 58 in men) and mental openness (T higher points mean 56). Student's t-Test ($p < 0.01$) highlighted some gender differences: females presented values in conscientiousness and males in emotional stability. Instead, there were no significant differences between students and teachers about personological aspects. There was a positive correlation (Pearsons' r 0.166 $p < 0.05$) between age and energy/extraversion: this dimension growed with the years.
Conclusions: Personological aspects are often overlooked when studying the population of sport science and sport pedagogy, but it seems important to consider this information both to understand the reason of this career choice (also comparing in the future our study population with another sample, for example of human sciences) and to define appropriate training courses in sport education field.
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SPORT BIOMECHANICS AND TECHNOLOGY

35 SB K
D body centre of mass trajectory: different computational methods for the same result?

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Aim: The trajectory of the body centre of mass (BCoM) is often used to describe locomotion and estimate the mechanical work performed by muscles (W_{EXT}). The BCoM can be calculated through 2 different methods: i) double integration of ground reaction forces (GRF); ii) weighted mean of the body segments' centers of mass (kinematics) (Saibene and Minetti 2003). This study aimed to compare the 3D BCoM trajectory and W_{EXT} concurrently calculated via GRF and kinematics methods across five different gaits.
Methods: One participant performed walking, running, race walking, mono- and bi-lateral skipping on treadmill at incremental speeds. A 8-camera Vicon system sampled kinematics data at 300 Hz for 1 minute at each speed. Simultaneously a Mercury LTmed treadmill equipped with 3D force traducers recorded forces at 900 Hz. Five different markers-sets were compared: i) a single marker on C7; ii) mean of iliac spines markers (Spinae); iii) 11-segments model based on Dempster tables (18 mkr); iv) 14-segments model based on De Leva tables (DeLeva); v) Vicon Plug-in-Gait (PIG). Besides, BCoM was obtained via GRF method. A point-by-point 3D root mean square (3D-RMS) was computed between GRF and each kinematics models trajectory. W_{EXT} was calculated for each trajectory.
Results: 3D-RMS: Considering the GRF as the gold standard, C7 and Spinae showed the greatest discrepancy, whereas 18mkr and DeLeva provided the best results. PIG was in accordance to GRF only in running. The BCoM trajectory during race walking was poorly estimated regardless the markers-set employed. W_{EXT} showed the slightest discrepancies when adopting 18mkr and DeLeva models.

Conclusion: Two whole-body models (18mkr, DeLeva) allowed a satisfactory estimation of BCoM trajectories and W_{EXT} in walking, running and skipping. Besides, a single-marker model does not allow a reliable estimation of BCoM position and negatively affects W_{EXT} calculation. Race walking BCoM trajectory cannot be described by kinematics.

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36 SB O

A new, open-platform, wearable inertial measurement system for energy expenditure estimation

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Aim: Advances in technology have led to the emergence of many wearable devices for physical activity (PA) assessment and energy expenditure (EE) estimation [1]. In general, the signal processing algorithm used is proprietary and raw signals are not accessible, thus limiting the effectiveness of these systems for research purposes. Here we present a novel, open-platform wearable device that provides researchers with new tools for PA monitoring and EE estimation.
Methods: We designed and built a wearable system embedding inertial sensors, aimed at providing objective measurements of human movement. Originally conceived for the assessment of balance control abilities of elderly people [2], the device versatility makes it a valuable instrument also for PA monitoring. Raw signals can be stored on a removable memory card or sent to a remote device via Bluetooth®. We have developed software libraries for various programming languages in order for the device to be easily managed by researchers. To demonstrate the reliability of the system, a test has been made asking 10 subjects (6 females, 4 males, mean age 22.4 ± 3.1 years) to wear the system on the waist while walking for 5 minutes on a treadmill. For each subject, raw signals from the gyroscope were processed to estimate EE, while EE measured by a portable metabolic analyser (K4, Cosmed, Italy), which was considered as providing a reference value. Pearson correlation between the two measurements was computed and significance was assessed at $p < 0.05$.
Results: There is a good correlation between EE computed using the proposed device and that provided by the reference system ($r = .81$, $p = 0.005$).
Conclusions: The proposed device, which was reported as comfortable to the subjects and easy to use by the operator, allowed implementing a simple algorithm for EE estimation. Preliminary tests show a good correlation between EE calculated by the system and that measured by a portable metabolic analyser.

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37 SB O

The influence of gait variability on physical activity level in elderly women

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Aim: Variability can be considered an indirect assessment of gait stability, in particular using variability of temporal or spatial measures[1]. Physical activity (PA), such as walking, is encouraged in elderly individuals[2]. However, in our knowledge, no studies have examined the influence of gait stability on the level of PA maintained by elderly persons.
Methods: 10 healthy older women (age, 67.9 ± 2.6 yr; BMI, 26.7 ± 2.3 kg/m^2; PWS, 4.9 ± 0.3 km/h) were recruited in the study. A kinematic analysis was performed with an optoelectronic system to calculate gait variability (expressed as standard deviation (SD) and coefficient of variability (CV) of step width, step length, stance and swing time) during treadmill walking at different speeds. Principal component (PC) analysis was used as a data reduction tool; only the first PC was retained. The preferred walking speed (PWS) was measured as the time taken to walk the middle 10 m of 14 m. To assess PA, subjects wore a multisensor activity monitor for a whole week, inferring time spent in moderate to vigorous PA (MVPA >3METs). MVPA were analyzed in bouts of at least 10 consecutive minutes ($MVPA_{bouts}$) and in overall minutes ($MVPA_{tot}$).
Results: $MVPA_{bouts}$ was significantly lower than $MVPA_{tot}$ ($MVPA_{bouts}$: 54.8 ± 49.3 min/day; $MVPA_{tot}$: 113 ± 56.8 min/day; $p = 0.005$). Both $MVPA_{bouts}$ and $MVPA_{tot}$ exceeded current PA guidelines (ns, $p = 0.002$, respectively). No significant associations, adjusted for age and BMI, were identified between PCA (both SD and CV) and $MVPA_{tot}$ or $MVPA_{bouts}$ analyzed at the speed closest to the PWS.
Conclusions: The present results showed that gait stability (SD less than ± 0.01 and ± 0.02 and CV less than 3 % and 15 % for step length, stance and swing time and for step width, respectively) and a high PWS (5 km/h) seem to be able to ensure elevated level of PA in healthy older women.

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38 SB O
External mechanical work in shuttle runs over different distances (5–20 m)

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Aim: The aim of this study was to calculate external mechanical work (W_{ext}) during shuttle runs with an approach validated in the literature for walking and running (at constant speed) based on the sum of the positive increments of total energy (kinetic + potential) at each step (e. g. Saibene and Minetti 2003).
Methods: Ten healthy male team sport players were asked to perform shuttle runs (with a 180° change of direction) over distances of 5, 10, 15 and 20 m at a target speed of 15 km/h (4.16 m/s). The experiments were video-recorded (Sony, Handycam, 25 Hz) and the video were analysed with an open source software (Kinovea). The position of the hip (assumed to represent the body centre of mass, BCOM) was digitized "frame by frame"; based on these data W_{ext} was calculated.
Results: The average shuttle speed was lower than the target speed over the shorter distances (e.g. players where not able to attain the requested running speed): V_{mean} (m/s) = 2.62 ± 0.23, 3.51 ± 0.18, 3.96 ± 0.19 and 4.15 ± 0.17 (for d = 5, 10, 15 and 20 m, respectively). External mechanical work was found to increase with the distance covered: W_{ext} (J/kg) = 22.9 ± 2.3; 42.6 ± 3.7; 59.5 ± 4.9, 73.2 ± 6.4 while the work per unit of distance was essentially unaffected by it: W_{ext} (J/kg m) = 2.3 ± 0.2, 2.1 ± 0.2, 1.99 ± 0.16 and 1.83 ± 0.16 (for d = 5, 10, 15 and 20 m, respectively).
Conclusions: In shuttle running, in the investigated speed range, the work per unit of distance amounts to about 2 J/kg m; this value is larger than that calculated with the formula proposed by Zamparo et al. (2015) ($W_{ext} = 2 \cdot 1/2mv^2$, where v is the maximal shuttle speed), the more so the larger the distance: 115 %, 126 %, 158 % and 196 % (for d = 5, 10, 15 and 20 m, respectively). These differences can be attributed to the energy fluctuations at each step, which "cumulate" over the longer distances (i.e. the number of steps increases) and are taken into account in this study but not in the other.
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39 SB O
The most effective pedaling technique is not the most efficient: a theoretical demonstration

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Introduction: In cycling the index of mechanical effectiveness IE is the ratio between the tangential and total force at the pedal during a full revolution. The (metabolic) efficiency is the ratio between the metabolic power demand and the mechanical power provided. An increase in IE can be obtained with proper technique but has not been found to have a positive monotonic effect on efficiency [1]. Musculoskeletal models can be used in an attempt to gain a better understanding of the responses of the IE to changes in pedaling technique.
Aim: to study through musculoskeletal model simulations the relationship between IE and efficiency. We hypothesize that IE is not indicative of efficiency across pedaling techniques, but a limit exists beyond which IE cannot be increased without negatively affecting efficiency.
Methods: A musculoskeletal model [2] of the lower limb was adapted to simulate the movements of a cyclist pedaling at 90 rpm and 100 W on an ergometer. Firstly, an optimal control approach was used to compute the torques at the lower limb joints that replicated experimental data of the joint motions and crank torque. Second, a static optimization process in which the effort of single muscles was minimized, was used to calculate individual muscle forces. For the purpose of this study, efficiency was calculated as the ratio between the sum of the individual muscle powers and the mechanical power output.
Results: Simulation revealed that the pedaling technique that minimizes muscular contributions (efficiency) differs from the technique that minimized IE when the same mechanical power is provided. Simulation data suggest that IE and efficiency are positively related until IME_{MAX} is obtained (IME_{MAX} = 0.5 %) close to the value experimentally found for competitive cyclists [3].
Conclusion: Beyond IME_{MAX}, modifications in pedaling technique aimed at increasing IE have a negative effect on efficiency. This behavior can be explained by a mechanism which is limited by the physics of the system and not by the fact that cyclists are used to a different pedaling technique.
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40 SB O
Upper and lower body impacts during walking and nordic walking performed at different speeds and grades

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Aim: Nordic Walking (NW) has been claimed to be suitable in the rehabilitation of patients with either vertebrae (Wendlova, 2008) or

sacrum (Knobloch et al. 2007) fractures, despite little evidence is available on its effect on spine loading. Accordingly, this study compared upper and lower body impacts during NW and walking (W).

Methods: Antero-posterior (AP), medio-lateral (ML), and vertical (VT) accelerations of the 7th cervical vertebrae (Cer), sacrum (Sac), and dominant tibia (Tib), were measured by 3 tri-axial accelerometers on 21 healthy adults. The participants performed W and NW on a motorized treadmill at different speeds (60 %, 80 %, and 100 % of their preferred greatest walking speed) and grades (0 % and 7 %). Peak and root mean square (RMS) were calculated for each accelerometer axis as measures of acceleration intensity and body segments oscillation, respectively, from the average stride (i.e. 30 time-normalized strides) in each condition. The effects of locomotion type (W, NW), treadmill speed and grade were investigated through adjusted F tests performed on generalized estimating equations models, and pairwise contrasts with Holm-adjusted p values. The α level of significance was set at 0.05.

Results: Peaks and RMSs of the Sac were not affected by the locomotion type (all $p>.05$). NW resulted in higher Cer_{AP} peak and lower RMSs in Cer_{AP}, Cer_{ML}, Tib_{AP}, and Tib_{VT} ($p < .05$) when compared to W. Treadmill speed increments resulted in higher values of all the variables (all $p < .01$) except for Cer_{VT} RMS. Conversely, the highest treadmill grade reduced Cer, Sac, and Tib peaks and RMSs ($p < .05$) in all axes except for Cer_{AP} and Sac_{VT} (peak only).

Conclusions: Despite the vertical impacts on the rachis of NW and W are approximately the same, NW reduces Cer_{ML} and Cer_{AP} oscillations while exercising. Therefore, NW appears more suitable than W—especially when walking uphill—for people who may benefit from greater spinal stability.

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41 SB O
Gait analysis in water using wearable inertial magnetic sensors

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Aim: The water is an environment with unique characteristics to perform rehabilitative motor activities. Immersed in water we can take advantage of the fluid high density and viscosity to reduce the effective gravitational load on joints. Walking is one of the fundamental motor task executed during aquatic therapy (Becker 2009). Previous studies investigated relevant kinematics using waterproofed video cameras; however, the analyses were limited and this methodology requires time-consuming set-up and post-processing. The aim of the present study was to estimate the joint kinematics using wearable inertial magnetic sensors (IMMUs). Joint angle patterns of underwater walking (UW) were compared with those of the same participants in dry-land (DW) condition.

Methods: 5 healthy adults participants (28.0 ± 7.3 years, 169.6 ± 7.8 cm height, 63.6 ± 10.5 Kg mass) were acquired during UW and in DW. 8 IMMUs (Opal, APDM, 128Hz) were in waterproofed boxes and fixed to the body segments. A total amount of 170 gait cycles were normalized in time and averaged to obtain the mean cycle among participants.

Results: Lower walking speed (52.6 ± 16.7 cm/s, 144.0 ± 17.7 cm/s), longer stride duration and reduced stride distance were found in the UW with respect to the DW condition. Similar patterns but with some peculiar differences were found between the two environments due to buoyancy and different effect of velocity in water; more significant for hip flex/extension, (max 33° and 25°, min −3° and −11°) and knee flex/extension (max 65° and 57°), respectively for UW and DW.

Conclusions: The use of IMMUs allows fast set-up and data analysis, allow to acquire a high number of cycles for subject being. In the present study, for the first time, a comparison between UW and DW patterns of lower limb joint angles in the sagittal and in the frontal planes was performed using IMMUs, opening new interesting scenarios.

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BIOMOLECULAR ASPECTS OF EXERCISE AND SPORT

42 ME K
Effects of different-type sport training on human myoblast differentiation and oxidative metabolism

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Aim: We aimed to investigate the effects of different sport training on differentiation and oxidative metabolism in LHCN-M2 cells.

Methods: Human LHCN-M2 myoblast[1] were treated with serum from 6 male young subjects (20–30 yr) regularly trained (>3yr; ≥180 min/w; 3/w) in different sports: Aerobic (A; swimming, S), Anaerobic (AN; body building, B), Mixed, aerobic/anaerobic (M; volleyball, V and soccer, So); as control serum from Untrained age-matched male subjects (U) was used. LHCN-M2 cells were maintained in Growth Medium (GM) and induced to differentiation in a Differentiation Medium (DM) supplemented with 0.5 % serum from S, B, V, So or U respectively for 4-days. Myogenic differentiation and Oxidative metabolism was evaluated by MyoD (MD), Myogenin (MG), AMPKa2, PGC1a, PPARγ and TFAM mRNA expression in treated cells by RTqPCR. Creatin Kinase (CK) activity was also assayed in cellular extracts from treated cells.

Results: Significant MD and MG mRNA increase were observed in cells treated with trained sera to respect to GM or U ($p < 0.005$), highest increase in cells treated with S and B serum ($p < 0.05$) to respect to DM. Also CK activity resulted significantly up-regulated ($p < 0.005$) in trained sera treated-cells compared to GM and DM ($p < 0.05$), respectively; these results parallels the highest IGF-1

serum concentration (mean 250 ng/ml; ref. value 98–228 ng/ml) observed in all trained subjects. Similarly, the mRNAs expression of all-oxidative metabolism investigated genes resulted significantly up-regulated (from $p < 0.01$ to $p < 0.005$) in trained-sera treated cells to respect to U. Further, AMPKa2 expression resulted highest ($p < 0.05$), as expected, in S compared to B, So and V treated cells, differently TFAM expression levels resulted higher in S and B treated cells to respect to So and V.

Conclusion: Our preliminary results evidenced a different effect of training on myogenic differentiation and oxidative metabolism in human myoblast cells.

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43 ME O

Myotendinous junction plasticity: the role of muscle contractile strength

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Aim: Myotendinous junction (MTJ) is the muscle-tendon interface through which the contractile strength is transmitted between tissues. MTJ plasticity has been demonstrated following different kind of activities or pathological conditions (Curzi et al. 2015). The aim of this work is to investigate the possible role of muscle force in MTJ changes following different running protocols and the molecular pathways which could control these modifications.

Methods: The MTJs of *extensor digitorum longus* (EDL) muscles of three groups of rats have been compared: control, slow-runner (SR) and fast-runner (FR). The running speed of exercise sessions (30 min twice a day for 30 days) were respectively: 15 and 25 m/min. Optical and transmission electron microscopies have been used to evaluate MTJ changes and muscle hypertrophy (cross sectional area), while in vivo tension recordings have been used to assess muscle strength. The mRNA levels of IGF1 and TGF-β have been quantified in EDL muscle belly, while IGF1and TGF-β receptor mRNA levels have been evaluated in EDL tendons.

Results: Morphological and morphometric data confirm a proportional increase of MTJ complexity from control to FR while hypertrophy has not been displayed among groups. A muscle strength growth is revealed in running groups, in particular in FR. The mRNA analysis of muscle tissues display an increased TGF-β expression in FR, while the same analysis on tendon tissues reveal an increased level of TGF-β receptor 3 in the same group.

Conclusions: MTJ plasticity of EDL is confirmed after running protocols. In particular the MTJ complexity increase is related to muscle force increase and it appears not necessary dependent to muscle hypertrophy. The preliminary data on IGF1 and TGF-β pathways suggest a possible role of TGF-β in MTJ adaptation.

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44 ME O

Acute Walking and Nordic Walking effects on salivary dehydroepiandrosterone sulfate, adiponectin and vascular endothelium growth factor. A pilot study

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Aim: Breast cancer treatment, including surgical, pharmacological and radiant areas, has different negative effects, ranging from kinesiological to cardiovascular and metabolic fields. Therefore, during the recovery period, physical exercise has been shown important because of its polyhedric effects on health. As literature begins to report the modulator role of both dehydroepiandrosterone sulfate (DHEA-S) on adiponectin production, and of adiponectin on vascular endothelium growth factor (VEGF), aim of our study was to investigate the acute effect of aerobic activities, parified for duration and intensity, but differing on quantity of involved muscle mass, on DHEA-S, adiponectin and VEGF production.

Method: One year after surgical treatment and after a preliminary screening, 23 breast cancer survivors (BCS), under aromatase inhibitor therapy, were randomly assigned to Walking (W) or Nordic Walking (NW) workouts. Three lessons after the beginning, salive was collected at T0 (immediately before the beginning of workout), T1 (after the end of workout), T2 (one hour after the end of workout), T3 (at 11:00 p.m.) and T4 (at 7:00 a.m.) and was used to know the trend of DHEA-S, adiponectin and VEGF production until the morning following the workout.

Results: Statistical analyses showed that W and NW workouts differently affect DHEA-S, adiponectin and VEGF production. While NW elicited a continuous increase of DHEA-S, adiponectin and VEG-F production, from T0 to T4; W elicited a sinusoidal trend of them. W and NW workouts elicited also a different quantitative production of the observed hormones: a greater production was detected in NW group.

Conclusion: our results suggest that at the beginning of the training period, NW is able to expose the body, for more time, to positive effects of DHEA-S, adiponectin and VEGF than W. This result is very important for BCS because of the anabolic, immunostimulant, cardioprotective, angiogenic, and lymphogenic effects of the considered hormones.

45 ME O

Effect of long-term football training on muscle oxidative metabolism and mitochondrial biogenesis

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Aim: Long-term football training improve muscle oxidative metabolism in young healthy subjects (1). Aim of this study was to determine whether lifelong football training may affect the expression of molecular biomarkers related to oxidative metabolism and mitochondrial biogenesis in muscle of veteran football players.
Methods: Muscle biopsies from the *vastus lateralis* of 10 male Veteran Football Players (VFP; 65–75 years) and 10 healthy age-matched untrained men, control group (CG; 65–75 years) were provided by Copenhagen group. Total RNA was extracted from muscle biopsies and the expression of different molecular biomarkers: FNDC5, SIRT1, PGC1α, PPARγ, AMPKa1/a2, TFAM, NAMPT, involved in mitochondrial oxidative metabolism and biogenesis were assessed by RTqPCR; PolR2A and PPI mRNA expression were also evaluated as constitutive internal standard.
Results: Significant up-regulation, at least of 2-fold ($p < 0.05$), was observed for all-molecular markers tested in muscle from VFP with respect to CG group. Interestingly, FNDC5, a new biomarker whose expression is regulated by physical activity in human muscle and adipose tissue and associated to improvement of insulin sensitivity (2), resulted up-regulated 3-fold in muscle from VFP with respect to CG ($p < 0.005$) group.
Conclusion: Our preliminary results indicate that long-term football training improve the expression of molecular biomarkers associated to oxidative metabolism and mitochondrial biogenesis in muscle from VFP; this is in line with improvement of physical fitness and healthier body composition observed in VFP group compared to CG group (3). Multiple linear regression analyses are in progress in order to assess the association between variables analyzed.
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46 ME O
Moderate exercise improves cardiac hypertrophy in female aged mice

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Aim: Cardiac hypertrophy is a common finding in old people. Regular and moderate physical activity improves cardiac performance in elderly people. Type 5 cyclic nucleotide phosphodiesterase (PDE5) regulates intracellular cGMP levels and its increased expression has an important role in the development of cardiac hypertrophy (1). Our hypothesis is to assess if moderate exercise modulates PDE5 expression and reduces cardiac hypertrophy in old mice.
Methods: CD1 female mice were grouped in young (2 months) sedentary (YS), young trained (YE), old (18–24 months) sedentary (OS) and old trained (OE). Exercise was performed at moderate intensity (speed of 13 m/min, for 30 minutes) on tapis roulant for 5 days/week.
Results: Morphometric (left ventricular weight/tibial length ratio) and histological (cardiomyocyte size) analyses showed that cardiac hypertrophy is present in OS compared to YS and YE and significantly reduced in OE group compared to OS group. Moderate exercise also attenuated cardiac fibrosis in OE group. Molecular analysis revealed that hypertrophic markers such as ANP, BNP, GATA 4 and NKX 2.5 were significantly down-regulated in OE group. SIRT1 and PPARα, two regulators of oxidative stress and fat metabolism, were up-regulated in aged trained mice. PDE5 expression is down-regulated after exercise in OE group.
Conclusions: These results suggest that exercise leads to a beneficial effect in old mice. Interestingly PDE5 expression correlates with the anti-hypertrophic effect of training in old mice.
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47 ME O
Partial preservation of intrinsic skeletal muscle function in upper- and lower-limbs of oldest-old humans according to in vivo and in vitro evidence

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Aim: Loss of skeletal muscle mass and strength contribute to the disability and the mortality in the elderly. We investigated both *in vivo* and *in vitro* the effects of ageing and long-term disuse in 8 young (YG), 8 oldest-old mobile (OM) and 8 oldest-old immobile (OI) women upper limb (biceps BC) and lower limb (quadriceps QC) muscles.
Method: *In vivo*, maximal voluntary contraction force (MVC), force of electrically evoked twitch at rest (RT), physiological cross sectional area (PCSA) were evaluated. Muscle biopsies were taken for *in vitro* assessment of single fibres to determine cross sectional area (CSA), isometric force (Fo), tension (Po), and Myosin Heavy Chain (MyHC) isoform composition.
Results: In vivo compared to YG both the OM and OI exhibited a more pronounced loss of MVC in the lower- than the upper-limb. Tension developed in an electrically evoked twitch (RT) was well preserved in OM and OI compared to YG. Data showed an increased proportion of MyHC-2X isoform in the upper and lower-limbs of both OM and OI in comparison to the YG. CSA analysis from the lower- and upper-limb was similar across the three groups and significantly

higher in the lower-limbs compared to the upper-limbs. Isometric tension (Po) was not significantly different among the three groups.
Conclusion: Loss of muscle mass and voluntary force occurs in the oldest old women, more pronounced in the OI and in lower limb compared to upper limb muscles. Tension in electrically evoked twitch and developed by single fibers in vitro demonstrated a preservation of function in at least part of the muscle. This suggests that the decline is due to loss of muscle fibers and impaired voluntary control.
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48 ME O
Sedentary behavior in children: analysis of adiponectin expression in children

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Aim: We evaluate the effects of sedentary life style on metabolism of children affected by obesity and/or insulin resistance. In particular we focused on adiponectin, a protein hormone, analyzing serum levels of total adiponectin and its oligomeric forms in obese children with or without insulin resistance compared to control children.
Methods: 55 children were recruited from the Department of Pediatrics of the Second University of Naples, consisting of: 13 normal weight children, 23 obese children with HOMA <2.5 and 19 obese children with HOMA >2.5. We analyzed serum concentration of both total adiponectin and HMW oligomers by ELISA assay. Furthermore, to assess serum distribution of adiponectin oligomers, we used FPLC under native conditions. We collected and analyzed fractions by ELISA and Western Blotting.
Results: We found a difference in adiponectin levels between controls and obese children: there is a slight reduction in adiponectin concentration in the group of obese children with HOMA <2.5 compared to controls; on the contrary, the difference is statistical relevant considering obese children with HOMA>2.5 (p-$value < 0.05$). Similarly, HMW oligomers levels are already reduced in the group of obese children with HOMA < 2.5 compared to controls but the reduction in the group of obese children with HOMA < 2.5 is higher being statistically significant (p-$value < 0.05$). Finally, FPLC confirmed that HMW oligomers are less expressed in insulin resistance children with obesity than in controls.
Conclusion: Today, adipose tissue is considered not only as an energy storage organ but also as an endocrine organ that produces adipokines among which adiponectin, secreted at high concentrations. It is known that total adiponectin and its HMW oligomers are strongly reduced in obese adults; however, little is known about the role of adiponectin in childhood insulin-resistance and obesity. In this study, we highlighted that in insulin resistant children with obesity, total adiponectin and HMW levels strongly decrease with a correlation to insulin-resistance underling the importance of assessing the entire adiponectin oligomeric profile as an indicator of insulin resistance, obesity and sedentary behavior in children.
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POSTURAL APPROACH TO SPORT AND EXERCISE

49 PO K
Analysis of major injuries and their prevention in women's soccer

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Aim: Women's soccer is increasingly spreading worldwide with 22000 players in the last one. The aim of this study is analyze major injuries and their causing factors, particularly of the anterior cruciate ligament (ACL) in female soccer players, and of training programs in a preventive view.
Methods: Retrospective analysis of the recent literature.
Results: A survey conducted by the FMARC on 174 matches from 1999 to 2006 detected 387 injuries (average 2.2/game, versus 2.7 in men), with no significant correlation between minute of the game and injury type. Injuries involved the lower limbs (65 %), head and neck (18 %), trunk (9 %) and upper limbs (8 %). Only 30 % of injuries was due to foul play. Injuries occurred for 45 % during tackle and 55 % during the run of the ball (26–34 % in tackle for men) (Junge 2007). In the German top women soccer league, 25 % of recorded injuries was due to overload disorders unrelated to seasonal periods (Hartmut 2010). In young Danish women players (15–18 years) injuries had high incidence and were of serious type, with a clear correlation with short practice time (1 hr/week or less) (Clausen 2014). Many ACL injuries concern female athletes, with an exponential increase relative to males after puberty. In female adolescent athletes the risk of ACL injury ranges 4.4–5 %, compared to 1.7 % in males, and 70 % of ACL injuries occur in situations of non-contact (Sutton 2013).The association between increased Q angle, greater width of pelvis and of intercondylar notch is the main risk factor for ACL injury (Mohamed 2012). Over time, the presence of the mentioned favoring factors has made it necessary to define specific "Personal Neuro Muscolar Training" (PNMT) programs, like Enhance Performance Program and Sportsmetrics, that proved valuable in increasing conditional strength and speed capacity.
Conclusion: In women's soccer "injury prevention" should be a key objective through a personalized "warm up" customizing PNMT.
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50 PO O
The delayed effects of static stretching with posture maintenance for a duration of 30 seconds

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Aim: To determine the delayed effects on the flexibility of the hamstrings and the lower back muscles following a protocol of static stretching (SS), composed of 8 sets of muscle stretching lasting 30 seconds with 30 seconds rest after each set.
Methods: Sixteen participants who regularly engage in non-competitive weight training, for at least three years, were recruited and divided into the experimental group (EG) and control group (GC). The EG was composed of 6 males and 2 females (age 23 ± 3 years, height 173 ± 11 cm, weight 69 ± 10 kg). The CG also consisted of 6 males and 2 females (age 23 ± 3 years, height 173 ± 10 cm, weight 67 ± 8 kg). Their flexibility was measured using the sit and reach test with the application of a digital distance meter (GLM 150 Bosch, Germany) The EG, after following the muscle stretching protocol, had measurements taken at 3, 6, 9, 12, 15, 30, 45, 60, 90 and 120 minutes, 4, 24, 48 and 72 hours, and 7 days from the end of exercise protocol. The CG had their measurements taken at the same intervals of time without performed any exercises.
Results: Data shows an important flexibility gain after exercise (Anova, $p < 0.001$) in relation to the baseline condition. Flexibility significantly increased after 6 minutes from the end of the protocol ($p < 0.01$; + 33 %) and remained significantly higher after 9 min ($p < 0.001$; +36 %), 12 min ($p < 0.01$; +36 %), 15 min ($p < 0.001$; +34 %), 30 min ($p < 0.01$; +34 %), 45 min ($p < 0.001$; +36 %), 60 min ($p < 0.05$; +33 %) and 90 min ($p < 0.05$; +30 %) from the end of the exercise. Subsequently, no significant regressions were detected in terms of muscle flexibility.
Conclusions: A training session of static stretching consisting of 8 sets of muscle stretches up to discomfort point, significantly increases flexibility. This increase is maintained up to 7 days..

51 PO O
Effects of 12 weeks postural training con core stability, flexibility and balance in people with idiopathic scoliosis

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Aim: Adolescent idiopathic scoliosis (AIS) in one of the most complex spine deformity related to many postural and neuromuscular disease. Actually, scoliosis specific exercise is the primary conservative treatment for mild and moderate curves, in conjunction with braces for serious cases. Despite exercise-based therapy has a large diffusion, confusion still exist about kind of training and many different techniques are currently suggested (Mezieres, Souchard, Sohier, Schrot, Klapp, Seas). The aim of this study is to analyze the effect of 12 weeks training time using SEAS method (Scientific Exercises Approach for Scoliosis) on core stability, balance and flexibility in subjects with AIS.
Methods: Thirty four people with diagnosis of AIS were recruited for this study (24 females and 10 males, age between 11 and 17 years).They trained for 12 weeks, 2 times per week, 45 minutes per session following SEAS principles (active spine correction, body stabilization and flexibility). Balance Error Score System (BESS) in 3 different conditions (eyes open—EO, closed—EC, unstable—PAD), Star Excursion Balance Test (SEBT), McGill modified (MG), Sahrmann Test (SAHR), Sit and Reach (SR) and Adam Test (ADAM) were used to asses balance, core stability and flexibility pre and post training.
Results: MG significantly improved for prone ($p < 0.01$), quadruped ($p < 0.01$) and right side position ($p < 0.05$) and SAHR mean score increased from 0.7 to 2.5 ($p < 0.01$); BESS improved in 1 leg EC and PAD positions ($p < 0.01$) and EC tandem position ($p < 0.05$), SEBT scores significantly increased for all directions ($p < 0.03$) with exception of anterior right; SR final score improved from 2 to 4 cm ($p < 0.05$).
Conclusions: These findings suggest that SEAS method could be an efficient kind of training to improve postural control and mobility in people with AIS. The spine condition and neuromuscular system could be positively influenced when balance, core stability and flexibility are properly trained.
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52 PO O
Postural assessment and well-being in the workplace

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Aim: Work-related musculoskeletal disorders are found in many working areas and affect both the socio-economic and healthcare costs (Buckle *et al*., 1999) and workers' quality of life (Aldana *et al*., 1993). The purpose of this study was to evaluate the effects of an intervention protocol on a sample of workers with morpho-functional alterations detected through a postural assessment.
Methods: The survey involved 32 employees (16 F; 16 M) of the company DIESEL S.p.A.-Vicenza (Italy), aged between 25 and 37 years and divided into a control group (CG: 17 individuals) and an experimental group (EG: 15 individuals). The EG was submitted to a protocol of postural gymnastics duration of six months. For the purpose of the postural assessment, the Postural Experience program was used in times T0 and T1.
Results: For the statistical analyses, the following parameters were considered: *PFA-eyes*; *PFA-shoulders*; *PFP-SIPS*; *PS-acoustic meatus*. At T0, in the full sample, for each variable the values of the averages were greater than zero, index of non-aligned posture. At T1, the values of the averages of the CG remained unchanged, while the values of the averages of the EG decreased. Pearson's correlation coefficient was used to measure the association between variables. The results showed a significance between *bending angle* and *inclination angle* in both groups at T0 and T1, with a decrease at T1 in the EG (=0.636; =0.439).

Conclusions: the study has confirmed that the regular participation in motor activity programs represents an effective prevention and/or co-treatment method against postural alterations related to the work environment.

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53 PO O
Pilot study on the effects induced by the use of the postural shirt "Posture + shirt"

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Aim: the aim of the present pilot study was to evaluate the effect in the short time induced by a postural shirt on a group of sedentary computer professionals.

Methods: 10 subjects, mean age 37.8 ± 9.7, who are computer professionals and doesn't practice any sport activities at any level, were recruited. These subjects were evaluated on a period of 4 weeks. To make the postural evaluation was performed a test using a motion analysis system: first two data acquisition were made at the beginning of the trial period to measure the "immediate effect", last data acquisition was made at the end of the trial period.

Results: Angle α (C7-T10 and the horizontal axe), in the30 days follow up, increased, meanly, of 10.4 % ($p < 0.001$). Angle β (C7-T10 and S1-T10) decreased of 28.5 % ($p < 0.001$). To evaluate head's inclination angle γ (C7-head's center and the horizontal axe) was measured that increased, in the 30 days follow up, of 22.06 % ($p < 0.001$). VAS scales results shows an increase of the muscular fatigue at neck and a decrease at shoulders. No muscular fatigue was recorded at arms.

Conclusions: Results of this first study shows how the effect induced by the shirt causes significant modifications in sedentary subjects with poor posture.

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54 PO O
Evaluation of postural stability in a facioscapulohumeral dystrophy patient

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Aim: In Facioscapulohumeral muscular dystrophy (FSHD) ankle muscle impairment and knee, hip and abdominal weakness cause complex alterations of static and dynamic balance and increased risk of falls. No data are available on the static and dynamic balance in FSHD patients selected for clinical score.
We quantified static postural control in single stance with and without arms counterbalance in a FSHD patient.

Methods: A 21-year-old woman affected by FSHD was enrolled (Score 1 according to Lamperti et al. 2010). The subject was assessed with total-body MRI and with Delos Postural System in single stance on the ground without arms counterbalance and in different visual conditions: open (EO) and closed eyes (EC). An electronic reader (DVC Delos Vertical Controller measured the trunk inclination in the frontal (x) and the sagittal (y) plane by means of a two-dimensional accelerometer unit. The single stance test consisted of four trials of 20 s each with 15s of rest. Each leg performed a first trial with EO and a second trial with EC, in an alternate sequence of the left and the right limbs. The subject stood with the weight-bearing knee bent to 170° and the non weight-bearing knee flexed to 45°.

Results: MRI revealed abnormalities on T1-weighted sequences corresponding to marked atrophy and fatty-fibrous replacement in trapezium muscle bilaterally. Single stance left leg EO (°from zero axis) 2.1°, EC 2.4°; without using hands support to manage instability. Single stance right leg EO (°from zero axis) 0.9°, EC 7.0°; using hands support 13.9 % of the EC trial.

Conclusions: The difference between EO and EC trials quantified the visual gain and the relative visual dependence of postural stability. Results indicate the use of a precautionary strategy instead of proprioception and vestibular control in the right limb side.

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55 PO O
Postural control and balance. Effects of proprioceptive fitness training in a group of adults

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Introduction: Posture and balance adjustment are the result of the integration of different multisensory processes (Peterka, 2002). The Tonic-Postural system, through the proprioceptive reflex, ensures the immediate correction of continuous disturbances in stability. The object of this study was to evaluate the effects of proprioceptive exercises on the modification of parameters associated with stability and posture.

Methods: 12 subjects, attended pre-skiing amateur classes, were recruited in the study (5 males, 7 females), 42–55 years of age (M = 48.9, SD = 3.32). The participants completed a personal data form and subsequently underwent stabilometric analyses (in static and dynamic modes, with their eyes open and then closed), as well as Fukuda Tests. They had a proprioceptive fitness training for 6 weeks. Tests were recorded at starting point (T0) and after training (T1) and then were compared.
Results: Statistical analyses were conducted on the parameters measured by the stabilometric platform: *confidence ellipse area (S90), length of Statokinesigram (Longr), variation in speed (Var.Vit), distribution of body weight (AVG, TalG, AVD, TalD), and speed variation index (IVV)*. In order to detect significant changes between T1/ T0, we used T-test for paired samples. Results showed improvements in most parameters with a $p\text{-value} \leq 0.05$.
Discussion:s: The study confirmed the initial hypotheses: proprioceptive aspect is fundamental for stability and maintenance of the erect position of a person. We would like to underline results obtained in dynamic mode with closed eyes, to confirm the high valour of proprioceptive aspect.

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PHYSICAL EDUCATION AND SPORT PEDAGOGY

56 PE K
Contemporary issues in sport pedagogy—a discursive contribution to the field

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In an international perspective Sport Pedagogy has no common history. Different anthropological and philosophical rationales for Sport Pedagogy can be found in different countries. Additionally, the reasons for establishing Sport Pedagogy as an academic subject, as well as the point in time when it has been integrated into universities, differ quite a lot from country to country.

As far as the contents of Sport Pedagogy as a field of research and practice are concerned there are probably more commonalities than differences. There seems to be a consensus that Sport Pedagogy generally deals with learning, teaching and instruction in sport, physical education and related areas of physical activity in a life-span perspective. Within this framework a core question can be identified: How can physical activity and sport best support individual development?

Recent developments in most countries show that in order to be able to give satisfying answers to this fundamental question Sport Pedagogy has to broaden its traditional horizon and face the challenges of empirical educational research. With the turn of the new Millenium evidence-based research has come to the fore also in the so-called "soft sciences". The presentation has the following aims: (1) to give a brief and selective overview of the development of Sport Pedagogy in Germany and the USA and (2) to present some recent empirical research in the field and to show the power and implications of this kind of research.

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57 PE O
Physical education, motor development and health promotion in primary school

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Aim: Physical education in primary schools is an essential component for the development of the motor abilities and psychological and social factors of the child, as they occur significant mediating factors (Lubans et al. 2008). The recent programs of promotion and development of the physical activity in primary school, offer various methods of organization during the day and week to increase the physical activity levels (Babey et al. 2014). Aim of the study is to evaluate and compare the results of the monitoring of motor abilities, physical self-efficacy and enjoyment, in relation to differences in BMI, at the end of a program of physical education curriculum, conducted in six months.
Methods: Tests involving the standing long jump, 1 kg medicine-ball throw, 10 × 4m shuttle-run, 20 m slalom basket were administered before (T_0) and after (T_1) a 6-month intervention in 144 boys and 131 girls aged 8 to 10 years, divided into two groups, NW and Ow-Ob, in relation to the differences in BMI. Enjoyment were assessed using the Physical Activity Enjoyment Scale (PACES). Individuals' perceptions of strength, speed and agility were measured using the Perceived Physical Ability Scale for Children (PPAS_C).
Results: Apart from the descriptive statistics (M ± DS), Student's T Test was carried out, in order to highlight the significant differences within the group. The significativity index was set to $p < .05$. ANOVA 2 (T_0 vs T_1) showed significant differences in the two groups, for males and females, in motor tests and in the self-report PPAS_C. In the scale of PACES_P only males, Nw and Ow-Ob, showed differences.
Conclusions: Findings support the feasibility and efficacy of the school-based intervention for improving motor abilities, enjoyment, and perceived and actual physical abilities of children.

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58 PE O
Tripartite efficacy beliefs and individual autonomy in physical education

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Aim: The aim of the study was to examine the effect of tripartite efficacy beliefs and individual autonomy in the physical education context toward the intention to practice physical activity in the leisure time. A regular physical activity plays a crucial role in a healthy lifestyle.

Methods: Participants ($N = 250$, 143 boys and 115 girls, aged 14–15 and 18–19 years) were asked to complete a questionnaire about tripartite efficacy beliefs (individual self-efficacy, confidence in teacher's ability, and relation-inferred self-efficacy; Jackson et al., 2012), and the Autonomy and Relatedness scales of the Psychological Needs Satisfaction Scale in Physical education (Liu and Chung, 2014).

Results: Correlational results showed that the intention to practice physical activity in leisure time was positively related to all the variables. Hierarchical regression analysis was run by entering intention to practice leisure time physical activity as the dependent variable. Results showed individual self-efficacy belief and relation-inferred self-efficacy to be the main predictors. Perceived autonomy in Physical education tended to moderate this effect.

Conclusions: Findings highlight the value of perceived competence and autonomy. During the lessons, physical education teachers can strengthen pupils' self-efficacy beliefs, providing positive feedback, support, autonomy, and opportunities for choices and self-determined behaviors.

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59 PE O
Challenging values-based education through sport and PE: preliminary results from the "one resource kit for teachers" WADA-AIESEP project

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Aim: In March 2014, AIESEP members from six countries, coordinated by the University of Padua, have put together their expertise in preparing a proposal in response to the call entitled "One resource kit for teachers" promoted by the WADA, the UNESCO, the IOC, the IPC, the ICSSPE and the International Fair Play Committee. The main objectives of this project are to map curriculum requirements for values-based education (VbE) across the globe, and to develop and pilot a contemporary resource kit for teachers that supports the delivery of VbE through sport.

Methods: The project is articulated into three phases: a literature search on VbE through sport and on good practice examples; a global scan on VbE curricula using a qualitative method; the development of a resource kit for teachers for promoting the values of Respect, Inclusion and Equity. A further phase will be the review of the toolkit contents according to the feedback received from educators across the globe.

Results: The review of the literature establish a concrete foundation for VbE through sport (Kohe Camirè, 2015). Curriculum goals, requirements for VbE, barriers facing student health, and challenges related to student engagement in PE and sports were queried in the global scan. Respondents comprised 52 professionals from 36 countries; reaching all inhabited continents. Results supported the toolkit development structuring the contents on three levels according to an ecological approach: micro-(focusing on individual factors), meso-(involvement of social environmental factors such as relations with classmates, teachers, the schoolmates) and macro-level (consideration of the school in the community).

Conclusions: The toolkit has been based on a solid scientific literature that underlined how active learning strategies are effective in delivering VbE. The project challenges Partners in developing a toolkit that embraces diversities across cultures and disciplines. Nevertheless, the toolkit would inspire changes in teachers' practices on VbE across all continents.

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60 PE O
Surveillance system on schoolchildren: "cambio stile" project

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Aim: To assess in a school setting children's physical activity, sedentary time, and nutrition as fundamental factors for children health.
Methods: 183 school children (aged 8–13 years), from 5 schools of Rome, were assessed by "Cambio Stile" questionnaire designed to evaluate weekly leisure time physical activity (PA), sedentary time and eating habits. Weekly PA was assessed by the number of times spent in activities classified as mild, moderate, or strenuous in a typical week (Godin, 2011). Sedentary time was assessed by the average minutes spent in sitting during non-school times (Coombs, 2013). Children were asked how many times weekly they usually eat some foods (Vereecken, 2008).
Results: The 10.5 % of children was overfat and 4.1 % was obese. The 73.6 % showed a total weekly PA >24 units indicating an active physical habits. Only 16.3 % had a sedentary time higher than 2 hours/day. The 80.4 % regularly eat breakfast every day and only the 5.7 % skipped it. Children do not had an everyday fruits (52.1 %) and vegetable's (31.4 %) consumption.
Conclusion: Compared to national surveillance "*OKkio alla Salute*" (7–9 yrs), our children showed better PA level and lower sedentary habits. However, nutritional habits (fruit/vegetable consumption) were worse indicating that educational intervention is needed also in a multidisciplinary approach to improve children's lifestyle.
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61 PE O
The opinion of the students of Sport Sciences (UNITO-UNIVR) on Physical Education

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Aim: Physical Education (PE) is one of the main actors of Italian physical activity promotion model but the whole results of this model are disappointing. The aim of the search is to study the role that students of Sport Sciences courses attribute to PE in order the adoption of their lifestyle.
Methods: The research was carried out with 396 students of the first year of Sport Sciences Bachelor in the Universities of Torino (250) and Verona (146). The opinions about PE and on the role it played in determining their active lifestyles was studied through a questionnaires (Nuviala, 2011—integrated). Body mass index (BMI), physical activity (IPAQ), Sitting Total Minutes/week (ST), Physical Self-efficacy perception (PSE), Votes in PE (VPE) and assessment obtained at Baccalaureate examination (BE) are been detected in order to characterize the population.
Results: Gender distribution of Males (M) and Females (F) isn't equal (M = 72.3 %; F = 27.7 %). M and F present the same value in age (20.9 ± 2.61 years), IPAQ (6297.8 ± 3485.3 MET/1'/w), ST (329.6 ± 135.1 min.) and VPE (9.04 ± 0.78). Males show higher values in BMI (M = 22.7 ± 2.3; F = 20.6 ± 2.19; $p < 0.001$) and in PSE (M = 45.1 ± 6.3; F = 41.5 ± 6.4; $p < 0.001$). On the other hand females show better evaluation in BE (F = 76.5 ± 9.3; M = 71.0 ± 8.4; $p < 0.001$).
Majority of students has a good opinion of PE as they consider fun (93.9 %) and important for their development (91.9 %). Almost totality declare that they will be active in the next years (98.7 %). The 81.7 % sustain that the PE time was well used and the same percentage (M = 81.6 %; F = 76.5 %; $p < 0.05$), consider useful for their future what he/she has learned in PE lessons. The 72.0 % think that PE teachers helped them to practice physical activity outside the school and 70 % (M = 75.1 %, F = 57.8 %; $p < 0.01$) argues that PE favored their sport in daily life.
Conclusions: The students of Sport Sciences Bachelor have a good opinion of their previous experience in PE courses. Comparisons with others data relating to the general population can check the differences and possible causes. Further research will investigate the follow-up at the end of University courses.
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62 PE O
The educational role of the game: a pilot study through a motor-narrative method

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Aim: We propose an innovative motor-narrative method that uses the game as a tool to encourage in children the performance of motor activity.
Methods: For the present research 30 children aging 5–6 years from the Elementary School "A. Diaz-A. Manzoni "of Catania.
The motor-narrative method was divided in 20 seminars, divided into Didactic Motor Unit (DMU). Each child had to perform a motor acto (a vertical jump) evoked through images reproduced on panels 40 × 50, from nursery rhymes, fairy tales and accompanied by songs. The DMU are performed in constant liaison with the daily work of teachers.

It was developed an observation form and specific assessment containing six areas of learning (the body and the sense-perceptual functions; the movement of the body and its relation to space and

time; body language as communicative-mode expressive, the game, the sport, the rules and fair play, safety and prevention, health and wellness; Cognitive skills) and were examined 72 goals.
Results: The data collected in the initial checks show that 80 % of children who took part in the research have limited skills in basic motor skills, speech and especially inadequate behavior.
The findings in the final test showed significant improvements in all areas of learning, 55 of the 72 goals set have been achieved by the entire sample examined.

The nature of the game and the rules have reported 78 % of the positive result in the sample of pupils.
Conclusions: The positive results obtained from the performance of the project will enable us to forecast the effectiveness of actions taken stressing their important effect teaching especially as regards the promotion and development of practices and recreational motor of social coexistence.

SATURDAY POSTER SESSION TRAINING, PERFORMANCE AND EVALUATION METHODS

63 TP P
Core stability training and physical perfor mance in female football players compe: a longitudinal study

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Aim: To verify whether core stability training with two different physical training methods might improve body balance in an upright position, lower limbs explosive strength and stiffness.
Methods: Fifteen national-level female footballers were studied over a period of ten weeks. They were divided into two groups: the Unstable Surface Group (USG: 8 athletes aged 20 ± 3 years old, weight 57 ± 7 kg, height 163 ± 7 cm) and the Elastic Band Group (EBG: (7 athletes aged 18 ± 2 years old, weight 58 ± 7 kg, height 168 ± 4 cm). The USG performed a protocol of exercises on unstable surfaces, while the EBG did exercises with elastic bands. Both groups followed their respective programmes twice a week.
Girls were tested at the beginning of the study, after 5 weeks and finally after 10 weeks from the starting period, using the following devices: (monopidalic) positions in order to evaluate the ability to manage imbalance countermovement jump, CMJ; CMJ with arms free).
Results: Both groups improved balance. However, in the USG this improvement was detected after 5 weeks in reference to the two-footed (bipodalic) position (T0vsT1, Anova $p < 0.05$; post hoc $p < 0.05$, −16 %), while in the EBG after 10 weeks in reference to the two-footed (bipodalic) position (T0vsT2, Anova $p \leq 0.05$; Post hoc $p < 0.05$, −19 %) and in the left one-footed (monopidalic) position (T0vsT2, Anova $p < 0.05$; Post hoc $p < 0.05$, −18 %). Moreover, in the EBG, an improvement in the squat jump was also detected (T0vsT2, Anova $p \leq 0.05$; Post hoc $p < 0.05$, +7 %).
Conclusion: Five weeks of training following a core stability protocol on unstable surfaces with twice-weekly sessions can improve balance. In addition, it has been shown that 10 weeks of resistance training, performing exercises with an elastic band twice a week, can improve body balance and explosive strength performance.

64 TP P
Evaluation of external workload in female futsal players

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Aim: Match analysis technology has been largely used in football, but there is limited literature on its use on futsal. Despite its increased popularity, the female futsal game model has never been quantified. The aim of this study was quantify locomotors and mechanical activities performed during a non-competitive female futsal match, measuring the differences between first and second half.
Methods: Sixteen female futsal players of Italian 2nd division were enrolled (age 27 ± 5 years, height 1.65 ± 0.09 m, body weight 56.9 ± 7.7 kg, BMI 20.9 ± 1.9, fat mass 21.5 ± 2.9 %). Locomotors and mechanical activities were recorded by means of 10 Hz GPS StatSports system. Games were performed on 38 × 18 m synthetic grass outdoor pitch.
Results: Significant differences were found between first and second half in total distance (1424 ± 114 and 1313 ± 113 m, $p < 0.05$), relative velocity (70 ± 6 and 64 ± 6 m min^{-1}, $p < 0.05$), high speed running (28 ± 16 and 22 ± 19 m, $p < 0.05$) and high metabolic distance (80 ± 29 and 69 ± 28 m, $p < 0.05$).
Conclusions: The match analysis of female futsal matches gives useful information about its external load demands. Female futsal players decreased the workload in second half compared to first one during this non-competitive match. It's show that fatigue impairs performance in second part of game. Coaches and physical trainers could take useful information for design training programs taking in account the quantification of locomotors and mechanical activities performed in this study.

65 TP P
The Scouting project of the Italian Basketball Federation for female talent selection

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Aim: Since the early 2000s, the scouting project "Centri Tecnici Federali" (CTF) has represented the largest program for female talent selection of the Italian Basketball Federation, Federazione Italiana Pallacanestro (FIP). The aim of this study was to measure the influence of CTF on players' selection for the Italian National team between 2007 and 2014.
Methods: For this study, 1517 athletes born between 1992 and 2001 were selected. A longitudinal analysis was carried out on their national and international careers, starting with information collected during the CTF scouting (14.39 ± 0.55 y-o). The data was analyzed based on: age,

height, duration of CTF selection, duration of transition period between CTF and professional career (PRO), and number of seasons spent in the national championship. Differences between groups were assessed with Chi Square and Student T-test (significant differences were found $P < 0.05$). Results were expressed as percentages, means and SD.
Results: The results show that 50 % of the athletes reached a national level (NL) championship and 6 % reached an international level (IL). Significant differences emerged for every parameter, except for the duration of transition period between CTF and PRO. It is also interesting to note that 90 % of the players U22 recruited on the national team in the summer of 2014 have had previous experience with CTF scouting.
Conclusion: Beyond strong physical development (1), our study shows how other factors, such as the relevant social context or how old the athlete was when she was scouted, can have a significant effect on the development of a talented athlete. In conclusion, our results confirm the importance of CTF for Italian female basketball players for their national and international career.
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66 TP P
Morpho-functional asymmetries in fencing athletes

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Aim: Investigate, in a asymmetrical sport such as fencing, the differences (right vs. left) of the muscular strength and flexibility of the lower limbs, the body balance, the proprioceptive control and isometric strength of the hands flexors, in a group of fencing athletes.
Methods: Were studied 17 fencing athletes, 9 male and 8 female, all with right guard (age 15 ± 3 years, weight 58 ± 12 kg, height 168 ± 11 cm, who trained by 6 ± 3 years). The functional evaluation were: Baropodometric and stabilometric platform (P-Walk, BTS, Italy). Gate cycle (G-Walk, BTS, Italy). Hamstring flexibility and length of the lower limb (GetMyRom for Iphone 5s, USA). Proprioceptive platform control (Easy Tech, Firenze, Italia) Hand grip test (Baseline 300 lb ER digital LCD dynamometer USA). Maximal voluntary contraction of quadriceps with dynamometric platform (Globus Italia).
Results: The analyzed data (Wilcoxon test) showed a statistically significant change (right vs. left) of the following variables: 1) hamstring flexibility ($p < 0.05$, +7 %). 2) Hand grip test ($p < 0.05$, +9 %). The proprioceptive control test ($p < 0.05$, +31 %).
Conclusions: It is highlighted the importance of preventive activity of compensation (right vs left) in order to reduce the possible injuries from overusing muscles and joints.

67 TP P
Effects of whole-body cryotherapy on sit and reach amplitude in healthy women

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Aim: A decrease in neural activation of the muscle has been linked with a greater range of motion (ROM). The application of cold agents could be reduce neural activation (1, 2). Whole-body cryotherapy (WBC) consists of the exposure of the human body to extremely low temperature (below −110 ***°C) for a short period of time. The aim of the present study was to evaluate if a single session and ten sessions of WBC would increase ROM.
Methods: 90 women were recruited for this study. They were divided into two groups (control and experimental). After the initial sit-and-reach test, experimental group performed a 150 s session of WBC, whereas the control group performed the same movements (standing rotation) in a temperature-controlled room. Immediately after, both groups performed another sit-and-reach test. 30 of these subjects were also divided into other two subgroups: experimental performed ten 150 s sessions of WBC and immediately before and after the tenth session they performed another sit-and-reach test; control performed another sit-and-reach at the tenth day of the study.
Results: Experimental groups improved sit-and-reach amplitude to a greater extend than the control group, both after one single WBC session (p 0.001) than after ten consecutive WBC sessions ($p < 0.05$).
Conclusions: The results of the present study support the hypothesis that ROM is increased immediately after a single session of WBC. ROM remains increased also after ten consecutive WBC sessions. This is of practical value for practitioners working with clients aiming to increase ROM.
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68 TP P
Relationship between muscle power and speed in elite swimmers

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Aim: The swimming speed depends of several factors; such as the drag, the efficiency and the power output. Several studies demonstrated strong relationships between upper body strength and sprint swimming (Sharp 1982). Literature reported positive effects of dry land training on swimming (Costill 1999). In this paper we reported the data of Italian National front crawl swimmers inspected during the preparation phase (one month before) of the Italian National Championships 2015. The purpose of this study was to investigate the relationship between the muscular power measured in dry land tests and the maximal velocity obtained during the competition.
Methods: Have been investigated 7 male athletes (23.4 ± 3.2 years) all participants to the final of the 100 m front crawl. The power values expressed in two exercises were measured: bench-pull (pull) and bench-press (push). These exercise were performed with weight barbell during one maximum speed lift and repeated for six incremental steps of 5kg. Therefore, the maximum muscular power was calculated. The swimming speed was obtained from the official reports.
Results: The average value of pull muscle power was 571.4 ± 91.8 W and push power was 509.4 ± 92.0 W. Each relationship between speed/pull ($r = 0.86$) and speed/push ($r = 0.77$) were significant ($p < 0.05$).
Conclusions: The relationship found between the tests carried out dry and the performances of the Italian Championships shows that muscle strength plays a particularly important role in the swimming sprint events. The proposed protocol for assessed the swimming muscle power is a good estimator of the sprint performance.
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69 TP P
Specifically designed and professionally guided training improve joint mobility/muscular chain elasticity and motor coordination in 9–11 years school children

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Aim: physically active children have lower risk of injuries as adults. The aim of this work was to study whether joint mobility/muscular elasticity and coordination could be significantly improved by a specifically-designed and professionally-guided program, or they merely depend on active lifestyles.
Methods: A cohort of 277 children (aged 9–11 years) was single-blind tested for specific functional and anthropometric parameters. A specifically designed physical education program was administered to 148 children, randomly selected, while the remaining 129 children (control group) continued the general physical activity program.
Results: The specific program generated a significant improvement of joint mobility and coordination abilities as compared to non-specific physical activity, pointing out differences based on gender and BMI. Indeed, females responded to a low intensity program, whereas males needed higher intensity programs, particularly when belonging to overweight/obese BMI classes.
Conclusion: Specifically designed programs based on demographic and anthropometric data should be preferred by the decision-makers in the area of physical exercise for primary school children.

70 TP P
Plyometric method compared to acute and chronic effects of training on the performance in young athletes of rhythmic gymnastics

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Aim: The technical content of a sport such as rhythmic gymnastics, where the Code of Points requires the execution of the jump with an elevation sufficient to achieve the corresponding shape in which the jump reaches a defined and fixed shape during flight, strength, particularly in its expression explosive-reactive and ballistic.
Methods: Pilot study, 10 gymnasts, aged 12 and 15 years, randomly Case Group (5 units) and control Group (5 units), subjects with same background athletic discipline of (±7 years). Kinovea and Golden Ratio.
Results: TBF is of ±3.6 cm CG. FS present initial slight decrease of ±3.6°, with a subsequent recovery of ±2.2° during output test. SS is increase ±8.2° to the right side and ±8.8° to the left side. CG improved TBF was not significant regards Splits, we note FS decrease of ±9.8°, and the RSS ±10.4°. Different situation LSS, that increase ±13.6°. JRT IG increase ±2.4 cm, SG instead, is not subjected to conditioning, we see a decrease average of ±2.2 cm. Zanon's PET, increase ±5.2 cm for the IG, while for SG they are not occurred particular improvements, but a decrease of ±2.2 cm. Analyzing the GR diff., in the Snip flexed, CG does not present a particular improvement (±3.1 cm), while the CG showed a decrease of ±3.3 cm. VJ passé position, we increase in a bit most significant part of the CG, ±2.9 cm, unlike the CG that virtually remains stationary, presenting a slight difference in negative of ±1.1 cm. Groupé jump, improved ±3.7 cm, other decreased height of ±3.9 cm. Jump with 360° body rotation, CG increased height of ±3.1 cm, CG has, again, presented a reduction of ±3.4 cm.
Conclusions: The data collected showed an important improvement in Group case, especially as regards the main variant that we used to test, jump height, while the same has not occurred for the group that has not received the plyometric training, the Control Group, but by recording a small decrease in performance..
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71 TP P
The effect of the shuttle running on neuromuscular performances in soccer players

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Aim: This study was conducted to investigate the effect of a standard Repeated sprint ability (RSA) protocol on the neuromuscular responses in soccer players.
Methods: For the reliability of the study, 16 young soccer players performed the RSA test (6 × 40-m interspersed with 20'' of passive recovery) in two testing sessions, 7 days apart. In both occasions, following a standard 10' warm-up, and before the RSA, each player was assessed for Blood Lactate concentration (BLa) and jumping ability including a Squat Jump (SJ) and Counter-movement-jump (CMJ), performed in random order. Fatigue as Fitzsimons Index (FI) was computed after RSA. Changes and comparison in SJ and CMJ scores were analyzed using a Paired Student's *t*-test.
Results: The Intra-Class Correlation was high (range 0.823-0.964). For RSA, best time and total time were 7.1 ± 0.2 and 44.8 ± 1.1 sec, respectively. The metabolic responses expressed in terms of BLa were 11.3 ± 2.0 mmol/l, and FI was 5.4 ± 1.8. RSA test showed a significant acute influence on subsequent neuromuscular performances. SJ before and after RSA were 35.6 ± 5 and 33.1 ± 4.0 cm (−5.7 ± 11.1 % with $p = 0.0022$), respectively. CMJ before and after RSA were 37.4 ± 5.2 and 34.2 ± 4.1 cm (−8.0 ± 7.7 % with $p < 0.00001$), respectively. First SJ and first CMJ were significantly correlated ($r = 0.939$, $p < 0.0001$), as well as second SJ and second CMJ ($r = 0.780$, $p = 0.0004$). In addition, first SJ and second SJ were correlated ($r = 0.688$, $p = 0.0032$), as well as first CMJ and second CMJ ($r = 0.921$, $p < 0.0001$), while −ΔSJ correlated with total time ($r = 0.520$, $p = 0.0389$), and best time ($r = 0.685$, $p = 0.0034$).
Conclusions: The RSA test is reliable to assess the acute effects of fatigue in young soccer players. The post-exercise vertical jump height loss experienced during the RSA test can be considered as a good expression of neuromuscular fatigue. Thus the test could be used to discriminate across playing standards and monitor fitness levels.

72 TP P
Validity of an iPhone application (Gymnastics—The Giant) for evaluating giant's performance

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Aim: The giant is an artistic gymnastics skill in which a gymnast rotates of 360° around an axis while in a fully extended position. The gymnast begins in a handstand position (0°); on the upswing (from 180° to 270°) the abdominal muscles are engaged to slightly arch the body and prevent anterior pelvic tilt (which would adversely affect the strength of the swing). When the giant is properly performed (no pelvic tilt) a brisk change in the angular speed of the CM occurs at about 230° (Cheetham 1984); in correspondence of this angle the angular velocity of the tight is maximal (TAV_{max}). An un-correct performance can thus be detected by a shift of TAV_{max} at smaller or larger angles. Acceleration data can be recorded by means of an iPhone embedded accelerometer (it allows to determine TAV_{max} because it is associated with a brisk change in velocity: before TAV_{max} the body accelerates and after TAV_{max} it decelerates) and the angle at which the TAV_{max} occurs could be recorded by means of the iPhone gyroscope. Our aim was to validate an iPhone application by comparing the data of angle at TAV_{max} with those assessed by kinematic analysis in young elite gymnasts (National Italian Team).
Methods: Ten gymnasts (8F/2M, 13 ± 3 years, 39 ± 13 kg, 1.44 ± 0.17 m) with 8 ± 4 years of experience, participated to this study. The iPhone was fixed on the lateral side of the right thigh; the gymnasts were asked to repeat the giant 5 times while being video recorded (Casio Exilim, ex-zr1000, 120Hz). Video clips were analysed with an open source software (Kinovea): the angle corresponding to TAV_{max} was calculated and compared to that derived from the iPhone application.
Results: The iPhone angle at which TAV_{max} occurs was 215 ± 3° and not significantly different (paired t-test: $p = 0.15$, $N = 50$) from that determined with kinematic analysis (214 ± 4°).
Conclusions: The angle at TAV_{max} is the same when calculated by kinematic analysis or with the iPhone application; in elite gymnasts, this angle is close to the angle at which the TAV_{max} should occur (230°). This app can thus be utilized for training purposes since its output (the angle at TAV_{max}) allows discriminating a good form a bad performance.
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73 TP P
Career performance trajectories in Italian track and field athletes: from adolescence to peak performance

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Aims: The idea that early sport success, because of either early sport specialization or early physical maturation, can be detrimental for long-term sport performance in still under debate (Moesch et al. 2011, Tønnessen et al. 2015). The aim of this study was to quantify performance developments in track and field running, jumping, and throwing disciplines as a function of age, disciplines and gender.
Methods: In this retrospective study, we collected performance data of the last 20 years (1994–2014) from the Italian track and field federation rankings. We evaluated performance and rankings from the age of 14 to date (or to career termination) in the following disciplines: 100 m, long jump, high jump, shot put, discus throw, 100/110 hurdles. The absolute and relative annual performance developments, the ranking development, the ages of best performance, performance plateau around the peak, and career termination, were calculated.

Results: In the currently available preliminary results, males showed higher annual performance development than females in all disciplines. In general, men achieved peak performance later than women.
Conclusions: This is the first study calculating absolute and relative annual performance developments in running, jumping, and throwing events of competitive athletes from late adolescence to career termination. The relation between early career performance and adult peak performance will provide important information to track and field coaches.

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74 TP P

Arm swing improves performance of goalkepeers? A pilot study

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Aim: Arm swing enhances performance in the vertical and long jump (Lees et al., 2004; Ashby and Heegard, 2002) by increasing jump height/length and take off speed. In "lateral jumps" (such as those performed by goalkeepers) an increase in take off speed can be expected to reduce the time to reach a target and, thus, to a better ability to intercept the ball (i.e. to a better performance). The aim of this study was to investigate the effects of arm swing in the "lateral jumps" of goalkeepers.
Methods: Ten healthy male goalkeepers were asked: i) to perform a "vertical jump" (CMJ, with and without arm swing) and ii) to perform a "lateral" jump by reaching as quickly as possible (with and without arm swing) a ball positioned at a distance of 3.66 m on the goal at two different heights (HT, high target: 1.25 m and LT, low target: 0.7 m). The experiments were video-recorded (GoPro Hero 3+, 60 Hz), and the video were analysed by means of an open source software (Kinovea). A marker positioned on the trunk (assumed to represent the body centre of mass) was digitized "frame by frame"; so that the instantaneous values of vertical and horizontal displacement and speed were obtained.
Results: In CMJ arm swing significantly increased ($p < 0.001$) take off speed (4.3 vs. 3.9 m/s, 8 %), flight time (0.60 vs. 0.55 s, 9 %) and jump height (0.58 vs. 0.42 m, 27 %). During HT and LT take off speed was larger than in CMJ (5.08 and 5.00 m/s without and 5.89 and 5.62 m/s with arm swing in HT and LT, respectively) and take off speed was larger with the arm swing (about 12 % in HT and LT; $p < 0.005$). No differences were observed in the flight time and in the take off angle (the angle between the leg and the ground) with or without arm swing but take off angles were larger in HT than in LT (42° vs. 34°; $p < 0.001$). Finally, step length was not influenced by target height but, in LT, step length was smaller with the arm swing (1.14 vs. 1.21 m; $p < 0.05$).
Conclusions: Arm swing allows to increase take off speed in "lateral jumps" as is the case for "vertical jumps" (CMJ), but this does not allow the goalkeeper to reach the ball in a shorter time, independently of the target position.

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75 TP P

Monitoring training in non-professional soccer players by coupling SSGs and GPS technology: effects of pitch size and player role

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Aim: We analyzed the energy cost of soccer training, in term of metabolic power (P_{met}), in non-professional soccer players (nPSPs) by coupling small sided games (SSGs) to global positioning system (GPS) technology: the effects of pitch size and player role were evaluated.
Method: Data were collected from 19 nPSPs competing in regional championships over a 3-month period during the 2013–2014 in-season competition. All players took part to 3 specific SSGs with goalkeepers:
SSG1: 5vs5 (format); 30 × 30m (pitch size); 5 min (duration). SSG2: 5 vs 5; 35 × 45 m; 5 min. SSG3: 7 vs 7; 35 × 45 m; 8 min.

They played as defenders (DFs), midfielders (MFs) or attackers (ATs) and followed specific SSG rules: 1. Defenders could not run in the opposite team half field; 2. Attackers could not run back in their half field; 3. Ball touch limit was set to 3. Players' activity was monitored using GPS devices (Q-Starz 10Hz, Taipei, Taiwan). The equations proposed by Di Prampero (1) and then by Osgnach (2) were adopted to estimate average P_{met}. Moreover we analyzed the total distance (TD), the % of total time spent at P_{met}>20W·kg^{-1} or at speed (v)>16km·h^{-1} (%T W>20 and %T v>16, respectively) within the SSGs.
Results: In all formats and pitch sizes considered, DFs, MFs and ATs covered different TD ($p \leq 0.05$), being the longest distance always done by MFs. As for P_{met}, an average value ≥10W·kg^{-1} is registered or all player roles in all formats and pitch sizes, but for DFs within SSG1; MFs get always the highest values, followed by ATs and then by DFs. %T W>20 was always higher than %T v>16 irrespective of formats, pitch sizes and player roles. The average % difference between %T W>20 and %T v>16 was positively correlated to the number of players and inversely correlated to pitch size.
Conclusions: Coupling SSGs and GPS technology allow to obtain more detailed information about the players' performances. In this study we confirmed that P_{met} provides a better estimation of the energy cost of SSGs compared to running speed alone.

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76 TP P
Effects of Coordination training in amateur soccer players

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Aim: Egan, et al. (2007) showed that skilled players tend to score more during a moving-ball condition than during a dead-ball condition with respect to their less skilled counterpart. The aim of study was to evaluate the effects of 10-week of coordination training (CT) on physical and soccer abilities in amateur soccer players.
Methods: Seventeen amateur soccer players participated to study and they randomly divided into two groups: Experimental Group, (EG; n: 8; age: 23 ± 5 yrs: weight: 75.0 ± 8.2 kg; height: 181.1 ± 11.5 cm; BMI: 22.9 ± 1.1 kg m^2) and Control Group (CG; n: 9; age: 24 ± 4 yrs, weight: 71.1 ± 5.9 kg, height: 176.6 ± 5.0 cm; BMI: 22.8 ± 1.2 kg m^2). Both groups continued technical and tactical soccer training together three days (120 minutes/day) a week. EG attended additionally CT (rhythm and soccer specific coordination exercises) through 10-week, 2 days per week, 20 minutes session duration. After 10 week, playing time, physical (YO–YO IR1, counter movement jump—CMJ), and soccer ability (shooting a dead ball, and shooting from a pass) test were compared ($p < 0.05$).
Results: No anthropometric significant differences emerged between groups. Between groups, no differences emerged in playing time, physical, and soccer ability test. After 10 week, the results showed statistical different only in YO–YO IR1 ($p < 0.001$) and CMJ ($p < 0.005$) of each groups.
Conclusions: To our knowledge, the current study is the first attempt to investigate the effect of a regular CT in soccer players. Considering the results of this study and that, during matches, player constantly adjust his body coordination (i.e. in relation to ball speed and ball position, and the intent of the task goals), further studies are needed to fully elucidate the effects of CT on performance and injuries.
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77 TP P
Mechanical power increase after whole body vibration compared with plyometric training

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Aim: Whole-body vibration (WBV) has been considered in the rehabilitation and training programs as an alternative plyometric exercise (i.e. drop-jump) to increase power and strength. In the literature it has been speculated that the neuromuscular effect of WBV is similar to that induced by drop jump exercises. However, to date no studies have compared the training effects of the two exercises intervention. This study aimed to investigate the effect of an 8-week period of WBV and plyometric training on the power-output during drop-jump performance.
Method: Twenty-nine physically-active students [aged 21.3 years (0.35); height 171.7 cm (2.79); body mass 67.6 kg (4.55); body mass index 22.98 kg/m^2 (0.90)] took part in this study. They were assigned to a vibration (n = 9), drop-jump (n = 11) or control-group (n = 9). The mechanical effects were assessed before training, after 4-wks, after 8-wks and 1-wk after the end of the intervention training. The vibration-group was exposed to synchronous WBV (1), whereas the drop-jump group trained by using drop-jump exercises (1). Both groups trained 3-times weekly.
Results: The power-output increased significantly in both the vibration-group ($F_{(3.176)} = 10.979$; $p = 0.0001$) and the drop-jump group ($F_{(3.216)} = 9.048$; $p = 0.0001$), whereas the control-group showed no significant increase ($F_{(3.176)} = 0.123$; $p = 0.946$). The interaction effect (group × time) was also significant ($F_{(6.568)} = 3.850$; $p = 0.001$). Additionally, the drop-jump group changed both the contact time ($F_{(3.211)} = 2.915$; $p = 0.035$) and the flight time ($F_{(3.211)} = 9.072$; $p = 0.0001$) significantly, whereas the vibration-group showed significant changes in the contact time ($F_{(3.176)} = 12.744$; $p = 0.0001$), but not in the flight time ($F_{(3.176)} = 1.431$; $p = 0.235$).
Conclusion: The results of this study suggest that the power-output increase in the two experimental groups could be dependent on different specific neuromuscular adaptations.
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78 TP P
Acute effects of Whole Body Vibration on balance in soccer players: a controlled study

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Balance is considered as a prerequisite for a successful sport performance and Whole body vibrations (WBV) improve balance in athletes (Hortobagyi, 2014).
Aim: To assess the acute effects of WBV protocol on postural control and balance ability in soccer players and in non-athletes, analysing the different postural adaptation strategies with open and closed eyes.
Methods: Twelve male soccer players, and ten healthy volunteers, not-practicing regular sport activity, underwent two testing sessions. During the first session, balance was assessed evaluating postural sways and Centre of Pressure Displacements (COP). The optimal vibration frequency (OVF) was determined for each subject, by the maximal EMG vastus lateralis muscle response during a continuous incremental protocol. In the second session postural sways with open and closed eyes were investigated following WBV at OVF. The WBV exposure was generated by Double Vibe platform (Bosco System Technologies) and consisted of 5 series of 1 min., with 1 minute rest between series, while balance data were collected for 30s in succession, using the Zebris pressure plate, immediately after (T1), 10 min (T10), 20 min (T20) and 60 min (T60) after the end of WBV (Takata,, 2013). Data were analysed with a repeated measures MANOVA, with group (athletes and non-athletes) as between factor, and condition

(open and closed eyes) and time (pre, T1, T10; T20, T60) as within factors. When significant interaction were observed pairwise comparison with Bonferroni correction were performed.

Results: Soccer players showed significant impairments in open eyes condition than non-athletes, who maintained this impairment after T60. No significant differences between groups were found in the closed eye condition, for all the postural control parameters after WBV treatment.

Conclusion: WBV exposure did not cause prolonged impairment of balance in soccer players before performance. Their visual feed back contributes to reach a good postural control.

Keywords: Vibration exposure, postural control, footballers, visual feedback.

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79 TP P

Hand grip strength and characteristics in Italian female basketball teams

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Aim: In basketball, a number of movements rely on the continuous use of upper extremity muscles and grip strength in catching, holding, shooting, throwing, and passing accuracy (Visnapuu and Jurimae 2007). Performance differences among players of different ability levels have been identified also in the body anthropometric characteristics (e.g. height, Ackland et al. 1997). There is, however, a lack of grip strength and anthropometric data collected in basketball female elite players, to facilitate talent identification approach. The aim of this study was to investigate the influence of some hand and body dimensions on hand grip strength, to define a reference scale for talent identification.

Methods: Body and hand anthropometric data and the maximal handgrip strength of 109 female Italian basketball National players (Under14-Seniores) were measured.

Results: Handgrip strength and arm length trend increase, as well as age and sport level, raising the statistical significant differences only from 19 aged players (U20, Seniores) with respect to sub-elite groups (U14, U15) ($p < 0.05$). Only Seniores showed an asymmetry, obtaining higher handgrip strength values in dominant side (+4 kgf) ($p < 0.001$). Handgrip strength showed low positive correlations with height and BMI, whereas a positive relationships with arm length ($r = 0.5$; $p < 0.001$) was observed.

Conclusions: Findings underline training and years of practice effects on handgrip strength increasing. Data show that to select female basketball players by arm length means to select by handgrip strength. Thus it is possible to suggest that in addition to height, also arm length could be considered an useful parameter in young female talent identification.

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80 TP P

Athletic preparation and injury prevention for the èlite international soccer referee: an experimental training protocol for the 2014 FIFA Brazil World Cup

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Aim: To present a survey concerning monitoring health, training procedures and methodology, prevention disease and traumatic injuries in soccer referees of élite categories and to report the experimental training program for referees introduced for 2014 FIFA Brazil World Cup.

Method: Retrospective analysis of the recent literature and application by the author of experimental personally-titrated protocol of training for a sample of referees selected to participate in the 2014 FIFA World Cup in Brazil.

Results: They strongly indicate the need for an athletic preparation of referees oriented to high intensity efforts, resistance to stress, sport skills. Studies show that a specific, constant, standardized, monitored training give results in terms of: higher endurance in workloads (training and matches), a better ability to recover from the psychophysic stress of the matches, reduction of injuries. Perspective and retrospective studies of FIFA's Medical Assessment and Research Centre show that the profile of injuries in the élite arbitral category regard essentially muscles and joints, being this category strictly evaluated in order to prevent severe heart or stroke attacks, as in training like in matches. In last years the incidence of muscle injuries decreased, this probably due to systematic diffusion and application of recently proposed training and warm-up protocols by the technical staff of FIFA, Eleven Plus Referees®. The results of referee evaluation and selections tests are presented for the population of referees selected. Furthermore new protocols for monitoring performances during the whole 2014 season are illustrated.

Conclusions: Eleven Plus Referees, currently directed to élite referees, promoted worldwide to prevent referee injuries, encourages a combination of sport-specific and athletic preparation activities; This program might be addressed to all referees that national Federations select each year in every continent.

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81 TP P
Introducing sand-surface as an alternative training for soccer players

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Aim: The purpose of this preliminary study is to promote the application of sand-surface within soccer training programs.
Methods: Sand-surface as "special" training session should be introduced on same location in order to lead the attention regarding the main issue (Campedelli, 2013). Being a "new" approach for mostly players, it is important to pay special attention to clarify the terms used, the effectiveness of concepts expressed and staff positioning while introducing training tasks.
Results: Different physical, physiological and psychological response are expected among season whether sand training is introduced. A difference between purposes of first sandy session (pre-season) and others (pre-season or in-season conditioning period) must be considered. For instance, when sandy session is carried out for enhancing recovery, the purpose should be to remove any mental or musculoskeletal stress (Impellizzeri et al., 2007), trough an environmental change.
Conclusions: Speaking about sand means placing players facing a "different" training context, until now rarely identified with soccer activities. According to our hypothesis, Campedelli (2013) suggest to do not enter in training details or constraints administered in the previous session (on grass), but just to provide a brief concept on behavior that can occur. However, special attention should be paid on movements patterns in order to avoid potentially injuries (Brito, Krustrup, and Rebelo, 2012) due to a propriception gaps.

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82 TP P
Periodization of strength training in amateur football players: a pilot study

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Aim: Football is a sport which a high physical and physiological capacity is required to withstand the stress induced between matches and training sessions. This study focus on the periodization method specifically to strength features. Strength training is an important determinant of football performance, as key feature of physical capacity and main regulators of important football-specific tasks (Hoff & Helgerud, 2004) . Also, monitoring training load is an important feature for the control of the training process (Rebelo et al., 2012) preventing injuries in football and consequently enhancing performance in sport. The purpose of this pilot study is to assess the effectiveness of periodized training monitoring changes in strength values in three different evaluation stages among a pre-season.
Method: Two males amateur football performed basic strength and endurance test in order to assess changes during a pre-season and evaluate the efficacy of the periodization strength method applied in football. According to Bompa (1999) we defined three different stages of pre-season: preparatory period as baseline, end of cargo (increasing of any strength load parameters) and end of transformatory period (transference of football specific strength exercises to technical skills). The periodization program consist in one session conditioning training per week where players performed strength and conditioning exercises (without ball) assisted by a physical coach, while control group performed regular soccer training (small sided conditioned games for the whole session).
Results: Despite slightly, it seems that periodization group presented greater improvement in all the test compared to control group (small sided games).
Conclusions: These results increased the credence of the Tudor Bompa's proposal about the concept of periodization of strength. Physical training may allow to build a "basic" strength ability allowing to maintain a certain strength levels during the whole season. This concept allows us to achieve peak performance in the desired period. We applied this concept in amateur football players. This pilot study lays the groundwork for further research future in order to obtain additional data performing more reliable test with a greater sample.

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83 TP P
Pacing strategy of master athletes during a half marathon

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Aim: Important factors in the regulation of pacing are the sensation of fatigue experienced at a certain point of the race, the perceived exertion (RPE) expected at that time point integrated with the time

remaining to complete the task (1). The aim of the study was to monitor pacing adopted by master runners during a Half Marathon dividing the sample according to their predicted time (correct, faster, slower).

Methods: 100 master endurance runners filled in a training history questionnaire and completed a profile of mood state (POMS) before and after the race. Athletes were monitored during a Half Marathon and were instructed to rate their RPE every 7 km. Pacing is presented as percent difference compared to average running speed. The Hazard Score (HS) was calculated (2) as the product of the momentary RPE and the remaining fraction of the event. HS higher than 3 has been hypothesized to predict a decrease in performance, while values between 1 and 3 should predict an even pacing strategy. Differences in speed, HS and POMS between and within groups was calculated by a 2 way ANOVA ($p < 0.05$).

Results: Pacing adopted during the race was even in the faster group while the slower and the correct groups adopted a positive pacing with a significant decrease in speed from 7th to the 21st km respectively of 10.2 % and 3.9 %.

The correct and slower groups showed a HS higher than 3 (possibly predicting their decrease in speed), while the faster group showed a HS between 1 and 3. RPE increased significantly during the race in all three groups, while no difference between groups was observed. POMS showed a significant increase in fatigue and a decrease in tension and depression comparing PRE and POST.

Conclusions: The HS divided into three groups seems to confirm previous laboratory results (2). Although RPE was not significant between groups, the faster group showed lower values at the 7th and 14th km compared to the other groups.

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84 TP P

Testing modality affects lactate threshold assessed with different methods

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Aim: The lactate threshold (LaT) is an important physiological parameter in the laboratory and on the field. Continuous incremental ramp tests are commonly used for LaT determination (Bosquet et al. 2007). The aim of the study was to compare two incremental ramp tests on the treadmill, with different velocity increments in time and to determine to what extent protocol would affect LaT assessment. Moreover, we investigated also which of the five methods (D_{MAX}, $D_{MAX\ MOD}$, 4 mM, D1 mM and Log–Log) commonly utilized to assess LaT was less affected by differences in testing modality.

Methods: Sixteen physically active males (age 22.5 ± 1.8 yrs; stature 1.75 ± 0.04 m; body mass 68.7 ± 4.0 kg; mean ± SD) reported to the laboratory on different days to perform two maximum incremental continuous ramp protocols (1 km/h^{-1} per min, R1, and 2 km/h^{-1} per min, R2), in random order. $_{max}$ and LaT were assessed on a motorised treadmill. At rest and during exercise, cardiorespiratory and metabolic parameters were collected breath-by-breath. Blood lactate concentration [La$^-$] was measured at rest, during, and at peak exercise. In both protocols, LaT was calculated by D_{MAX}, $D_{MAX\ MOD}$, 4 mM, D1 mM and Log–Log methods.

Results: LaT was found at significantly higher velocities in R1 vs R2 for D_{MAX} (16.5 ± 0.4 *vs* 15.1 ± 0.4 km/h^{-1}), $D_{MAX\ MOD}$ (17.7 ± 0.5 *vs* 15.6 ± 0.4 km/h^{-1}), 4mM (17.0 ± 0.6 *vs* 15.5 ± 0.5 km/h^{-1}), Δ1mM (17.1 ± 0.5 *vs* 15.1 ± 0.4 km/h^{-1}), but not for Log–Log.

Conclusions: The testing modality influenced significantly LaT assessment. Indeed, with the only exception of Log–Log method, all the other methods for LaT determination presented significantly higher velocities at LaT when the steeper slope (R1) of the velocity *vs* time relationship was utilized.

This was probably due to a delayed La$^-$ accumulation in R1 because of the insufficient time for La$^-$ equilibration between muscle and blood. Therefore, care must be taken with the protocol choice and the method used for LaT determination when precise assessments are needed.

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85 TP P

Double helix training: effects on basketball agility repeated test, repeated sprint ability and stabilometry in under 19 basketball players

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The evolution in training methods led to the definition of sport-specific training exercises in order to maximize Athletes's performance. Among these, the concept of functional training is becoming very useful. The purpose of this study was to verify the effects of a specific functional training programme in basketball players, Double Helix Training (DHT), to improve stabilization, that should translate as an improving in the capacity of acceleration and deceleration during the game. To check this, 14 healthy young subject (17.3 ± 0.5 years) subjects were equally divided in two groups, one performed the functional training programme (DTH) while the other one was the control group (CTRL) which trained as usual. All subjects were evaluated on their speed and balance skills, through the Basketball Agility Repeated Test (BART) and Romberg test on the stabilometric platform, before and after seven weeks of training. Student t-test analysis were performed for each items. Both groups shown a decrease ($p < 0.05$) in the anteposterior swing performance during bipedal stance with closed eyes (OAP CE); while the performance on lateral-side swing improved significantly ($p < 0.05$), in particulary during the single left leg stance with open eyes (OLL OE). Also the execution time of BART test improved significantly in both groups. These results suggest that the enhances in test performance was probably due to sport-specific nature of this test. Moreover, it seems that DHT could be a good strategy to improve players stability.

86 TP P
Test-retest reliability of an Italian version of the Pictorial Children's Effort Rating Table (PCERT)

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Aim: In children, the Rating of Perceived Exertion (RPE) can be used in the context of physical education (PE), to compare performances before and after an exercise program and in the context of health promotion (HP) to implement children's recommendation on physical activity (PA), by educating about the meaning and feeling of PA intensity.
The study is aimed at evaluating an Italian version of the Pictorial Children's Effort Rating Table (PCERT) by assessing test-retest reliability.
Methods: The PCERT contains numerical and verbal expressions (1 to 10 levels) combined with pictorial drawings of perceived exertion, i.e. a child dressed with a typical school PE kit, running on a series of visibly inclining steps. After a 'translation–back translation' from the original English version, the PCERT was submitted to 88 Italian children, 10.5 years-old in average, during the PE lesson, immediately after a series of three exercise with increasing effort (pacer shuttle run test at 7.7 METs, 8.5 METs, 9.3 METs). The tests and the PCERT assessment has been repeated two times within a week of distance.
Results: The overall test-retest correlation is 'moderate' for the first level of effort (Spearman's rho = 0.552, $p < 0.001$), 'strong' for the second and 'very strong' for the third level (0.753 and 0.857, $p < 0.001$). The subgroups' analyses showed a stronger reliability in the normal vs overweight children, in children practicing organized PA vs not-practicing and in males vs females. Moreover, with a 'learning effect', the PCERT scores were higher in the retest than in the test (a sort of 'self-awareness' improvement about the exercise execution, very important in the PE).
Conclusion: The study has some limitation, firstly we didn't used an instrumental measure of effort (cyclergometer), nevertheless, it suggested a good reliability of the Italian version of PCERT and the usefulness of RPE assessment in children.
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87 TP P
Temporal analysis of men's single badminton matches played under two different scoring systems

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Aim: Badminton World Federation is recently testing a new scoring system of 5 games up to 11 points ("5 × 11") to find a feasible alternative to the current format with 3 games up to 21 points ("3 × 21"). The aim of this study was to compare the temporal structure of men's single competition under the conventional "3 × 21" with the new "5 × 11".
Methods: Seven male (age 20.4 ± 3.8 yrs; BM 67.3 ± 5.5 kg; H 1.79 ± 0.03 m; VO_2peak 54.8 ± 6.7 $mlO_2 \cdot min^{-1} \cdot kg^{-1}$), high-level badminton players were recruited.
Participants were paired up to play against each other playing the "3 × 21" or the "5 × 11" match, in random order. Overall match duration, games duration, rally and rest time, effective playing time (EPT), shots per rally (SR), work density (WD), and shot frequency (SF) were recorded. In addition, frequency of rally and rest time distribution were calculated.
Results: Match duration was 2129 ± 332 s and 1996 ± 182 s (mean ± SD), with a mean of 107 ± 10 and 90 ± 7 rallies played and 669 ± 80 and 606 ± 49 shots executed during the "3 × 21" and the "5 × 11", respectively. Mean rally time was 6.7 ± 4.3 s and 6.6 ± 4.6 s, and mean rest time was 10.4 ± 3.9 s and 10.3 ± 3.4 s for "3 × 21" and "5 × 11", respectively. 84.5 % ("3 × 21") and 83.2 % ("5 × 11") of all rallies lasted between 1 and 10 s, with a rally time between 4 and 8 s occurring most frequently. Rest time was mostly situated for both conditions between 8 and 14 s (80.4 % and 82.0 % for "3 × 21" and "5 × 11", respectively). SR were 6.2 ± 0.5 and 6.8 ± 0.4, with a SF of 0.92 ± 0.26 $shot \cdot s^{-1}$ and 1.0 ± 0.2 $shot \cdot s^{-1}$ under the "3 × 21" and the "5 × 11" format, respectively. Lastly, EPT was 34 ± 3 % and 30 ± 4 %, with a WD of 0.75 and 0.70 for "3 × 21" and the "5 × 11", respectively. No statistical differences in all the investigated variables were found.
Conclusion: The "5 × 11" scoring system seems not to affect the temporal structure of badminton matches. More time under the "5 × 11" is likely needed to change tactical habits that can influence the temporal structure of matches. Further studies may be required to retrieve differences between the two scoring systems.
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88 TP P
Effects on performance of two different forms of warm up in soccer

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Aim: The aim of our study was to verify the effects of a warm up with ball (WAB) or without ball (WNB) on performance in soccer.
Methods: 13 young soccer players (mean age = 15.89 ± 0.60 years) were recruited and tested with a physical and technical test, consisting of 10 long kicks interspersed with intense intermittent exercise. This test, called "PT test", was the object of a study published in 2008 whose aim was to develop and examine a test for evaluation of the physical and technical capacity of soccer players. After a period of familiarization subjects performed the test (10 trials) in two separate day in random order after the specific warm up: with or without ball. . Anova for repeated measurements was performed.
Results: The mean of the 10 trials showed a significant better score after WAB compared to WNB (1.7 ± 1.1 vs 1.15 ± 1.28; $p < 0.05$). In particular significant improvements were measured in the 3rd and 10th trials (WAB3 = 2.30 ± 1.03; WNB3 = 0.84 ± 1.28; WAB10 = 2.30 ± 1.18; WNB10 = 1, 23 ± 1.16).
Conclusions: An appropriate warm up is essential to prepare the athlete to a performance, whether a training or a match. With this

study it is found that a warm up with ball, performing technical movements of the discipline, leads to improvements in soccer's performance skill.

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ADAPTED PHYSICAL ACTIVITY

89 AP P
Assessment of oxygen uptake response to arm cranking exercise in athletes with locomotor impairment

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Aim: Exercise prescription (EP) is a fundamental commitment for sports medicine physicians and for trainers/coaches to improve health status and to train physical fitness (PF) components, respectively. To accomplish these purposes, the EP intensity should be precise and tailored on the individuals' PF characteristics, *stimulating* with adequate workloads the appropriate metabolic level. So it appears mandatory to know metabolic responses at different power output (PO) on the arm cranking ergometer (ACE) in individuals with different locomotor impairments (LI). To accomplish this purpose Paralympic male athletes (PA), either with a spinal cord injury (SCI) or with other LI (OLI), such as poliomyelitis or lower limb amputation, competing in summer and winter sports and with different aerobic fitness, were enrolled to study their oxygen uptake (VO_2) response to ACE exercise and therefore to build an appropriate curve to predict PO from VO_2 and *vice-versa*.
Methods:. In 2 consecutive days 29 PA-SCI (35.4 ± 8.9 y; 68.9 ± 10.2 kg; 1.77 ± 0.09 m) and 35 PA-OLI (37.4 ± 8.4 y; 71.4 ± 8.2 kg; 1.74 ± 0.13 m) were submitted to a continuous ramp maximal exercise test on an ACE (E800, Cosmed, Italy) under metabolic monitoring (Quark b^2, Cosmed, Italy) to assess VO_2peak and, in the following day, with the same metabolic chart were submitted to three rectangular exercise tests to assess VO_2 response at 30, 50 and 70 % of their VO_2peak.
Results:. Statistical analyses did not show significant differences between PA-SCI and PA-OLI neither in anthropometric characteristics, nor in the VO_2peak and PO peak curves (Pearson R equal to 0.976 and 0.896 in PA-SCI and PA-OLI, respectively) nor in the steady state (SS) VO_2 and PO curves (Pearson R equal to 0.97 and 0.90 in PA-SCI and PA-OLI, respectively). The overall relationships were: VO_2peak ($ml \cdot min^{-1}$) = 691 + 12.11 PO peak (watt) ($R2 = 0.8160$) and SS-VO_2 ($ml \cdot min^{-1}$) = 428.1 + 15.396 PO (watt) ($R2 = 0.9095$).
Conclusions: The equation PO (watt) = $0.0591VO_2$ ($ml \cdot min^{-1}$) − 19.59 can be used for tailored and adequate EP in sedentary individuals and PA with different LI. The relationship between PO peak and VO_2peak can be used to estimate the latter when VO_2 cannot be measured.

90 AP P
Body composition assessment in spinal cord injured wheelchair athletes

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Aim: The assessment of body composition (BC) in wheelchair athletes (WA) represents an important way of monitoring the results of an athlete's training as well as achieving real improvements in performance. The aims of this study were a) to compare BC of male WA with a large sample of healthy athletes matched for age and BMI; b) to investigate the relationship between the duration of injury (DOI) and the time since restarting athletic career (TRAC), and BC.
Methods: Twenty-three male WA with chronic spinal cord injury aged 33.6 ± 10.54 y were recruited and split into two groups (Tetra, $n = 10$; Para, $n = 13$) according to their level of injury: Tetra, injury above T1; Para, injury at T1 and below. Each WA was matched with three healthy males athletes of similar age (± 2y) and BMI (± 1kg/m^2). Total-body and regional composition (fat-free soft tissue mass [FFSTM], fat mass [FM], bone mineral content [BMC], areal bone mineral density [aBMD]) was evaluated by means of Dual-energy X-ray absorptiometry according to the manufacturer's procedures. The t-test for independent samples was used to assess differences in the BC outcomes between the Tetra and Para group, and their respective controls. In the whole sample of WA, the relationship between DOI, TRAC and BC outcomes was assessed by means of Pearson's product-moment correlation coefficient.
Results: At the total-body level, both the Tetra and Para group showed significantly greater %FM along with lower %FFSTM, BMC and aBMD ($P = 0.043 \div < 0.001$) compared with able-bodied control athletes. At the regional level these differences were mainly evident in the trunk and in the lower limbs. In WA, the longer the DOI the lower the aBMD at the total-body level and in the lower limbs. A similar trend was observed with longer TRAC.
Conclusions: Compared with able-bodied athletes, WA develop substantial alterations in BC independent of the extension of motor impairment. These findings suggest to begin physical activity as soon as possible after injury to prevent or reduce negative effects on BC.

91 AP P
The role of health care workers in motivating users of psychiatric services to physical activity

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Aim: regular physical activity (PA) can positively influence the treatment of psychotic disorders.
The main obstacles in adhering to regular PA programs for people with severe mental illness are the side effects of antipsychotic drugs, the lack of motivation and poor concentration abilities. All these elements reduce the exercise capacity of these persons and hinder their long-lasting participation in regular PA. Health care workers

have a crucial role in the promotion of healthy behaviors and physical habits of people with psychotic disorders but, even if they are aware of the importance of PA, they have to cope with lots of barriers to sustaining patients participation in PA programs (Mo et al., 2011; Verhaeghe, 2011).
Methods: Four focus groups have been conducted with health care staff members where PA programs are part of the treatment proposed to the users of psychiatric services. They were asked to highlight the benefits, barriers and facilitators of outpatients' PA in their personal experiences.
Results: the content-analysis of the focus groups confirmed and enriched the evidences about the utility of PA programs within the rehabilitative paths for people with psychotic disorders. Moreover results highlighted the need for a specific preparation, for health care workers, especially in what concern motivational processes and the management of strategies to promote active lifestyles. Participants also affirmed the key role of exercise specialists within the health care staff and the growing need for collaboration with local institutions to support the promotion of PA.
Conclusions: results provide evidence for the increasing need of regular PA in the rehabilitative interventions of psychiatric disorders. The engagement of exercise specialist within the health care staff is desirable to facilitate the managing of PA programs and support educational interventions also for health care workers.
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92 AP P
Effects of a training program on manual wheelchair propulsion ability in paraplegic people: two case reports

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Aim: Adequate manual wheelchair propulsion ability (MWPA) is required to perform activities of daily living (ADL). Exercise may be effective to gain or improve MWPA; this study aimed to evaluate the efficacy of a training program on MWPA.
Methods: Two women with long term paraplegia (subject A: 7 years post injury, AIS A, complete T7 lesion, aged 21; subject B: 8 years post injury, AIS C, incomplete T8 lesion, aged 20) attended twice a week a 75 minute adapted physical activity program (APA), based on aerobic and anaerobic exercises, for 7 months.
Subjects were evaluated with a multistage field test (MFT) and a Vanlandewijck's 30 second sprint test, before (T0) and after (T1) the training.

Level and covered distance were the main outcomes to assess MWPA.
Results: Performance between T0 and T1 increased in both subjects. In MFT, subject A improved from level 5 (480 meters) to level 8 (900 meters) and subject B from level 6 (575 meters) to level 7 (840 meters).
In 30second sprint test, women increased from 64 to 71 (A) and from 66 to 69 meters (B).
Conclusions: MFT and 30 second sprint test results could be the expression of a positive training effect. Mixed aerobic-anaerobic training could be a possibility to improve MWPA and ADL in paraplegic subjects.
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93 AP P
Strength conditioning in wheelchair basketball: a chronic study

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Aim: To verify the effects of circuit training (8 weeks) on strength, both with elastic bands and with weights, in a group of competitive wheelchair basketball players.
Methods: Twelve wheelchair basketball players participated in the study, and were divided into an 'Elastic Band' group (EG, 8 athletes, aged 28 $\pm$ 10 years, 10 $\pm$ 8 years of competitive experience) and a 'Weights' Group (WG, 4 athletes, age 29 $\pm$ 5 years, 7 $\pm$ 6 years of competitive experience).
To evaluate physical performance the following tests were used: the Figure of 8 and the Twist and Shape Sprint for the evaluation of speed propulsion and the ability to use the wheelchair during the test; maximal isometric voluntary contraction (MVC), measured by the dynamometer KERN HCB 200K100 (KERN and SOHN, Balingen, Germany)
Results: EG: MVC, Anova $p < 0.001$; Post-hoc, T1 vs T2, $P < 0.05$, +10 %. Figure of 8 shape, Anova $P < 0.001$, post-hoc, T0 vs T2, $P < 0.001$, −12 %. Twist and Sprint, Anova $p < 0.001$, post-hoc, T0 vs T2, $p < 0.001$, −11 %. OG: MVC, Anova $P < 0.05$, post-hoc, T1 vs T2, $p < 0.05$, +8 %. Figure of 8 shape, Anova $P = 0.0016$, post-hoc T0 vs T2 $P < 0.05$, −10 %. Twist and Sprint, Anova $P = 0.0016$, post−hoc T0 vs T2 $P < 0.05$, −9 %.
Conclusions: The results show an improvement of physical conditioning in both groups, but a more relevant increase in EG.

94 AP P
Can adapted physical activity change life satisfaction of people with different disabilities?

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Aim: Many studies investigated physiological effects of adapted physical activity (APA) in disabled people but few considered the psychological effects. The aim of this preliminary study was investigate if the regular practice of APA could modify life satisfaction of sedentary disabled people.
Methods: Eight sedentary disabled people (2 paraplegic, 1 spina bifida, 1 multiple sclerosis, 1 spastic quadriplegia, 1 hip dysplasia, 1 cerebral palsy, 1 radial head resection; 6 female, mean ± sd: age 25 ± 5.2 years, BMI 21.1 ± 4.5 kg/m^2) were involved in a 90minute two times/week APA program for 6 months consisting in tailored functional exercises. Life satisfaction, as main outcome measure, was measured by satisfaction profile questionnaire (SAT-P), composed by 32 items about work, sleep, nutrition, free time and psychological, physical and social functions.
SAT-P was compiled before (T0) and after (T1) the training period. Wilcoxon test was run to compare pre-post data.
Results: satisfaction level for PA increased between T0 and T1 (4.4 ± 2 to 6.5 ± 2 cm, $p < 0.05$); furthermore 5 of the 8 subjects increased SAT-P score in: food quality (4.8 ± 2.2 to 7.1 ± 1.8 cm), eating behavior (4.6 ± 2.5 to 6.8 ± 0.1 cm), body image (3.3 ± 2.3 to 5.9 ± 2.5 cm), mood (6.6 ± 0.5 to 8 ± 1 cm).
Conclusions: considering that participants were inactive and no relevant life's changes occurred during the study, the increased satisfaction in PA level could be considered as the main positive effect of the training. The increased satisfaction in body image could be considered as an additional effect of the training. The improved satisfaction in food quality and eating behavior could be linked to a better attention to lifestyle, probably due to greater satisfaction about body image. The emotional changes could be the consequence of the previous results. APA seems to modify satisfaction levels in some areas of disabled people's life.
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95 AP P
The motor habits in people with multiple sclerosis: a pilot study

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Aim: To investigate the habits of movement of people with multiple sclerosis (MS), relapsing-remitting.
Methods: Were recruited 147 subjects with MS (age 40 ± 11 years, age of disease onset 29 ± 12 years, EDSS 1–3). The patients fill out the IPAQ questionnaire. The question concern these motor activities (MA) areas:

1. Intense MA: for example cycling at a fast rhythm (70–80 % of HR_{max}) or precautionary muscle strength workout in the gym (i.e. 60–70 % of MVC),
2. Moderate MA: lift light weights (i.e. to lift up a full bottle of water), housework (i.e. washing up), walking.
3. Skill both in walking and maintaining the seated position. In each area it was measured the perception of fatigue, muscle and joint pain through the visual analogic scale (VAS).

Results: The MA of the studied sample before and after the diagnosis of MS are the following:
1. The intense MA is decreased from 37 % to 22 % with a frequency of 2 times a week for about 2 hours.
2. The moderate MA is passed from 63 % to 78 % with a frequency of about 2 times per week for a duration of about 3 hours.
3. Only 19 % carries sport activities such as swimming or cycling with moderate intensity.
4. It showed a positive correlation between EDSS and perceived fatigue (R: $P < 0.05$) which is present in 75 % of the sample studied. In 50 % of cases there is neuropathic pain.

Conclusion: The data highlight how diagnosis of disease determine a regression in motor activity, probably due to a few information it. Furthermore, the correlation between fatigue and level of EDSS suggests, with the purpose of reducing the abandonment of motor activity, to manage individually the necessary recovery times within the routine exercises and between the conditioning motor sessions.

96 AP P
The effectiveness of an aquatic program on swimming skills in children with Autism

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Aim: Children with Autism presents difficulty of communication: they need specific programs to improve motor skills and social behavior (Sandt and Frey, 2005).
The aim of this study was to test the success of Aqua therapy in the development of motor performance and basic swimming skills in children with autism (ASDs).
Methods: The sample group consisted of four subjects ASDs (age 7.5 ± 1.73 yrs), participated to a 10-weeks activity programme in water, organised around two sessions per week (60 minutes each). The sessions included four phases: warm up, breathing-immersion, aquatic positioning and jumping. In the last twenty minutes of the exercise, parents were invited to accompany their children in the water, in order to known their behaviour with children (in the end the parents completed a questionnaire).
It was used 'Aquatic Orientation Checklist' to track any developments in motor performance and swimming skills.
Results: Compared to the items investigated K. has recorded an increase of 20 points, N. of 14 points, I. of 10 points and D. of 16 points, between T1–T2.
Questionnaire's results show that after participating in the aquatic program, children's strength, endurance and balance improved for 75 % of parents.
Conclusions: The results obtained show an improvement of motor performance and swimming skills. The results of the questionnaire show that the protocol used has improved the ability of parents to care for their children in water.
It can be argued that water therapy, if properly organized, can offer valuable support to children with autism and to their parents.
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EXERCISE, DISEASES AND SPORT MEDICINE

97 SM P
Physical Activity before and during pregnancy in normal weight and overweight/obese pregnant women: the TRILOGY-PA Verona Study

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Aim:s: Although the health benefit of a regular physical activity during pregnancy is well recognized, the proportion of inactive pregnant women is high. However, only a few studies have investigated the differences between normal weight and overweight/obese pregnant women in terms of physical activity (PA) volume during pregnancy. The aims of the present study were to assess the volume of weekly physical activity during pregnancy in normal weight vs overweight/obese pregnant women, and to explore which factors predict compliance to PA recommendations in these women.
Methods: In 236 pregnant women, 177 normal weight and 59 overweight/obese (median [IQR] BMI 21.2 [19.9–22.8] *vs* 26.5 [25.5–29.0] kg/m^2, respectively), maternal medical history and anthropometry, as well as glucose tolerance (by OGTT at 15–16 and 24–28 wk and by fasting glucose measurement at 30–32 wk), were recorded. GDM diagnosis was performed by the IADPSG criteria. Pre-pregnancy PA was evaluated by the Kaiser questionnaire, while total, walking and fitness/sport PA were assessed by the PASE modified questionnaire, at 15–16, 24–28 and 30–32 weeks of gestation.
Results: The prevalence of women being active ($\geq$150 minutes *per* week) throughout the pregnancy was 28.2 and 13.5 % ($p = 0.023$), respectively in normal weight and overweight/obese pregnant women. In normal weight pregnant women, minutes, days and METs of total, walking and fitness/sport PA significantly increased during the pregnancy. However, in overweight/obese women these measures of PA did not change. In logistic regression analysis, to be physically active during gestation was predicted by pre-pregnancy PA, but not by pre-pregnancy BMI, age, weight gain during pregnancy, gestational diabetes, smoke, education level and parity.
Conclusions: The prevalence of leisure-time PA is strikingly low among pregnant women, especially in overweight/obese subjects. PA volume increases during pregnancy only in normal weight women. Pre-pregnancy physical activity is the only independent predictor of meeting the recommended PA volume during pregnancy.

98 SM P
Acute effects of a 21 km walking on glucose concentrations, measured by continuous glucose monitoring system, in type 1 diabetes patients

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Aim: In this preliminary study, we have assessed, by continuous glucose monitoring system (CGMS), the effects of prolonged walking on glucose profiles in patients with type 1 diabetes (T1DM).
Methods: Seven T1DM patients (3 M, 4 F; six on insulin pump therapy, one on conventional insulin therapy; mean $\pm$ SD, age 47.2 $\pm$ 7.1 yr, BMI 23.3 $\pm$ 3.4 kg/m^2, HbA1c 7.4 $\pm$ 0.4 %) were studied. They underwent 21 km of walking during the RUNforSCIENCE 2015 meeting. The CGMS was applied two days before the walking session and blood glucose was recorded over the following seven days. Glucose concentrations during exercise, the subsequent night, and the 24-h period following exercise, as well as during the corresponding periods of a non-exercise day were measured, and glucose variability and time spent in hypoglycemia or hyperglycemia were calculated. Carbohydrate intake and amount of injected insulin were also assessed.
Results: T1DM patients completed the 21 km of walking in a mean time of 228 $\pm$ 30 min, speed 5.6 $\pm$ 0.78 km/h. During walking, glucose level significantly declined as compared with a non-exercise day ($p < 0.001$). Carbohydrate intake and mean blood glucose in the 24-h and nocturnal periods were similar during the exercise and non-exercise days, while total amount of injected insulin was less during the exercise day ($p < 0.01$). In particular, basal insulin but not bolus insulin was lower during the exercise day. No differences were found in glucose variability, and time spent in hypoglycemia or hyperglycemia, during the 24-h period after the exercise or non-exercise day.
Conclusions: Prolonged moderate-intensity aerobic exercise does not show adverse effects on blood glucose levels and glucose variability in T1DM patients, while reducing insulin needs. We hypothesize that insulin pump therapy combined with CGMS may be a useful tool in preventing hypoglycemia in DMT1 patients who undergo long duration aerobic exercise.

99 SM P
The use of hyaluronic acid in chondral disorders of the knee: Regenflex Starter versus Bioplus in traumatic diseases

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Aim: Literature has scientifically proven that the presence of collagen hydrolysate and alkaline phosphatase in articular fluid is a clear indication of cartilage reconstruction.
Materials: and Methods: 34 patients for knee sport injuries: 20 m. 14 f. All chondrophaties of 2nd to Kellgren—Lawrence, an ECO upon 12 months. Cyclic for all ELISA TEST and doses of acid and alkaline phosphatase, HA, metalloproteases, leukine and collagen hyidrolisate. Regenflex Starter and Bioplus (7 days) 1st. Regenflex Starter two injection (7 days) for 2st. Pain and joint mobility was assessed for every patients every 3 months using the Womac index and Primus.
Results: 1st method obtained complete recovery of joint mobility, which was permanently lower than that of the other group over all six months.1st the inflammation and cartilage reconstruction indices showed a no significantly lower performance compared to the opposite group. The 2st, showed a slower but constant improvement of pain full symptoms compared to the 1st with a much lower number of relapses. 2st, the inflammation index was significantly lower than the opposing group until the end of the trial; the cartilage repair was much higher

compared to the other group. The ECO showed the results of the 1st is better than 2st, especially about to chondral "connection" of the newly formed tissue compared to the lower surface. Evidence of inelasticity and unevenness was shown, which was not reported in the 2st where, cases of reconstructive hypertrophy were reported.
Conclusion: Bioplus and Regenflex Starter is the only one that guarantees both viscosupplementation a cartilage repair. This therapeutic action cannot be successfully reproduced in a single simultaneous administration of the two fractions. Therapeutic action is dose and time dependent; the two phase cycle includes an interval between the high density fraction and the others and, a higher dose of low-density HA is administered, for partial permeability of the synovial membrane, thereby proting production of endogenous by synoviocytes, as well as normalization macrophages and interleukins-metalloproteases synthesis.

100 SM P
Manifestations of central and peripheral fatigue in a facioscapulohumeral dystrophy patient

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Aim: In facioscapulohumeral muscular dystrophy (FSHD) fatigue is a critical symptom flag of the pathological processes leading to muscle wasting but is currently unknown the relative contribution of central and peripheral mechanisms to perceived fatigue.
Methods: We examined 1) the myoelectric manifestations of central (fractal dimension, FD) and peripheral (conduction velocity, CV) fatigue in a FSHD patient (female, age: 23, Score 1 according to Lamperti et al. 2010). and 2) whether fatigue precedes or follows detectable alterations of the muscle by muscle MRI. Surface EMG signals were recorded in biceps brachii short head during isometric contractions at 20 % and 60 % of the MVC (120s for 20 % and till exhaustion for 60 %) at 90 degrees knee joint angle. Initial values and rate of change (slope) of Mean Power Frequency (MNF), CV and FD of the EMG signal were calculated. Total body muscle MRI was also obtained.
Results: MRI revealed no abnormalities in the biceps brachii bilaterally. A difference in CV slope was observed in the right biceps brachii compared to the left at 20 % MVC (right −0.044 vs left −0.034 %/s) and 60 % MVC (right −0.506 vs left −0.06 %/s) with a shorter duration of sustained contraction (right 58s vs left 22s). This change was associated with a positive MNF slope at 20 % MVC (right +0.02 vs left −0.0083 %/s) and a higher MNF slope at 60 % MVC: right −0.9 vs left −0.04 %/s. A higher FD slope was also observed in the right side at both force levels (20 % MVC: right −0.011 vs left −0.0058 %/s; 60 % MVC right −0.08 vs left −0.01 %/s)
Conclusions: These results highlight the arising of higher peripheral and central fatigue and in the right biceps without phonotypical alterations detectable with muscle MRI.
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101 SM P
Breast cancer survivors, lymphedema and Nordic Walking: the additional effect of the ISA METHOD

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Aim: lymphedema is one common negative effect of surgical treatment of breast cancer. Therefore, early proper physical exercise practice is very important to allow functional and physiological recovery of the arm. Nordic Walking (NW) has been shown effective for lymphedema reduction as it allows the active use of upper limbs during walking. As novice nordic walkers had a reduced active use of upper limbs until the whole technique is learned, aim of our study was to investigate the effectiveness of a series of NW-based exercise (ISA method) as additional therapy for lymphedema. **Method:** 15 breast cancer survivors (BCS), one year after surgery treatment, were investigated for body composition, upper limbs anthropometry and neck, shoulders, upper limbs, hamstrings and lower back kinesiological characteristics. BCS were randomly assigned to NW ($n = 7$) or NW ($n = 8$) + ISA METHOD workouts. Both subgroups followed the same scheme: 15 min of warm-up, 40 min of teaching phase, 10 min of cool down. The only difference between subgroups was that one of them added the ISA METHOD, during the warm-up and cool down phases, to ANWI-INWA suggested exercises.
Results: Subgroups had the same compliance: 100 %. After 10 lessons, subgroups significantly increased muscle flexibility, and both neck and shoulders ROM, independently from subgroup membership. On the contrary, statistical analysis showed the presence of a subgroup membership effect for upper limb circumferences ($p = 0.02$) and extracellular water ($p = 0.01$): only NW + ISA METHOD group decreased both of them.
Conclusion: Until NW executive technique is completely learned, the active use of upper limbs is impaired. Therefore, lymphedema could not completely benefit from the "pump effect" of the open–close cycle of the hands. To insert the ISA method to ANWI-INWA suggested exercises, until the NW technique is completely learned, allows to early reduce lymphedema of BCS upper limb.

102 SM P
PCOS and muscle strength: preliminary results in normal weight women

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Background and aim: Polycystic ovary syndrome (PCOS) is a very common endocrinopathy in reproductive-aged women, characterized by hyperandrogenism, chronic anovulation and polycystic ovaries on ultrasound. PCOS is also frequently associated with body fat excess and insulin resistance, factors that may limit physical performance. However, androgen excess could be an advantage, in these women, in terms of increased muscle strength and performance. To date, only few studies in overweight/obese women have addressed the possibility that PCOS may be associated with changes in muscle strength, with controversial results. The aim of this study was to assess muscle strength in a sample of normal weight PCOS women, to avoid the confounder effect of excess body fat, compared with healthy controls.
Methods: Eight women with PCOS and 10 age- and BMI-matched healthy controls, with a similar level of habitual physical activity, were recruited. The strength of the knee extensor muscle of the dominant leg was assessed by isokinetic dynamometry at two different rates of execution (30°/s and 120°/s) in concentric and eccentric phase, whereas muscle architectural characteristics (thickness, fascicle length and pennation angle) were analyzed by ultrasound scan of the vastus lateralis muscle. Anthropometric and metabolic features, serum total and free testosterone levels (as measured by LC-MS/MS and equilibrium dialysis) were also assessed.
Results: As expected, testosterone levels were higher in PCOS women as compared with controls, while no significant differences were observed in body composition and metabolic features between the two groups. The PCOS group showed greater isokinetic muscle strength in concentric phase at slow rate of execution (30°/s) (difference between groups 17 %, $p = 0.04$), whereas borderline differences were observed at higher rates of execution. No differences in muscle architectural characteristics were found.
Conclusion: This preliminary study suggests that women with PCOS have increased muscle strength. Further research should assess whether this phenomenon may be related to differences in muscle fiber expression.

103 SM P
The effects of pilates exercise training on physical fitness and wellbeing in the elderly: a systematic review for future exercise prescription

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Aim: This systematic review aims to summarize the effects of Pilates exercise training (PET) in elderly population on physical fitness, balance and fall prevention, and its effects on mood states, quality of life and independence in the daily living activities.
Methods: Keyword "Pilates" associated with "elderly", "aging" and "old subjects" were identified as terms for the literature research in MEDLINE, Embase, PubMed, Scopus, PsycINFO and SPORTDiscus. Only studies published in peer-reviewed journals written in English language were considered. A meta-analysis was performed and effect sizes (ES) calculated.
Results: 10 studies were identified (6 RCTs and 4 uncontrolled trials); age ranged from 60 to 80 years. Overall, PET showed large ES to improve muscle strength (ES = 1.23), walking and gait performances (ES = 1.39), activities of daily living, mood states and quality of life (ES = 0.94), moderate to high effect on dynamic balance (ES = 0.77), small effects on static balance (ES = 0.34) and flexibility (ES = 0.31), while a small effect on cardio-metabolic outcomes (ES = 0.07).
Conclusions: PET should be taken into account as a way to improve quality of life in the elderly, due to the imparted benefits of fall prevention, physical fitness, and mood states. In this context, physicians might include PET as a tool for exercise prescriptions for the elderly.

104 SM P
Assessment tests to predict work injuries in waste collector workers

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Aim: This study is aimed at assessing the relationship between individual work injury incidence and the physical fitness level in operators working in urban differentiated waste collection.
Methods: A sample of 43 male workers (age 46.3 ± 8; weight 93.5 ± 19.4; height 176.7 ± 7.1) underwent, in three separate days, a body composition analysis (Bioimpedance method, BIA vector), a postural balance control in the bipedal posture under eyes open and closed conditions (force platform), two core stability (front and back plank test) and a leg and back maximal isometric force (leg and back strength test). All the measured parameters have been compared with reference values reported in the ACSM guidelines or in the recent literature. Then, they have been related with the incidence of National work injuries data.
Results: The subjects showed an average BMI value of 29.9 ± 5 (for ACSM, type I obesity corresponds to a BMI of 30–34.9); the body composition analysis showed an average Body Fat of 24.8 % ± 10.1 (in the ACSM Fitness Categories for Body Composition, % BF, ranging from 24.2 to 26.6 in men aged 40–49 is Poor); postural balance control showed high ML and AP amplitude spectral windows at long periods (>5 seconds); the core stability log ratio (0.7 ± 1.8) was significantly lower with respect to the expected value (Calavalle A.R. et al. 2013). On the other hand, maximal leg and back isometric force were very high (percentile), being 227.7 ± 57.8 and 183 ± 42, respectively. The relative data about job related injuries highlight that 35 % of the total is due to falls.
Conclusions: The level of physical fitness of waste collectors showed that Type I obesity and low core stability levels, in combination with the inability to keep for long periods the bipedal position, lead to a postural instability causing an increased fall risk. These results provide clear indications on the objectives to be pursued in order to reduce fall related injuries. These are: weight loss, improved core stability levels and increased proprioceptive capabilities.
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105 SM P
Postural control is impaired in kidney transplant recipients

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Aim: The prevalence of sarcopenia and frailty is high in kidney transplant recipients (KTRs) and it seems to occur at a younger age compared to the general population (Ozkayar et al., 2014). A reduced muscle mass, associated with lower muscle strength, could determine an overall impaired postural control in these patients. Therefore, the purpose of this study is to compare the static balance in KTRs with healthy matched individuals, in single and dual-task conditions.
Methods: Twenty KTRs and twenty healthy adults, matched according to age, weight and height, were tested in single and dual task situation on a stabilometric platform. Postural sways were measures in participants during Romberg position in three different conditions: Opened Eyes (OE), Closed Eyes (CE), and Dual-Task (DT). Sway path (SP), sway area (SA), anterior-posterior oscillations (AP) and medio-lateral oscillations (ML) were assessed in all testing conditions.
Results: Sway path (SP), sway area (SA) and medio-lateral oscillations (ML) were significantly lower in healthy adults compared to KTRs, in both opened and closed eyes conditions. No statistically significant differences were detected for all dependent variables in dual-task condition.
Conclusions: Results indicated a decreased in static balance performance in KTRs compared to the healthy adults in single task situations, but not in dual task condition. At the best of our knowledge, this is the first study investigating static balance in people living with a kidney transplant, so future investigations should analyze the factors that could be linked to the poor postural control observed in KTRs in the current study.

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106 SM P
Role of exercise in the treatment of breast cancer

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Aim: The exercise is not only able to improve the quality of life in breast cancer survivors, but it should be considered a nonpharmacological therapeutic technique. After surgical treatment, physical exercise allows to improve shoulder and arm mobility, pain and mood disturbance.
Methods: 100 breast cancer survivors (median age 56 years)underwent a 2 months program of specific adapted exercise. They were evaluated before and after the treatment as concerns the shoulder-arm mobility, and shoulder range of motion (ROM) was determined.
The pain was evaluated by means of numeric rating scale (NRS), while specific tests were used to evaluate psychological aspects.
Results: The results suggest a real efficacy of physical exercise in the treatment of breast cancer survivors.

107 SM P
Role of exercise therapy in preventing diabetic foot

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Aim: The limited joint mobility at the ankle and foot level, the impaired muscular performance and the reduced gait speed are risk factors for diabetic foot. We tried to evaluate the effect of an protocol of exercise therapy specific for these problems in a group of long-standing diabetic subjects.
Methods: 15 patients underwent treatment, while 15 were controls. The protocol consisted in 3 months of supervised exercise; joint mobility and muscular strength at the ankle were measured before and after the training program, by an inclinometer and by isometric dynamometers.
Results: In diabetic subjects joint mobility at ankle, as muscular strength at ankle, were significantly reduced in diabetic patients, and they significantly increase after training. Consequently, the walking speed increased after training (0.28 m/s).
Conclusions: In conclusion, the supervised training program significantly improves joint mobility, muscular performance and walking speed in diabetic patients, thus playing role in prevention of the diabetic foot.

108 SM P
A structured program of counseling and physical activity in diabetes patients

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Aim: Physical activity (PA) and nutrition play a central role in the prevention and treatment of type 2 diabetes mellitus (DM2). A care model based on Movement/Nutritional Counseling (MNC) and Adapted Physical Activity (APA) was created to support the therapeutic path of patients with DM2. Activities were founded by the Ministry of Health.
Methods: Doctors who adhered to the initiative in the province of Naples, recruited subjects with DM2 (50–70 years old) without severe comorbidities. Some of them participated voluntarily to APA program (60 minutes, 2–3 days a week), which included exercises for training of cardiovascular, muscular and osteoarticular systems; the others constituted a control group. Periodically collective meetings, led by counselors, were organized to discuss with participants about the importance of nutrition and PA in the management of DM2. Anthropometric and clinical-metabolic parameters, food habits, lifestyles, quality of life (Short Form 12) and movement performances (Senior Fitness Test) were evaluated at the start of the activities and then quarterly. Student t-test was used to compare parameters measured before and after the program; ANOVA was employed in the participant-control comparison.
Results: Data showed a significant improvement ($p < 0.05$) of clinical and metabolic parameters [BMI (−14 %), blood sugar (−16 %), hypertension (−8 %), waist circumference (−12.5 %)] in the "active" group, while no similar variations were registered in the control group ($p < 0.05$); flexibility, strength and agility were also increased. An improvement in perceived health status and quality of life was also registered among participants.
Conclusions: These findings showed the efficacy of a structured program of APA and MNC in the management of DM2. It is hoped

that a similar model will be further adopted and applied in the Italian territory.

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109 SM P
Functional evaluation of orthopedic pillows in the prevention and treatment of skeletal muscle disorders of idiopathic cervical pain

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Aim: The study aimed to evaluating the benefits induced by three different types of orthopedic pillows like cervical support in regulating skeletal muscle function of the cervical spine and the determination of any relations with other skeletal-muscle and gnathologic apparatus.
Methods: We tested three different types of pillows: Ortophedic Pillows, Ortophedic Pillows Memofoam and Ortophedic Pillows Ergo Praxis, that were molded and made with different materials for specific uses by Fabe srl Factory of Calcio (BG) Italy.
We studied 15 heterogeneous subjects with neck pain, aged between 18 and 23 years. They were randomly divided into 3 groups of 5 subjects, and evaluated with psychological tests, according to strict clinical inclusion and exclusion criteria. They have been subjected at: Test Neck Disability Index; instrumental evaluation of Mobility and Articulation of the Cape by Free4 Act sensor; detection of the 3D morphology of the trunk for postural aspect by "Spinometria Formetric" and Baropodometric—Stabilometric evaluation: surface electromyographic measures of the Neck-skull—mandibular district by BTS TMJOINT instrument.
Results: From the data, we have had no statistical significance in the case of a short rest (2h), while in assessments of a more long term (all night), the data reach statistical significance.
Conclusions: The important significance in the use of the device in the longer term, leads us to consider these specific pillows as an effective orthosis that could be used in the treatment and prevention of the cervical diseases and postural tensive muscle disorders.

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110 SM P
Effects of cognitive and exercise treatments on physical performance in patients with Alzheimer's diseases. Effects of cognitive and exercise treatments on physical performance in patients with Alzheimer's diseases

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Aim: Both, physical function (PF) and execution of everyday tasks (ET) are severely compromised in patients with Alzheimer's disease (AD). Interestingly, it has been shown that physical activity (PA) and cognitive stimulation (CS) positively impact the cognitive deterioration of patients with AD. However, the effects of PA and CS on PF and ET are still matter of debate. Therefore, the aim of this study was to compare the effects of PA treatment with respect to CS therapy on PF and ET in patients with AD.
Methods: Twenty-three patients with AD (71 ± 6 years) were randomly assigned to PA group (n = 12) or CS group (n = 11). All the subjects performed 72 treatment sessions, 3 times a week. PA included moderate intensity aerobic and strength training. CS included multi-modal stimuli (visual, verbal, auditive). Before and after 6-month of treatments, physical performance test (PPT), 6-minute walking test (6MWT), and gait parameters (speed, stride, step, stance, swing, and cadence) were measured.
Results: The subjects completed all the 72 training sessions. PPT was unchanged in PA, meanwhile was decreased by 17 % in CS ($p = .01$). 6MWT increased by 12 % in PA ($p = .05$) but was maintained CS. Gait speed increased by 18 % in PA ($p = .02$), and decreased by 13 % in CS ($p = .03$). Stride was stable in PA, but decreased by 9 % in CS ($p = .04$). Step, stance, swing and double support were stable in both groups. Double support decreased by 8 % in PA ($p = .03$) and was unchanged in CS. Cadence increased in PA ($p = .05$), and decreased in CS ($p = .05$).
Conclusion: Data from the current study suggested that the progressive reduction in physical function, usually exhibited in patients with AD, was reversed by a program of ET. Further benefits of ET were retrieved in the maintenance of the everyday tasks performance. CS seems less effective in comparison to the ET treatment.

111 SM P
Gait variation in Facioscapulohumeral dystrophy (FSHD)

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Aim: Facioscapulohumeral dystrophy (FSHD), the third most common inherited muscular dystrophy, is an autosomal dominant progressive myopathy causing motor impairment and mobility limitation (Padberg,1982). The aim of the present study was to investigate whether the clinical score defined according to Lamperti et al. 2010 has a counterpart in gait variations analyzed by four camera 3D motion analysis system (SIMI Twinner Pro) and a walking protocol on the treadmill.
Methods: Four facioscapulohumeral dystrophy (FSHD) patients of both genders with different score have been selected (age 16–50, score 0, 1, 2, 4). Four healthy subjects were used as controls (age 20–50). Subject undertook a three steps walking protocol on the treadmill as follows: Step 1: 3 min walk in steady state chosen by the subject; Step 2: 3 min walk medium intensity (sustainable speed without running); Step 3: 3 min walk at the same speed of the first step. After one minute of every step, heart rate was checked and 10 sec of video were recorded. Helen Hayes clinical marker set was used to identify anatomical locations in

human movement. Shoulders and arm fluctuation were the main joint analysed. Biomechanical data were processed via Excel and evaluated in comparison with healthy subjects.
Results: The biomechanical assessment showed asymmetry in left and right arm oscillation during elbow flexion as the score rises (±1 deg Score 1 [G1] to ±5 deg Score 3[G2]). The control group showed the same impairment as the score 1 patients. The heart rate increased as the walking speed become higher and in the patients, despite the speed of the third step was slower, the heart rate remained constant.
Conclusions: The results provide an initial overview of gait variations related to clinical score in FSHD patients. More studies are required to set a defined standard.
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112 SM P
Two years of individualized post stroke APA program: a cases study

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Aim: Aim of the study is to verify efficiency of a two years Adapted Physical Activity (APA) program for people that suffered a stroke. APA program started after rehabilitation period.
Methods: Research is a cases study. Three subjects (60–79 years old) who suffered a stroke followed individualized APA programs three days a week. Data were collected four times: September 2012, May 2013 (after eight month of APA), September 2013 (after four month of inactivity—follow-up) and May 2014 (after the second period of eight month of activities).The adopted parameters were: BMI, Waist-hip ratio (WIR), 2' Step Test (2ST), Foot up and go (FUG), Chair Sit and Reach (CSR), 30'' Chair stand (30CS), Ten meters (10M), Romberg test (RT), 1RM Leg extension (LE). individualized training program included balance, endurance, flexibility and strength exercises.
Results: Results show differences between the two years training program. All subjects were and remained overweight; BMI increased in two subjects (+3.3 % and +7.1 %) while in the fatter subject it remained stable. The WHR decreases in one subject (−10 %), remained steady in another but in the fatter subject increased (+10 %). RT increased in T1 and maintained improvement in all next assessment (48.9 % ÷ 53.3 %). Two subjects improved FUG test (−3.3 % and −6.8 %) while one widely worsened (+28.6 %). 10M test improved for all (5.0 % ÷ 11.8 %). In 30CS two subject greatly improved (50.0 % and 55.6 %) while one slightly decreased (−8.3 %). LE improved in all subjects (40.8 % ÷ 79.8 %). All subjects improved CSR test (4.0 ÷ 8.0 cm). In 2ST two subject slightly improved (2.9 % and 9.4 %) while one greatly decreased (−43.1 %).
Conclusions: The anthropometric values (BMI and WHR) seem substantially stable and the large improvement of strength (LE and 30CS) may indicates a better ratio between lean and fat mass. Also the improvement of balance and 10 meters test may be related with a better lower limb strength. It is reasonable to argue that APA programs should be easily accessible to persons with stroke outcomes.
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113 SM P
Glycemic response to acute exercise in type II diabetes: training type or energy expenditure?

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The role of energy expenditure (EE) on the acute blood glucose response to different types of exercise remains unclear
Aim: We tested the hypothesis that EE is the main determinant of acute changes in glycemia during a training session.
Methods: 12 overweight patients (10 M, 2 F; mean ± SD age 64 ± 5 yrs), with uncomplicated type II diabetes on oral hypoglycemic drugs, performed the following 4 supervised, training sessions, one session *per* week, in randomised order: *i*) aerobic training (A, treadmill walking at constant, moderate intensity) lasting 30 min (A30); *ii*) A lasting 60 min (A60); *iii*) isotonic training (I, isotonic exercises) lasting 30 min (I30); *iv*) I lasting 60 min (I60). Oxygen consumption and respiratory exchange ratio (R) were measured throughout the training sessions and EE was calculated based on the energy equivalent of O_2 and R. Glucose (Glu) was determined from capillary blood samples at rest and every 5 min during exercise.
Results: EE was significantly higher for the longer duration sessions (i.e. 30 vs 60 min) and it was significantly higher for A than for I training sessions of equal duration (A30 200 ± 47 Kcal; A60 400 ± 119 Kcal; I30 116 ± 39 Kcal; I60 218 ± 92 Kcal). Glu was significantly reduced as a result of all training sessions. Significantly larger reductions were observed for the longer sessions and for A compared to I sessions of equal duration (I30 −7 ± 6.3 % of pre-exercise value; I60 −24 ± 19 %; A30 −19 ± 8 %; A60 −35 ± 17 %) (repeated measures ANOVA). Changes in Glu could be predicted based on a linear combination of EE ($p < 0.001$) and pre-exercise Glu ($p < 0.001$) ($r = -0.71$). On the contrary, exercise type *per se* does not appear to play a role.
Conclusions: EE appears to be the main exercise-related determinant of acute changes in Glu occurring during a training session.

EXERCISE PHYSIOLOGY

114 EP P
Effects of respiratory muscles training on vascular function

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Aim: Respiratory muscles training (RMT) leads to a decrease in sympathetic drive and to a subsequent drop in systolic and diastolic blood pressure. This may improve vascular function. However, scientific evidence is actually lacking about the effects of RMT on vascular function.
Methods: Eighteen physically active participants (5 males and 13 females) were randomly assigned to a training group (TG: age 27 ± 8, BMI 24 ± 4; RMT 3 times a week for 2 months) or to a sham group (SG: age 34 ± 15, BMI 24 ± 4; 8 weeks of RMT familiarization) after 1 week of familiarization. Maximal inspiratory mouth pressure (MIP) and maximum voluntary ventilation (MVV) were utilized to assess the effects of RMT. Heart rate variability (HRV) defined the activity of autonomic nervous system. Vascular function was assessed by pulse wave velocity (PWV), flow mediated dilation (FMD) and carotid lumen diameter (cLD) through ultrasound measurements.
Results: After 8 weeks, MIP and MVV increased by ~40 % and ~9 %, respectively, in TG ($P < 0.05$), but not in SG. However, no differences were found in HRV parameters and in PWV, FMD, cLD values after RMT.
Conclusion: Despite a significant effect on MIP and MVV, data from the current study indicate a not detectable effect of RMT on vascular function. Therefore, the increase in respiratory function didn't induce changes in vascular function, likely because of the normal sympathetic drive and normal blood pressure of the selected participants. Further studies on hypertensive individuals may be required to disclose RMT effects on vascular function.

115 EP P
Comparison of the physiological responses to matches differing in scoring system in badminton professional players

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Aim: Badminton is one of the most popular sports in the world. It is characterized by high-intensity intermittent actions and different performance factors, such as technical, tactical, and conditional aspects. The actual scoring system consists of 3 games up to 21 points (3 × 21). Recently, the Badminton World Federation is planning to introduce a new scoring system with 5 games up to 11 points (5 × 11). Therefore, the aim of the study was to compare the physiological commitment during badminton matches played with the two different scoring systems.
Methods:.Seven male professional players (age 20.4 ± 3.8 yrs; body mass 67.3 ± 5.5 kg; height 1.79 ± 0.03 m; BMI 20.9 ± 0.8 kg*m^{-2}; VO_2peak 54.8 ± 6.7 $mlO_2 \cdot min^{-1} \cdot kg^{-1}$) participated in the study.
Players performed a maximum ramp incremental test on a treadmill. On different days, each athlete played one match with the actual (3 × 21) and one with the new scoring system (5 × 11), in random order. During test and matches, the cardiorespiratory and metabolic data (oxygen uptake, VO_2, expiratory ventilation, VE; heart rate, HR) were collected on a breath-by-breath basis by a metabolimeter, together with blood lactate concentration ($[La^-]$). From VO_2 and respiratory quotient data, total and per minute energy expenditure (EE) were calculated off-line.
Results: At peak exercise, VO_2, VE, HR and $[La^-]$ were 3661 ± 124 $ml \cdot min^{-1}$, 152 ± 6 $l \cdot min^{-1}$, 196 ± 3 $beats \cdot min^{-1}$ and 8.96 ± 0.70 mM, respectively. Total EE was significantly higher (2012 ± 125 vs 1791 ± 59 kJ; $P < 0.05$) in 3 × 21 compared to 5 × 11. No significant differences were found between the two types of match in average VE, HR, $[La^-]$, and EE per minute. VE during matches reached, on average, 53 ± 2 % and 60 ± 10 % in 3 × 21 and 5 × 11, respectively, of that achieved during maximal treadmill exercise. HR reached 86 ± 2 % and 85 ± 2 % of maximum in 3 × 21 and 5 × 11, respectively.
Conclusions: The new scoring system (5 × 11) proposed by the Badminton World Federation, despite a similar physiological commitment with respect to the actual system (3 × 21), requires a lower total EE. Therefore, according to the present findings, should this new scoring system be adopted, some changes in training modalities need to be introduced.
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116 EP P
Central and peripheral fatigue in lower and upper limbs after cross-country ski race

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Aim: Although elbow extensors (EE) have a great role in cross-country skiing propulsion, previous studies on neuromuscular fatigue investigated only knee extensors (KE) muscles. Hence, the aim of the study was to determine the origin of fatigue after a cross-country ski race on both KE and EE.
Methods: Sixteen well-trained athletes were tested before and immediately after a 56 km long classical technique race. KE and EE forces were obtained under voluntary and electrically evoked isometric contractions. Maximal voluntary isometric contraction (MVC), rate of force development (RFD) were obtained for KE and EE. Electrically induced twitch produced during MVC [interpolated twitch (IT)], and at rest [resting twitch (RT)] were measured and the level of voluntary activation (VA) during each MVC was calculated as $VA(\%) = 100(1 - IT/RT)$.
Results: MVC forces decreased after the race in both muscles (KE: −13.0 %, $p < 0.001$; EE: −8.4 %, $p = 0.002$) as well as RFD (EE: −25.0 %, $p < 0.001$; KE: −16.5 %, $p = 0.01$). The decrease of MVC was higher in KE than in EE ($p = 0.01$) whereas the decrease of RFD was greater in EE than in KE ($p = 0.01$).
VA decreased in both muscles (KE: −10.7 %, $p < 0.001$; EE: −5.0 %, $p = 0.002$), as well as rest twitches (KE: −11.2 %, $p = 0.001$; EE: −34 %, $p = 0.01$). VA did not show significant differences between the two muscles ($p = 0.3$), whereas rest twitch reductions were greater in EE than in KE ($p = 0.03$).
Conclusions: The cross-country ski race caused marked reduction of MVC (greater in KE) and RFD (greater in EE). Our findings suggest that the origins of strength loss were multifactorial, in fact, both

muscles showed central and peripheral signs of fatigue. The extent of central fatigue did not differ between muscles, whereas peripheral fatigue was greater in EE.

117 EP P
Functional Magnetic Stimulation: what it isn't, what it is, what it will be

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Aim: Functional Electrical Stimulation (FES) is a specific type of neuromuscular electrical stimulation that replicates the body's own motor neuron signal to obtain a coordinated limb or body movement. FES was extended to long term denervated muscles when spinal cord injury skin anesthesia was complete. Pain sensation limits, indeed, current intensity and thus applicability of transcutaneous FES.
The improvement of a peculiar exercise chair has recently made possible to activate and strengthen the muscles used in standing, walking and climbing stairs by functional magnetic stimulation (FMS).
Methods: The introduction of FMS will represent a paradigm shift for assisted exercise, since skin pain sensation is avoided. The alternative (FES) requires to remove clothing to attach electrodes to the exposed skin. FMS is not the "magnetic therapy", a non-invasive treatment which gives pain relief and speeds up healing processes, by increasing blood flow to the areas that are treated with magnetic fields.
Results: FMS is a non-contact (user can wear their clothing) muscle-strengthening method that may be provided in sitting or lying position. FMS used for pelvic floor rehabilitation is now extended to leg muscles rehabilitation. FMS is safe for users, carers and medical teams.
Conclusions: FMS should be considered in nursing facilities and in critical care when patients are unable to perform volitional exercise. Extension to sport science is obvious.
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118 EP P
Electromechanical delay components during skeletal muscle contraction and relaxation in patients with myotonic dystrophy type 1

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Aim: The electromechanical delays during muscle contraction ($Delay_{TOT}$) and relaxation ($R\text{-}Delay_{TOT}$) can be partitioned into mainly electrochemical and mechanical components by an electromyographic (EMG), mechanomyographic (MMG), and force (F) combined approach. Their assessment could provide new insights on the alterations that characterize skeletal muscle dysfunction in patients with myotonic dystrophy type 1 (DM1).
Methods: $Delay_{TOT}$ and $R\text{-}Delay_{TOT}$ components duration and reliability were investigated during muscle contraction and relaxation in thirteen DM1 (age: 38 ± 15 yrs; body mass: 75 ± 14 kg; stature:1.78 ± 0.07 m; mean $\pm$ SD) and in thirteen age- and body-matched healthy controls (HC) from *tibialis anterior* and *vastus lateralis* muscles during maximum voluntary and electrically-evoked isometric contractions. Possible correlations between $Delay_{TOT}$ and $R\text{-}Delay_{TOT}$ components and scores for clinical evaluation in DM1 patients (MRC, MIRS and Rivermead score) and their genetic characterization (number of CTG expansion) were also determined.
Results: Force was lower in DM1 than in HC under both experimental conditions. $Delay_{TOT}$ and $R\text{-}Delay_{TOT}$ components were significantly longer in DM1 in both muscles, with a similar impairment of the electrochemical and mechanical components. Measurements reliability was very high (ICC from 0.82 to 0.97). $Delay_{TOT}$ and $R\text{-}Delay_{TOT}$ correlated with MRC, MIRS, Rivermead scores and CTG expansion (R^2 from 0.439 to 0.975).
Conclusions: The differences between DM1 and HC in $Delay_{TOT}$ and $R\text{-}Delay_{TOT}$ components, the high reliability and the strong correlations with the clinical scores and CTG expansions suggest that the EMG, MMG and F combined approach may represent a valid tool to assess the level of neuromuscular dysfunction.
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119 EP P
Relationships of leptin with body dimensions in normal, overweight and obese adolescents

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Introduction: The relationships of leptin with different anthropometric parameters, in normal, overweight and obese peripubertal boys, is not completely understood. Aim of the present investigation is to assess possible relationships of leptin with skinfolds thicknesses, and body segments in different BMI groups of prepubertal boys (Tanner).
Methods: A sample of 248 boys (age 10–12 y) were divided (Cole et al. 2000) into three BMI subgroups: normal weight, $n = 190$ (BMI $<$ 19.8–21.9); overweight, $n = 34$ (BMI $<$ 24.0–26.8) and obese, $n = 24$ (BMI $\geq$ 24.0–26.8). 9 skinfolds and 13 circumferences were measured and the waist-to-hip ratio was calculated. A 10 ml blood sample was obtained from the antecubital vein with the participant sitting in an upright position in the morning (8–9 a.m.) after

an overnight fast. Leptin concentrations were determined by an ELISA sandwich method.

Results: Body height was related to leptin in the total group. Body mass correlated significantly with leptin only in total and normal BMI groups and finally leptin did not correlate significantly with the BMI in the obese group. In subgroups of normal and overweight boys, the relationships between all skinfold thicknesses and leptin were significant. Sum of 9 skinfold thicknesses correlated significantly with leptin in all groups ($r = 0.558$–0.779). In the total group, all measured circumferences significantly ($p < 0.001$) correlated with leptin ($r = 0.328$–0.724) controlling for pubertal status and age. Surprisingly, in the obese group none of measured circumferences significantly correlated with leptin. Waist- to- hip ratio correlated significantly with leptin only in total group. Stepwise regression analysis with skinfold thicknesses and circumferences used in separate groups, showed that in total group, the sum of 9 skinfolds was the main predictor of leptin concentration ($R2 \times 100 = 30.7$ %). Thigh and wrist circumferences were the most important ($R2 \times 100 = 28.9$ %). In the normal BMI group, sum of 9 skinfolds with supraspinale skinfold thickness best characterized the leptin concentration ($R2 \times 100 = 33.1$ %). The most important circumferences were thigh and calf ($R2 \times 100 = 23.9$ %). In the overweight group, the highest predictor from the skinfold thicknesses was triceps ($R2 \times 100 = 66.4$ %) and arm relaxed circumferences ($R2 \times 100 = 55.6$ %).

Conclusions: There were not any significant relationships with measured circumferences and leptin in obese group.

120 EP P
Oxytocin variation during competition in amateur mixed-gender volleyball players

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Aim: Oxytocin plays a key role in human social behaviors. Team sports, as volleyball, may represent a novel and an ideal setting that researchers could use to better elucidate the role of this hormone. The aim of this study was to investigate the salivary level of oxytocin during an amateur mixed-gender volleyball competition.

Method: Thirteen volleyball players (6 men and 7 women: 31.4 ± 3.7 yrs) from an Italian mixed-gender volleyball team were included in the study. Saliva samples were collected immediately before and after each match. Individual performance was observed during each match. Oxytocin was measured by means of ELISA kit. A repeated measured ANOVA was used to evaluate changes in oxytocin before and after the matches. A mixed design ANOVA was used to assess the impact of gender on hormone change. Correlation between variables was evaluated by Pearson's correlation coefficient.

Results: We observed a significant increase in salivary oxytocin levels in players after the matches ($p < .05$); this effect was not mediated by genre. This increase in oxytocin level showed a positive, although not statistically significant, trend: change in oxytocin levels tended to be higher in more decisive matches (play-off vs regular season). Change in salivary oxytocin levels negatively correlated with the number of errors done in the match ($r = -0.56$. $p = 0.05$), the number of errors in previous matches seemed to be positively correlated with basal oxytocin level in the subsequent match ($r = 0.68$, $p = 0.041$).

Conclusion: Our results suggest practicing volleyball is associated with an increase of oxytocin secretion in the team components. Additionally, individual performance and match importance have been correlated with a greatest increase of oxytocin secretion.

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121 EP P
Estimated energy expenditure of Army Loaded Run in Italian Ranger trainees

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Among the specific tasks performed during training and operational life in Italian Army Rangers, the march in full military equipment on variable distances (i.e. Army Loaded Run (ALR)) has not been previously characterized.

Aim: our objective was to determine the energy expenditure of ALR.

Methods: A random sample of professional male soldiers enrolled in the Army Rangers Training program (#47, age 25 ± 3 years, body weight 78 ± 9 Kg, height 179 ± 7 cm) performed either a 10 (#16), 15 (#16) or 20 Km (#15) ALR, at the maximum possible speed, in full military asset (rifle 2.4 kg, combat uniform 2.4, backpack 15–20 kg). Heart Rate (HR) was recorded as 10-s averages throughout the run. Individual VO_2 was estimated based on HR_{index} (actual HR/resting HR) and the following equation: VO_2 (L* min^{-1}) = {[(HR_{index} * 6) − 5] (3.5 body weight)}. Then the Energy Expenditure was calculated based on an energy equivalent for VO_2 equal to 5 Kcal* L^{-1}. Data were compared with one-way ANOVA.

Results: The ALRs elicited HR responses indicative of a very heavy exercise (92 ± 4, 89 ± 4 and 89 ± 5 %HR_{max} for 10, 15 and 20K respectively, 15 and 20K significantly lower than 10K) and yield the following results:

10K: 65 ± 5 min, $6'30 \pm 30''$ min* Km^{-}1, 175 ± 8 b* min^{-}1, 0.17 ± 0.01 Kcal* Kg^{-}1* min^{-}1, 1129 ± 153 Kcal; 15K: 104 ± 8 (*), $6'54'' \pm 36''$ (*), 170 ± 8 (89 ± 4), 0.16 ± 0.01, 1710 ± 245 (*); 20K: 138 ± 9 (*, °), $6'54'' \pm 24''$ (*), 170 ± 9 (89 ± 5), 0.17 ± 0.01(*), 2369 ± 310 (*, °); * and ° indicate a significant difference from 10K and 15K respectively.

Conclusions: Ours are the first available data on ALR in Italian Army Ranger trainees. Irrespective of the distance covered, ALR is a very heavy-intensity activity that generates energy expenditures between 1000–2000 Kcal *per* session. Quantitative knowledge of the absolute and relative intensity and of the energy demands of specific tasks is essential to optimise physical recovery, food intake and training periodization.

122 EP P
Effects of auto-selected intensity in neuromuscular electrical stimulation and resistance training on muscle responses and functional capacity of elderly people

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Aim: Resistance training (RT) and neuromuscular electrical stimulation (NMES) are often used to combat sarcopenia and functional decline in elderly people. However, intensity is a barrier to adherence and regularity in training programs for this population. This study aimed to evaluate and compare the effects of RT and NMES, performed at auto-selected intensity, on adaptive responses of the neuromuscular system and functional capacity in healthy elderly people.
Methods: After health screening, the total sample (n = 18) was randomized into three groups: control group CO (age = 71.7 (1.9) yrs.; n = 6), NMES group (age = 68.8 (5.3) yrs.; n = 6) or RT group (age = 72.3 (6.1) yrs.; n = 6).The training groups performed a ten-week training period, while the CO group were advised to maintain their habitual lifestyle. Auto-selected load was determined as training intensity: The RT group used the maximal load to perform a range of 8–12 repetitions; the NMSE group trained at the pain threshold. Biopsies in the quadriceps muscles, strength and functional capacity were performed at the pre and post-training moments. Dependent variables included: (MVIC), predicted (1-RM), concentric isokinetic peak power and concentric power resistance of the quadriceps muscles and handgrip test to evaluate strength responses; the Five Times Sit-to-Stand test and the Timed Up and Go test performances, to evaluate the functional capacity; single fibre characteristics and satellite cell responses were used to evaluate muscle fibre responses.
Results:RT positively affected 1-RM and MVIC performances. Both training protocols positively affected handgrip and functional capacity test performances. The CO group did not demonstrate improvements in strength performance, but did demonstrate decrements in functional capacity tests. Molecular and cellular responses did not present alterations after the training period.
Conclusions: This study revealed that both RT and NMES protocols, using auto-selected loads, are valid strategies for promoting significant improvements in functional capacity in elderly people, even with modest improvements in strength capacity and an absence of alterations in myofibre responses.

123 EP P
Comparison of the energy cost of an isoinertial vs. a standard 4 × 10 squat routine

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Aim: The energy cost of isoinertial exercises has been poorly evaluated. This pilot study compared the energy expenditure (EE) of a standard training routine while squatting either in a smith machine (SM) or on an isoinertial (D11) device (Desmotec, Italy).
Methods: 5 male collegiate students (2-year squatting experience) underwent to 4 experimental sessions (1 week apart): S1) D11 maximal power test (5 sets, 6 reps, 5' rest); S2) D11 trial (4 sets, 10 reps, 3' rest); S3) SM 'matching load' test (3 sets, 3 reps, 5' rest); S4) SM trial (4 sets, 10 reps, 3' rest). The speed of the concentric phase of the very first rep of the trials was matched for EE comparison purposes: the load that allowed the maximal power output in S1 was used for S2; after completing S2, the average speed of the concentric part of the first rep was calculated; in S3, the load that allowed to match the speed calculated in S2 was found and adopted for S4. Both in S2 and S4, oxygen uptake (VO_2; breath-by-breath) and blood lactate concentration ([bL]; 25 time-points) were measured and computed in the EE estimation equation of Scott et al. (2011): VO_2 was converted in kJ by multiplying by 21.1 each L of O_2 consumed during the set (aerobic exercise EE) and by 19.6 each L of O_2 consumed after the set (aerobic recovery EE). [bL] was converted in kJ by multiplying the delta of [bL] (i.e. peak of [bL] after the set minus [bL] before the set) by body weight (kg), then by 3 (mL O_2), and then by 21.1 (anaerobic exercise EE). A two-way within-subjects ANOVA was used to compare EE between exercises and sets (alpha = 0.05).
Results: Total EE (kJ) did not differ significantly between exercises (SM 523.3 ± 156.6 vs. D11 580.7 ± 95.1) despite the higher energy cost of D11 squatting. SM squatting scored higher aerobic (6.4 vs. 5.4 %) and anaerobic (9.4 vs. 8.3 %) exercise EE contributions and a lower recovery contribution (84.2 vs. 86.2 %) to the total EE compared to D11.
Conclusions: Isoinertial squatting does not significantly increase the EE despite the inherently biomechanical differences compared to standard SM squatting.
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124 EP P
Electrocortical activity during monosynaptic reflex in athletes: a time/frequency analysis

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Aim: Monosynaptic reflex is triggered by a muscle stretch and consists into a rapid contraction of the muscle itself. The following study describes electro-cortical activity generated by a monosynaptic reflex on quadriceps femoris elicited by Babinski hammer jab; differences in the cortical activity before and after stimulus and the changes due to a variation of the body position of the volunteer during the test will be highlighted.
Methods: Twenty healthy volunteers (10 females and 10 males, aged 24–28) were chosen from athletes who practiced at least 6 hours of activity per week. Each volunteer, deprived of sight, received 20 stimulations of sub-patellar tendon, 10 in seated and 10 in supine decubitus position, with a Babinski hammer. The lengths of rest between stimuli were randomized. EEG signals were amplified and recorded using a 16-channel headset placed on the scalp, according to the International standard 10–20 system with reference in Cz. To highlight the differences between pre and post stimulus and the two positions was used a 2-way ANOVA evaluating the contributions of each independent component (IC). After Kolmogorov-Smirnov test, clustering functions with K-means algorithm were used to assess the consistency of ICA decompositions across subjects and conditions.

The level of significance was set at $p < 0.05$ under FDR (False Discovery Rate).
Results: During pre-stimulus time were no statistically significant differences in electrocortical activity between the two positions were found whereas were observed during post-stimulus time: seated position showed greater cortical activation than supine decubitus position at alpha, beta and gamma frequencies. Time-frequency analysis highlighted an activation at about 160 ms after the stimulus at all frequencies and at 250 ms at higher frequencies.
Conclusions: Power spectrum analysis indicated differences due to a variation of the body position after elicited monosynaptic reflex. Time-frequency analysis indicates two periods when the electro-cortical field activity is significantly different with respect to baseline; these results showed the time for the transmission of informations in the spino-cortical (ascending) pathways.

125 EP P
Inter-sex and inter-arm sEMG evaluation of central and peripheral fatigue in biceps brachii of young healthy subjects

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Aim: We evaluated central and peripheral descriptors of fatigue (fractal dimension, FD and conduction velocity, CV) in quadriceps muscle of healthy women (Beretta et al. 2015). We aimed to evaluate inter-arm and inter-gender differences and interaction in FD and CV during sustained fatiguing contractions of the biceps brachii (BB).
Methods: 20 active male (24.9 ± 6.1 y.) and 18 active female (22 ± 9.2 y.) performed two isometric contractions at 120° elbow joint angle: (1) at 20 % maximal voluntary contraction (MVC) for 90s, and (2) at 60 % MVC held until exhaustion. sEMG signals were detected from the BB short head using bidimensional arrays of 64 electrodes and initial values and rate of change (slope) of CV and FD signal were calculated. Statistical analysis was performed using two-way ANOVA for multiple comparisons and significant interactions were calculated ($p < 0.05$).
Results: Central and peripheral fatigue were described as decreases in FD and CV, respectively. A significant inter-arm difference was found only for initial values of CV at 20 % MVC. A significant inter-gender difference was found for MVC (right: $p < 0.0001$; left: < 0.0001), initial values of CV (20 % MCV: $p < 0.0001$; 60 % MCV: $p < 0.05$) and FD (20 % MCV: $p < 0.001$; 60 % MCV: $p < 0.0001$), and CV (60 % MCV: $p < 0.05$) and FD (20 %MCV: $p < 0.05$; 60 % MCV: $p < 0.0001$) slopes. No interaction of side and gender was found for all parameters. A positive correlation between FD and CV slopes was found in both genders and both sides (male: right $R = 0.7$, $p < 0.001$; left: $R = 0.77$, $p < 0.0001$; female: right $R = 0.47$, $p < 0.05$; left: $R = 0.14$, $p > 0.5$) during the sustained 60 % MVC.
Conclusions: Central and peripheral fatigue determine changes in FD and CV in BB during sustained contractions at 20 % and 60 % MVC. Gender significantly accounts for the total variance of the measured sEMG parameters.

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Beretta-Piccoli M, D'Antona G, et al. (2015) Evaluation of central and peripheral fatigue in the quadriceps using fractal dimension and conduction velocity in young females PLoS One 10(4):e0123921

126 EP P
Acute physiological effects of whole body vibration exercise in healthy man

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Aim: The ability of whole-body vibration (WBV) to increase oxygen consumption ($V'O_2$) and, consequently, energy expenditure would be practical to the use of WBV training as a complement to lifestyle changes aimed at health promotion. However, conflicting results are found in the literature in this regard. In this crossover study a typical training session and set of exercises was used in order to assess the additional metabolic cost of WBV in comparison with exercise alone.
Methods: Twenty-two healthy male Kinesiology students consecutively performed two randomly assigned training sessions (WBV, Control), with at least 48h apart from each session. The WBV training session consisted in 20 min exercise on the vibration platform turned on (frequency: 70 Hz; amplitude: 6mm). The Control training session was performed on the same platform with the vibration turned off. The training session consisted in three sets of six dynamic exercises, representing a typical WBV exercise session. $V'O_2$ measurements were made by indirect calorimetry using an online breath- by-breath analysis of oxygen consumption and carbon dioxide production (Quark b^2; Cosmed, Rome, Italy). Differences between mean and peak $V'O_2$ in the WBV and Control training sessions were analysed using repeated measures mixed effects linear models.
Results: Mean $V'O_2$ was significantly greater in the presence of WBV (WBV, 20.45 ± 0.42 $mL \cdot kg^{-1} \cdot min^{-1}$; Control, 19.47 ± 0.42 $mL \cdot kg^{-1} \cdot min^{-1}$; $p = 0.021$). A similar trend was found in peak $V'O_2$ (WBV, 30.38 ± 0.62 $mL \cdot kg^{-1} \cdot min^{-1}$; Control, 29.02 ± 0.93 $mL \cdot kg^{-1} \cdot min^{-1}$, $p = 0.125$). WBV addition elicited significantly greater $V'O_2$ in each of the three sets of exercises, squats ($p < 0.001$ for all) and plié squats ($p < 0.001$ to $p = 0.015$) being especially effective in increasing $V'O_2$.
Conclusions: A typical 20-min WBV training session involves a significantly greater mean $V'O_2$ (+5.0 %) in comparison with no vibration. Long-term WBV training especially employing squats and plié squats should be considered as a useful addition to programmes aimed at controlling body weight.

127 EP P
Physiological responses of intermittent exercise 30s–30s Treadmill Vs Runway

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Aim: To examine the physiological responses (VO_{2max}), in fourteen French University students (21.9 ± 0.9 years), during a running exercise 30s–30s (30s run at MAV_{45-15} /30s rest) runway (Rw) Vs 30s–30s (30s run at MAV_{45-15} /30s rest) treadmill (Tr) and to find the

running exercise intensity that allows to obtain the comparable maximal oxygen uptake in both 30s–30s exercise.

Methods: Oxygen uptake (VO_2), heart rate (HR), the time spent at 90 % VO_{2max} (T90 %VO_{2max}), respiratory quotient (QR) and lactate concentration ([La]) were measured in 14 subjects during 4 intermittent exercises sessions. First session: Fitness intermittent test 45–15 to determine the Maximal aerobic velocity 45–15 ($MAV_{45–15}$); Second session: 30s–30s Rw (30 s run at $MAV_{45–15}$ − 30 s rest); Third session: 30–30 s Tr (30 s run at $MAV_{45–15}$ − 30 s rest); Fourth session: 30–30 s Tr (30 s run at $MAV_{45–15}$ +15 % −30 s rest) the Fitness intermittent test 45–15 and in three different sessions of 30s–30s running exercies for 15 min.

Results: VO_{2max} average and T90 %VO_{2max} were significantly ($P < 0.001$) lower in the running exercise 30s/30s on treadmill (VO_{2max}: 55.1 ml/kg/min Rw vs 49.8 Tr ml/kg/min; T90 %VO_{2max}: 39 % Rw vs 8 % Tr). Increasing by 15 % the MAV45–15 during the 30s–30s Tr (Tr+15 %), obtained comparable physiological parameters to 30s–30s Rw (VO_{2max}: 55.1 ml/kg/min Rw vs 53.7 Tr+15 % ml/kg/min; T90 %VO_{2max}: 39 % Rw vs 39 % Tr+15 %). The [La] was significatly
higer during 30s–30s Tr+15 % in comparaison to other two exercice modalities (13.0 mmol/l Tr+15 % vs 9.20 mmol/l Rw; 13.0 mmol/l Tr+15 % vs 6.30 mmol/l Tr).

Conclusions: The results suggested that the increase by 15 % of MAV45–15, during a running exercise 30s–30s Tr, can obtain the comparable aerobic solicitation to 30s–30s Rw.

128 EP P
Study of the effect on oxidative metabolism, muscle composition, and metabolic cost in high altitude walking women

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Aim: During Hypobaric hypoxia (Hh) the oxygen level in the bloodstream is reduced and body responses lead to physiological adaptations that determines the modulation of oxygen transport/utilization and, for more than 4 weeks exposure to Hh, changes in structural and functional properties take place. Permanence to 4000–5000 m altitude lead to muscular arrangements similar to those resulting after endurance training and the addition of physical exercise further improve aerobic performance through adaptations of muscle oxidative metabolism. Even if a sex dependent response to chronic hypoxia has been described, only few studies involving female about physiological adaptation to high-altitude are published[1, 2].

Methods: Seven healthy women (36.3yy ± 7.1; 65.8kg ± 11.7; 165cm ± 8) were enrolled to participate in two 20-day trekking expeditions, respectively at 598 m and 4132 m of altitude, separated by 4 months of recovery. Before (B1, B2) and after (P1, P2) each expedition we measured maximal oxygen uptake, VO_2 and systemic O_2 delivery (QaO_2) kinetics during moderate-intensity exercise and energy cost of locomotion. Furthermore, muscle structure (slow/fast MyHC isoforms), mitochondrial features and mass were analyzed from muscular biopsies obtained at B1, P1 and P2.

Results: Both of altitude trekking reveal: No changes in QaO_2 kinetics, faster mean response time of VO_2 kinetics ($P = 0.002$, $P = 0.001$) and smaller oxygen deficit ($P = 0.001$, $P = 0.0004$). No changes in MyHC isoforms expression and mitochondrial mass. Decrease in ADP-stimulate mitochondrial respiration ($P = 0.016$), increase in leak respiration ($P = 0.031$) and in the respiratory control ratio ($P = 0.016$)

Conclusion Training don't affect muscle phenotype but it induced beneficial adaptations of the oxygen transport-utilization systems demonstrated by faster VO_2 kinetics at exercise onset.

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129 EP P
Exercise pressor reflex during static and dynamic skeletal muscle stretching

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Aim: Passive static stretching (SS), arterial occlusion (C), and the combination of both procedures (SS+C) has been used to stimulate group III and IV afferents of the exercise pressor reflex. However, the effects of dynamic passive stretching (DS) and arterial occlusion (DS+C) on the exercise pressor reflex are not fully elucidated. Therefore, the aim of the present study was to compare central and peripheral response to DS, SS, DS+C, and SS+C.

Methods: In twelve healthy volunteers, femoral blood flow (FBF), heart rate (HR), cardiac output (CO), and mean arterial pressure (MAP) were assessed during DS and SS of the quadriceps muscle. The same procedures were repeated with arterial occlusion of lower limb (upper-thigh cuff inflated at 250 mmHg).

Results: FBF increased significantly in both DS and SS by 365 ± 98 and 377 ± 102 ml/min. This hyperaemia was ablated during DS+C and SS+C by 11 ± 98 and 5 ± 87ml/min. The increase in HR was similar (∼4.2 bpm for DS, SS, DS+C, and SS+C). Likewise, the change in CO was ∼0.30 l/min. MAP dropped by −4.7 ± 1.2 and −4 ± 1.4 mmHg during DS and SS, while it increased by 3.7 ± 1.6, and 4.8 ± 1.3 mmHg for DS+C and SS+C.

Conclusions: Data from the current study indicated a similar group III afferents response to DS, SS (i.e., equal HR and CO changes). HR and CO findings during DS+C and SS+C suggested no evidence of interaction between group III and IV afferents. Conversely, the MAP reduced only during DS and SS, because of a limb induced-hyperaemia.

130 EP P
Evaluation of the relationship amid ematic lactate and aerobic threshold. Analysis of results according to used formels, activity status and anthropometric factors

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Aim: To understand if the values of lactate measurement in aerobic threshold, according to Mader, are different from the more used formulas (Cooper, Karvonen, Tanaka, Astrand)
Methods: The work was developed at Leading Medical Spa "Villa Eden" in Merano from March 2012 to November 2014, among 407 subjects, 217 women and 190 men, 50 ± 12 and 55 ± 11 middle age, of which Active Subjects 203 and 204 Sedentary Subjects. The sample was classified in according to body mass index (BMI) and on physical activity (fitness). The resting heart rate and the blood lactate had been surveied, and an incremental treadmill test had been dispensed.
Results: The lactate mensuration, among males and females, had been proved in line both with the Astrand and Coopers formulas values; among Sedentaries it is in line with the Cooper formula, as long as with higher values it is closer to Karvonen among the Actives. The BMI (20–25) corresponds to Karvonen, the BMI (26–30) to Tanaka, the BMI (30) shows exccessive values through all the formulas. About ages: up to 45th year Karvonen, from 46th to 70th Cooper and Tanaka, over 70th excessive values shown through all formulas.
Conclusion: The study notices that the heart rates can be influenced from both the level of fitness and BMI. Moreover, the variability of the age and of formulas too it suggests that the choice of a formula should be age related.
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131 EP P
Energy cost of shuttle running: methodological considerations

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Aim: Only few (recent) studies report data of energy cost per unit distance (C, J/mkg) during shuttle running (e.g. Zamparo et al. 2015); this essentially because the energy expenditure during a single shuttle run (SR) does not reach a steady state and thus cannot be easily determined. For this reason C is generally assessed with protocols in which several SR are performed so to reach a "steady state" in $V'O_2$. Our aim was to calculate C during a single SR and to compare these values with those assessed with a "steady state" protocol.
Methods: Thirteen male team players were asked to perform 10 shuttle runs at maximal speed (with 30 s of passive recovery between runs) over a distance of 5+5 m (with a change of direction of 180°) as well as a single SR over the same distance. Metabolic data were assessed by means of a portable metabolimeter (K4, Cosmed, I). Energy cost was calculated: 1—from the ratio of steady state $V'O_2$ to the shuttle speed (in a "steady state" shuttle test); 2—from the ratio of the time integral of oxygen uptake (exercise time + 125 s of recovery) to the shuttle distance (in a single SR); 3—from the ratio of the time integral of oxygen uptake (exercise time + fast component of O_2 recovery) to the shuttle distance (in a single SR).
Results: Average C was: 28.1 ± 2.4 J/mkg (range: 25–35; method #1); 33.9 ± 6.3 J/mkg (range: 22–45; method #2); 25.4 ± 11.9 J/mkg (range: 8–47; method #3). Considering method#1 as the "gold standard", method#2 overestimates C ($p < 0.01$) while no significant differences between methods #1 and #3 were observed ($p = 0.46$). However, the large variability in method #3 suggests that this is the less suitable method to assess C during a single SR.
Conclusions: The energy expenditure during a single SR (especially over this distance where the exercise duration is so short, i.e. about 3 s) is difficult to determine: the large variability in the $V'O_2$ breath–by-breath data prevents a correct measure of energy expenditure. Thus, the "steady state" method still seems to be the better way to assess C during shuttle running.
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POSTURAL APPROACH TO SPORT AND EXERCISE

132 PO P
Ocular position and body balance variation: a pilot study

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Aim: The aim of this study was to test whether a change of eye position, through prismatic lenses, affects the center of pressure (CoP) in an upright position.
Methods: A total of 35 footballers were recruited (age 11 ± 3 years, weight 40 ± 14 kg, height 144 ± 17 cm). The measurements were taken on a baropodometric platform (BTS SpA, Milan, Italy) placed at 90 cm from an optical reference situated at the height of the Frankfurt plane of the examined participant. Five tests were performed each with a duration of 30 second: the first at the baseline and four further tests using high, low, left and right based optical prisms.
Results: The data shows a statistically significant change (Friedman ANOVA, $p < 0.05$), in the CoP Y (Dunnpost-hoc, Baseline vs Low Base, $p < 0.05$, + 9 %).
Discussion/conclusions: An experimental modification on the visual system can influence the CoP. Dysfunction of the ocular receptor can modify body balance and sport performance. Their correction, through visual training, can improve peripheral vision and accuracy in shooting sports.

133 PO P
Evaluation through functional protocol "FMS" and correlation with back pain

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Aim: The goal of this work is to study the lumbar postural pain with static-kinetic-origin. The aim is to identify the body critical issues in various fundamental movement patterns and to improve it with a physical educational program wich is appropriate to the individual characteristics, and this considering the workout based on the synergy between the kinetic chains

Method: 76 subject, 33 men and 43 females, variable aged from 20 years old to 64 years, were evaluated for 6 months, they haphazard selected among a population attending Medicine KWellness structure (BO). The whole group had been evaluated by age, by each left and right body sides, basing on neuromuscular asymmetry and injury risk. To the whole group extreme positions had been induced, so to point out weaknesses and imbalances on the stability and mobility.

Results: The results showed that, in some subjects, there is a complete lack of perception control and balance. With the both sexes increasing age strength, flexibility, balance and stability decrease; after 30 years old, 8 people on 10 showed some troubles in controlling the laterality. The 79 % of the group showed a few mobility related to a poor core stability, with strong muscular retractions. The main factor of back pain is due to a low mobility pelvis

Conclusions: The results show that a biomechanics and posture alteration is related to an imbalance among all the pelvis muscles, in both anteroposterior and lateral directions, wich producing a strong sacroiliac functional limit it determines some difficulties of movement and mobility with negative consequences on the posture.

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134 PO P
Short time effects of 30' core training protocol using Flowin® on posture and metabolic parameters in healthy subjects

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Aim: Core training exercises are commonly performed in clinical, fitness and sport fields to improve performance and wellness. Despite his wide diffusion for healthy and unhealthy people, confusion still exist about focus, time and kind of training and many different tools are currently suggested (barbells, dumbbells, unstable surfaces, gliding and sling-based devices).

Recently, sliding devices (like Flowin® tool) have been largely promoted to increase neuromuscular and metabolic load, in relation to specific body responses during friction and gliding movements. The aim of this study is to analyze the short time effects of 30' core training protocol using Flowin® tool on posture and metabolic parameters.

Methods: Ten healthy and trained subjects volunteered for the study. They performed a 30' training protocol with focus on core stability and postural control during static and dynamic movements executed in different positions (standing, supine, prone and side positions) to continuously stress the whole body by gliding effects. Trunk mobility (SPINE) was evaluated pre and post training during standing (ST), flexion (FLEX), extension (EXT) and side bending (SIDE) movements by Spinal Mouse system. Heart rate (HR), breathing rate (BH), energy consumption (Kcal) and metabolic equivalent (MET) were recorded during training with a portable device (Zephyr Bioharness) and CR10 Borg' s Scale (BORG) was used to assess the individual perceived effort.

Results: Mean HR and BR during training were 152 ± 12 (range 103 ± 14–188 ± 19) and 28 ± 4 (range 8 ± 6–47 ± 4), respectively. Mean energy consumption was 396 ± 81 Kcal and mean MET was 10.6 ± 2.9, while mean BORG was 7.6 ± 0.9. SPINE slightly improved in left SIDE, FLEX and EXT for thoracic region, even of not significantly ($p>0.05$).

Conclusions: These findings suggest that a short time (30 minutes) core training program using Flowin® can stress the whole body system by producing medium-high intensity metabolic responses (mean HR % = 80 %) and increasing trunk mobility. Consequently, Flowin ® is an efficient tools for this kind of training.

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135 PO P
STEREOTRAINER: EDUCATION TO SEE. An inquiry into the performance in young volleyball athletes

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Aim: The eye plays a key role in Tonic Postural System. There is a strong connection between posture, visual system and movement. The aim of this study was to highlight, through electronic stabilometry in static mode, a correlation statistically significant or not of any possibility to influencing immediately proprioceptive reflexes linking the extrinsic ocular muscles and posture of an athlete.

Methods: The study was conducted on 18 female volleyball athletes. These were subjected to a Lang test of dominant eye and of hypoconvergence. Following to a stabilometric measurement in upright stance with open and closed eyes in the cabin and in the open field. Then exercises of evocation of the reflections of convergence closely with the use of a micromagnete, and far, with Stereotrainer device. We compared the stabilometric recordings in the cabin and in the open field.

Results: There were no statistically significant differences between recordings in the cabin and in the open field. The difference is statistically significant ($p < .001$), however, on behalf of the condition in the open field in the length parameter, which indicates a greater stability of athletes.

Conclusion: The data confirm that the athletes of volleyball have good stability due to the skills required by the specific sport.

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136 PO P
14 days of intensive rehabilitation program improves walking autonomy in elderly despite flexibility increas

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Aim: Peripheral arterial occlusive disease (PAOD) is a painful condition that limits walking efficiency and distance. Most of patients report pain in lumbar region with a retraction of the posterior chain combined with a dynamic alteration of the step. This framework could be due to claudication. Stretching techniques are effective in treatments for retractions of the back lower limb chain and are used to improve flexibility of the calf and mobility of the ankle. The aim of this study is to evaluate the effects of stretching on flexibility and walking performance in PAOD patients.
Methods: 50 patients with PAOD stage II of the Leriche Fontaine classification were randomly assigned to Stretching Analytics group (SA), or control group (C). The two groups were evaluate before and after the same 2-week rehabilitation protocol. Additionally SA group performed five extra sessions of traditional stretching exercises. Walking autonomy was assessed through a treadmill test and an over ground walking test, during both tests initial (WICP, TICP) and absolute (WACP, TACP) pain was recorded. Flexibility of the back chain was determined using the sit and reach test.
Results: At the end of the rehabilitation program 18 patients were classified asymptomatic. SA group improved flexibility (-13.5 ± 7.3 to -11.3 ± 7.7 cm, $p < 0.05$). Despite flexibility increased in SA, walking autonomy was improved similarly in both groups. WICP had a greater improvement in SA group (SA:184.8 ± 97.6 to 312.3 ± 117.8; C:165.5 ± 79.3 to 222.7 ± 79.2 seconds, $p = 0.013$).
Conclusions: The rehabilitation program improved walking autonomy in both groups. Since SA group improved flexibility and WICP, it seems likely that stretching could improve walking ability and delay the onset of pain.

137 PO P
Postural stabilometric differences during dual and triple-task performances. Effects of age, sedentary condition, long and short term physical exercise

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Aim: The aim of this study was to investigate sedentary condition, long and short term physical exercise, and age related differences on postural balance during dual (DT) and triple-task (TT)
Methods: Four groups of male participants were studied: 20 long term physical exercise trained subjects (7 bikers, 7 basketball and 6 tennis players, average age 70 ± 3 years); 7 active elderly (ex sedentary subjects, who attended to 5 years yoga, dance and gymnastics, 73 ± 1 years; 10 sedentary older adults (73 ± 3 years); 10 sedentary young adults (25 ± 2 years). The protocol consisted of 16 standard balance tests on a force platform in four different visual and sensory conditions. The subjects were evaluated: (1) maintaining only balance (single-task), (2) carrying a glass of water (MOT DT) (Taylor et al. 2013), (3) maintaining balance while counting backwards by 7 (COGN DT) (Hauer et al. 2003), and (4) maintaining balance combining COGN and MOT tasks (TT).
Results: Trials without visual control resulted more difficult than trials with eyes open for all groups ($p < 0.05$). Both long and short term trained older adults showed best postural stability, during all trials without visual control, than sedentary older and young adults ($p < 0.05$). The practice of physical exercise helped not only to decrease visual dependency, but also to increase both postural and cognitive performances in DT and TT tasks ($p < 0.05$). At the Kruskal-Wallis test short term trained group collected best postural stability in all proposed tasks, with respect to other groups ($p < 0.05$).
Conclusions: Regular practice of different physical activities, e.g. yoga, dance and gymnastics, have a positive effect on postural balance management in DT and TT tasks in elderly subjects, even if it started late in life.

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138 PO P
The effects of core stability training in young basketball practitioners.

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Aim: Recent studies have demonstrated benefits from core stability training on motor and sports performance in pre-pubertal children. The aim of the present study was to analyse the effects of an integrated core stability training programme on jump performance and running speed in young basketball players.
Methods: Thirty young basketball practitioners (24 M and 6 F; mean age: 7.01 ± 0.2 years) were subdivided into a control group (CG; 3F and 12M) and experimental group (EG; 3F and 12M). The following tests were used to assess lower-limb strength (pre- vs. post-training): side hop test, triple hop test, 6 meter timed hop test, Sergeant test; running speed was assessed using the 10m sprint test and the 10 × 5m shuttle test using photocells. Training sessions (lasting 1h) were performed twice—weekly for a total of 4 weeks. During the session's initial warm up period, only the EG integrated core stability exercises into their sport-specific training routine (4 sessions under stable conditions—i.e. on firm ground, 4 sessions on unstable surfaces). T-tests for independent data were used to test for inter-group differences at T0 and T1.
Results: The pre- vs. post-training comparison reveals significant differences in the results for the 6 meter hop ($t = -3.641$, $df = 28$,

p = 0.001, Effect Size 0.56) and the 10m sprint (t = −2.715, df = 28, p = 0.11, Effect Size 0.74).

Conclusions: The results confirm the efficacy of core stability training to improve running speed and jump performance. It remains to be clarified whether such exercises, which work very specific muscles of the trunk and core in the youth population, can pose general advantages in pre-pubertal children considering their sedentary life styles (Allen et al. 2014).

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139 PO P

Effects of an elastic taping application on active cervical R.O.M.: preliminary results

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Aim: The aim of this study was to measure the effects on active cervical Range of Motion (ACROM) of a classical application of elastic taping (ET). Previous studies (Saavedra-Hernandez et al., 2012; Gong, 2015) investigated the effects of neuromuscular taping or manipulation on cervical function and pain but the results are inconsistent.

Method: Fifty subjects (33.9 ± 4.8 yrs; 174.5 ± 8.2 cm; 73.5 ± 11.2 kg; 38M; 12F) for the study group (SG) and nine subjects (33.4 ± 3.6 yrs; 173.2 ± 10.6 cm; 70 ± 12.9 kg; 5M; 4F) for the control group (CG) were respectively recruited. Each group performed three ACROM measurements with an inertial sensor (Moover, Sensor Medica, Guidonia-RM, Italy): baseline, after 20' and after three days. Between the first and the second ACROM measurement an ET (ATS, Arezzo, Italy) was applied on the superior trapezius and cervical zone of the SG subjects. The ET was dressed in for three days and it was removed 1 hour before the last evaluation. The measured parameters were: maximum and average left and right rotation and lateral inclination, maximum and average flexion and extension. ANOVA analysis was used to find out significant differences between repeated measurements.

Results: The CG did not show any significant change in any measurement session both for maximum and average parameters. The SG showed higher significant values for all the measured parameters in the last evaluation respect to the baseline. Some significant differences were also found between baseline and after 20' from the ET application.

Conclusion: The results did not confirm previous study (Saavedra-Hernandez et al., 2012) probably because the different application of taping or the evaluation modalities. This study underlines the usefulness of ET in terms to enhance ACROM where it is necessary.

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140 PO P

Synergistic treatment of flexor and extensor hip muscles in postural realignment for patients with forward trunk lean

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Aim: The Forward Trunk Lean (FTL) is a pathological alteration of the postural alignment in the sagittal plane. It arises gradually and it is a clinical problem affecting a large portion of the general population (1). The causes may be various and the common symptoms are retraction of the hip flexor muscles (iliopsoas, rectus femoris,gluteus minimus) and of periarticular tissues (capsule, ligaments, tendons). Over time, the shortening process stabilizes, thereby blocking the hip in flexion. This involves, in the upright position, an anterior pelvic tilt and an increase in the sacral slope (2) with the activation of the hip extensor muscles, to oppose the pelvic tilt, and the contraction of the erector spinae muscle, with consequent low back pain (3). A synergistic rehabilitation protocol was implemented in order to restore the physiological length of flexor muscles and the function of the extensors.

Methods: A sample of 16 patients with FTL was selected with the use of a scoliometer and subsequently analysed through the raster graphics software Adobe Photoshop. In the preliminary phase (T0) and in the final phase (T1), the following elements were determined: the extension of the hip joint (Thomas Test-TT), the individual reactivity (VAS) and the degree of disability (Roland and Morris questionnaire-RMDQ). The protocol consisted in 15 sessions of 75 minutes each, it included manual therapy techniques, active-assisted exercises and postural rehabilitation in the gym.

Results: 16 patients achieved correction of the FTL, with an average reduction of the distance between the spinous process of C7 and the sagittal vertical axis of −2.43 cm (30.05 %). The ROM in extension showed an average improvement of 8°(TT). There has been a reduction of symptoms (VAS scale) with an improvement of 20 % to 88 % (2 to 7 points on the VAS scale). The degree of disability of the subjects improved of 38 % to 100 %.

Conclusions: The improvement in the outcome parameters suggests that the synergistic rehabilitation protocol induced a significant reduction of FTL and related symptoms.

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141 PO P
Effects of three months ai-jutsu martial art training on postural stability, grip strength and flexibility in older adults

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Aim: We aimed to quantify body composition, handgrip strength, flexibility, and static postural control in single stance, before and after Ai-jutsu training twice a week for three months in older adults.
Methods: A total of 46 healthy and sedentary older adults of both genders were enrolled in the study. Subjects were divided in two groups: Ai-jutsu and Control. The Ai-jutsu group (male n = 7 age 67.5 ± 4.1; female n = 20 age: 66.9 ± 4) was enrolled in a three months training twice a week for one hour while the control group (n = 9, male, age 67.1 ± 4.6 female, n = 7 age, 65.4 ± 4.3) received no training. The following analysis were performed before and after intervention: bio-electrical impedance for body composition (BIA, Akern), handgrip for strength, sit-and-reach test for flexibility, and stability test for postural control (Delos Postural System) in single stance on the ground without arms counterbalance and in different visual conditions: open (EO) and closed eyes (EC). The single stance test consisted of four trials of 20s each with 15s of rest. Each leg performed a first trial with EO and a second trial with EC, in an alternate sequence of the left and the right limbs. The subject stood with the weight-bearing knee bent to 170° and the non weight-bearing knee flexed to 45°. Paired t-tests were used to compare before and after exercise values.
Results: BIA revealed a significant increase in phase angle (Ai-jutsu +0.5 ± 0.9 $p < 0.05$; Control −0.58 ± 1.7 $p>0.05$), and no change in body cell mass (BCM Ai-jutsu +0.4 ± 1.9 $p>0.05$; Control +1.6 ± 5 $p>0.05$) following training. A significant increase in flexibility (Ai-jutsu +2.4 ± 2.8 cm $p < 0.001$; Control +0.68 ± 3 cm $p>0.05$) and grip strength (Ai-jutsu +1.2 ± 2 Kg $p < 0.05$, Control −3.8 ± 4 $p < 0.05$) was observed following training as well. In single stance tests no change in stability index was observed at both EO (Ai-jutsu 87 ± 6 % $p>0.05$, Control 78 ± 14 % $p>0.05$) and EC (Ai-jutsu 54 ± 13 % $p>0.05$, Control 43.8 ± 18 % $p>0.05$) in both groups.
Conclusions: 3-months Ai-jutsu martial art programme promotes strength and flexibility and no change in one leg stance stability in healthy.

TRANSLATIONAL APPROACH IN MOVEMENT SCIENCE

142 TR K
Physical exercise is the physiological route to longevity

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Aging is a natural process which affects most biological functions and results in increased vulnerability to diseases and increased probability of death. The past years have witnessed a great increase in our knowledge of the basic molecular mechanisms of ageing. It has emerged that the rate of ageing is not inevitably fixed but is plastic and open to modification through so the called "prolongevity interventions". To date calorie restriction (CR), the reduction of calorie intake (from 20 to 40 % of the daily intake) without causing malnutrition, is the only paradigm that has been linked to consistent delay of the ageing process and increase of lifespan in a wide range of organisms, from yeast to large mammals and primates. CR significantly delays or prevents the onset of age-related diseases thus extending average and maximum lifespan.

A current major focus of the research area in the field of CR is to identify the pathways that mediate CR effects with the aim to design CR mimetics, i.e. molecules that target CR pathways to provide the health and longevity benefits of CR, without restricting caloric intake. Such attempts have been only partially successful so far in experimental models and are not imminently feasible for humans. A plethora of hypotheses have been proposed in mediating the pro-longevity effects of CR but none of them has been unambiguously identified as causative. Among them CR-mediated loss of adiposity (and visceral fat), increase of mitochondrial biogenesis, and reduced oxidative damage may exert a critical role. Theoretically other conditions but CR, leading to negative balance between energy intake and energy expenditure, may impact on adipose accumulation, mitochondrial biogenesis and defense from oxidative damage thus promoting longevity. Therefore it is intuitive that exercise training (ET), by increasing energy expenditure, promoting body weight loss, mitochondrial biogenesis and by potentiating the antioxidant defense system might be considered a CR-mimetic. Surprisingly when exercise trained animals are matched for body weight or body mass index to calorie restricted animals, ET is able to determine significant increase in mean lifespan but fails to extend maximum lifespan.

Overall, the effects of ET and CR on longevity are critically to be examined on the light of the relationship between the age-related unbalanced physiological decline of skeletal muscle mass and daily energy expenditure.

143 TR O
The potential of "sociomotricità" for integration and development of social skills: two interventions in Congo and Brazil

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Objective: "Sociomotricità" can use consciously the play, the competitive game and sport to promoting the development of social skills. By means of observation and classification it enables us to recognize, within each gaming activity or sport, aspects concerning social interactions, thus offering the possibility of organizing initiatives of education for sociability, through competitive and non-competitive games and sport. This method is suitable in contexts of social marginalization with children and adolescents where the conflict among peers can be exacerbated and dangerous.
Method: The method of "sociomotricità" was used in two separate projects for international cooperation in Africa and Brazil: in the first case with teenagers former child soldiers; in the second case with children in a rural poverty contest. Through observation and

structured analysis of the features of the game (game action, player roles, playing field, relations between players, etc.) we were able to make a classification of the games adopted and use them to help improvement of social skills.
Data about enjoyment and impact of the activities were collected with validated and "ad hoc" questionnaires.
Results: In both projects emerged a satisfaction for activities; in African experience, gaming activities have fostered attitudes of collaboration and sharing rather than isolation. As for the experience in Brazil, instead, the proposed activities have fostered a positive climate, stress-free groups and encouraged positive feelings against those considered negative.
Conclusions: The practical application of sociomotricità in the design and planning of activities, seems to have given positive responses. It remains to be investigated as the operator, his or her personality, his or her ability to manage interpersonal relations, etc. may have a significant effect on the results.

144 TR O
Muscular dystrophy and adapted physical activity: longitudinal study

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Aim: To understand whether daily exercise (DE) compared with the exercise carried out twice a week (TW) both in low intensity, made by small tools and free body, modify the parameters of shoulder flexibility, muscle strength of the flexors of the hand and upper limb proprioceptive control during a predetermined motor task, in a group of subjects with muscular dystrophy.
Methods: Were studied 8 dystrophy subjects (5 male and 3 female, age 47 ± 14) that trained twice a week (TW) and, 7 dystrophy participants (5 male and 2 female, age 45 ± 16) that trained every day at their home. The groups were homogeneous according to their age and disability. The devices used for the functional evaluation were: the platform Libra (Easy Tech, Italy) for the ability evaluation in the management of upper limbs; hand grip (Baseline 300 lb, USA) for the upper limbs strength, Freak tap (Itunes, ipad), for the reaction time to an acoustic stimulus, the visual analogic scale VAS, for the perception of some moods.
Results: The right hand data show an improvement of reaction time to an acoustic stimulus in TW group: T0vsT2, Anova $p < 0.01$; Post Hoc $p < 0.05$, −22 %.
In both group the proprioceptive test shows an improvement: TW, Left area, T0vsT2, Anova $p < 0.01$; Post Hoc $p < 0.01$, −65 %; DE, Left area, T0vsT2, Anova $p < 0.01$; Post Hoc $p < 0.05$, −27 %,

In the TW the VAS question, "How do you feel comfortable?", shows a progress: T0vsT1, Anova $p < 0.05$; Post Hoc $p < 0.05$, +27 %; T0vsT2, Anova $p < 0.01$; Post Hoc $p < 0.01$, +33 %.
Conclusions: The research shows that adapted physical activity, performed twice a week, with low intensity can improve the reaction time to an acoustic stimulus and the VAS score. Both exercise protocols increase the proprioceptive control.

145 TR O
Sensibility of neuromuscular performances in clinically healthy soccer players under fatigue conditions

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Aim: This study aimed at investigating the neuromuscular responses under fatigue conditions in soccer players with previous lower limb injuries, considered clinically healthy (CH), after attending a 3-month rehabilitation program and a 3-month soccer training program.
Methods: 18 young (16.5 ± 0.5 yrs) male athletes—9 CH *versus* 9 in good health condition (GH)—performed the Repeated Sprint Ability (6 × 40-m interspected with 20'' recovery, RSA) test. Before RSA, after 10' of warm-up, each player was assessed for Blood Lactate concentration (BLa) and jumping-performance (Squat-Jump, SJ; Counter-movement-Jump, CMJ); BLa-CMJ-SJ were then assessed 3' and 10' after RSA. One week later, all tests were re-administered. Differences in BLa, SJ and CMJ scores were compared between and within the groups using repeated measures ANOVA. Decrements in scores between the groups were compared using unpaired Student's *t*-test.
Results: At baseline condition, no differences were found for each variable including RSA performances. The Intra-Class Correlation was high (range 0.85–0.97). About SJ, the within-effect was significant for both the factor ($p < 0.0001$) and the group-factor interaction ($p = 0.029$). 3' SJ differed from baseline SJ and 10' SJ ($p < 0.0001$). About CMJ, the within-effect was significant for both the factor ($p < 0.0001$) and the group-factor interaction ($p = 0.022$). 3' CMJ differed from baseline CMJ and 10' CMJ ($p < 0.0001$). About BLa, the within-effect was significant for only the factor ($p < 0.0001$). Decrement in SJ before and after RSA was −4.76 ± 1.60 % in GH and −14.03 ± 2.18 % in CH ($p < 0.0001$), whilst decrement in CMJ was −6.94 ± 1.77 % and −14.92 ± 1.77 %, respectively ($p < 0.0001$). Decrement in SJ before and after 10' RSA was −0.02 ± 1.55 % in GH and −3.13 ± 0.70 % in CH ($p < 0.0001$), whilst decrement in CMJ was 0.47 ± 1.25 % and −1.43 ± 1.03 %, respectively ($p = 0.0028$).
Conclusions: The RSA protocol can be effectively used to assess the functional recovery in previously injured athletes in comparison with healthy teammates as well.

146 TR O
Accuracy and reliability of COSMED K5 portable metabolic device versus simulating system

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Aim: To evaluate the accuracy of the new COSMED K5 portable metabolic cart with breath-by-breath technology. Simulated versus measured VO_2 and VCO_2 values at three different metabolic rates were compared.
Methods: A reliable metabolic simulator based on the dilution principle (VACUMED model 17056, S/N:35-001)[1], produced three metabolic rates resulting from different combination of tidal volume (Vt) and respiratory frequency (Rf) and gas mixture (Table).
The K5 was calibrated using a standard procedure including a turbine (3L syringe), gas (16 % O_2 and 5 % CO_2) and delay calibration. K5 was then connected to the VACUMED simulator. Data were collected and recorded for at least one minute for each simulated level, then a 30s arithmetic average was performed (K5, software Omnia 1.3). The collection of data set of three simulated metabolic rates was repeated six times to evaluate the reliability ICC. Accuracy was assessed by calculating the relative difference (simulated-measured) on parameters. Also, the standard error of measurement was calculated as $SEM\ \% = SD*\sqrt{(1 - R)}*1/(mean)*100$; were R was the ICC vs simulated data.
Results: The K5 data showed a very high repeatability with ICC ranging from 0.975 to 1. The overall SEM % was $VO_2 = 1.6$ % and $VCO_2 = 2.2$ %.

Table: Absolute values of simulated (VACUMED) and measured (K5) VO_2 and VCO_2, and relative percentage of difference (mean and range)

Vt	Rf	Tank flow	VACUMED		K5		% Difference	
L	1/min	L/min STPD	VO_2 ml/min	VCO_2 ml/min	VO_2 ml/min	VCO_2 ml/min	VO_2	VCO_2
1.5	20	4.5	939	952	941	985	**0.23 (−2.56 to 3.73)**	**3.43 (1.37 to 4.20)**
2.0	30	10	2087	2116	2086	2183	**0.10 (−2.11 to 1.63)**	**2.37 (−0.17 to 4.63)**
3.0	50	17	3547	3596	3564	3564	**0.46 (−1.61 to 2.45)**	**−0.89 (−4.06 to 1.67)**

Conclusions: K5 produces reliable and valid results of VO_2 and VCO_2 over a wide range of simulated metabolic rate.
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147 TR O
The power developed in high jumping: the decline with increasing age

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Aim: The power developed in carrying out the high jumping is proportional to the raising of the centre of gravity of the athlete and not to the height of the cross bar. The purpose of this study is to identify the basic parameters for calculating the power developed in high jump.
Methods: This remark about the centre of gravity is essential when calculating the decline of the power developed with increasing age based on the world records of the master athletes. The decline of the power output of the master athletes with increasing age with respect to the power output of the senior athletes is a parameter ranging from 1 (absolute record) to 0 (null performance).
For all the track and field events the power is, directly or inversely, proportional to the performance and the calculation of decline the power parameter is simple. For the throwing events the calculation is complicated because of the reduction of the implement's weight with increasing age but this problem can be overcame thanks to simple ballistic formulas.
Results: For the vertical jumps (high jump and pole volt) the decline of the power parameter with increasing age can be calculated correctly only if the raising of the centre of gravity is back-calculated from the height of the cross bar.
Conclusions: These calculations can be carried out with different procedures and some assumptions: additional studies could be useful to improve and consolidate the results.
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148 TR O
Leisure, wellness and quality services

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Aim:s: The physical education and the motor activity can increase the well-being of the people. Actually there are several professionals who offer various services aimed at promoting the wellness.
This article wold like to study the "services to people", offered in the field of the leisure and wellness, in order to the regulation of the performance of the professionals operators.
Methods: According to the constitutional law, the health is a fundamental right of the human beings. Thanks to the community legislator, even the consumer law recognizes and protect this right; in particular, it establishes a clear link between the health and the right to safety and to quality of products, in order to consumer protection. Then it is absolutely important that the operators and experts play their performance respecting rules and safety standard, to protect the physical integrity of the users.
Results: Several studies show the economic benefit of standardisation for the Consumer safety to ensure a high level of consumer and environmental protection, and more innovation and social inclusion. In the future, European standardisation will play a crucial role in a wide variety of areas, and it will be extremely successful for the

regulation of the professional services performance into the area of the professional wellness

Conclusions: The standardisation of the service of the wellness can ensure the consumers safety, it also seems a new instrument for the regulation of the professional services offered to protect health and to promote the wellness.

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MORPHOLOGICAL SCIENCE IN EXERCISE AND SPORT

149 MS K
Extensive subcortical direct cerebellum-basal ganglia connections in human brain with constrained spherical deconvolution

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Basal ganglia (BG) are supposed to play a function in the selection and inhibition of motor commands, while the cerebellum plays a role in tuning and remodelling on-going movement. Previously, the connections between the cerebellum and the cerebral cortex have been considered to be functionally different from those linking the BG with the cerebral cortex. Recent studies, using retrograde transneuronal transport of rabies virus in macaques, have challenged this old perspective demonstrating disynaptic subcortical pathways that directly link the cerebellum with the BG. Since the application of these techniques to the human brain remains elusive, whether and to what extent these specific connections between the BG and cerebellum exist in the human brain remains uncertain. However, recent studies in Diffusion Magnetic Resonance Imaging (dMRI) and diffusion tractography may allow for non-invasive and in vivo studies of the anatomical substrate of basal ganglia systems. In our previous paper we studied the basal ganglia connectome providing evidences of a direct connection from cortex to Globus Pallidum (GPe and GPi) [1].13 normal subjects with no history of any explicit neurological and psychiatric disorders were examined to test the hypotheses that substantial interactions, at least on the level shown in animal studies, also exist in the human brain. We demonstrated that it is feasible to disclose these cerebellar-subcortical connections by using constrained spherical deconvolution (CSD), an advanced approach which allows a reliable reconstruction of small- and long-fiber pathways, with sub-voxel resolution in brain regions with multiple fiber orientations [2]. In particular we found suggestions of subthalamic-cerebellar, dentate-thalamo-striatal, dentate-rubral-thalamic, dentate-rubral-pallidal and dentate-nigral connections. Moreover, we found a direct cerebellar-dentate-pallidal connection never reported in literature to our knowledge; we identified and isolated two well-distinct tracts presenting an ipsilateral and contralateral component, converging mainly on the antero-medial part of the globus pallidus.

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150 MS O
Protein Kinase C ε promotes by High Mobility Group (HMG) A-1 skeletal muscle differentiation and regeneration

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Aim: Protein Kinase C (PKC)ε modulates tissue homeostasis by regulating cell death and differentiation. In this study we investigate the role of PKCε during skeletal muscle (SM) differentiation in vitro and in vivo. We describe for the first time the role of the PKCε–high mobility group (HMG) A-1 signaling axis in myoblast differentiation and regeneration processes.

Methods: PKCε expression and activity was modulated in the C2C12 cell line and primary murine satellite cells (MSC) in vitro, as well as in an in vivo model of muscle regeneration.

Results: PKCε expression increases and subsequently re-localizes to the nucleus during SM cell differentiation. PKCε downregulation, prevent myoblast formation by impairing the transcription of myogenic factor Myogenin and Mrf4. We demonstrate that only catalytically active PKCε binds Hmga1 in the nucleus: PKCε blocks Hmga1 expression to promote Myogenin and Mrf4 accumulation SM differentiation. Following in vivo muscle injury by cardiotoxin, PKCε accumulates in regenerating, centrally-nucleated myofibers. Inhibition of PKCε impairs the expression of MyoD and Myogenin (markers of muscle differentiation) during injury induced muscle regeneration.

Conclusion: This work identifies the PKCε–HMGA1 signaling axis as a positive regulator of SM differentiation.

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151 MS O
The anterolateral ligament of the knee: a radiologic and histotopographic study

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Aim: Recent anatomic investigations of the lateral structures of the knee have identified a new ligament, called the Antero-Lateral Ligament (ALL). To date, the microscopic structure of ALL has not been analysed.

Methods: Ten specimens of ALL (6M, 4F, mean age 82.3) were sampled from bodies of the Body Donation program of the University of Padova for histological and immuno-histochemical studies. Moreover, a retrospective magnetic resonance (MR) study was

carried out in 50 patients (30M, 20F, mean age 37.5). MR exams with a normal anatomo-radiological report were selected.
Results: From the microscopic point of view the ALL corresponds to a dense connective tissue (mean thickness 893 ± 423μ), and is composed by collagen I (90 %), collagen III (5 %) and collagen VI(3 %) and scarce elastic fibers(<1 %). On MR exams, ALL appears as a thin linear structure, originating at the lateral epicondyle, running obliquely downwards and forwards, and inserting on the middle third (46 %) or inferior third(14 %) of lateral meniscus and on the lateral aspect of the proximal tibia. It was observed in 47 cases(93 %), with a mean length of 3.2 ± 0.46 cm and mean thickness of 1.1 ± 0.4 mm. The ALL showed low signal intensity on both T1- and T2-weighted sequences.
Conclusion The ALL shows the typical structure of a fibrous ligament. From the anatomo-radiological point of view the ALL is almost constantly depicted by routine 1.5 T-MR scan, but probably it is difficult to recognise in young patients, probably due to a minor presence of fibro-adipose tissue between ALL and the surrounding tissues.

152 MS O
Muscle adaptations in relation to different types of strength training: an application of Diffusion Tensor Imaging technique

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Aim: Several exercise methods are commonly used by fitness practitioners to increase muscle strength and body mass. Pre-exhaustion (PE) is a strength training method of combining two exercises, in which a single-joint exercise performed exhaustively is followed by a multi-joint exercise. The purpose of PE of the smaller muscle is to provide lower involvement of this muscle in the subsequent multi-joint exercise, thereby enabling greater participation of other muscles. Conversely, in the post-exhaustion (PO) method is reversed the sequence of the exercises: first a determined muscle is trained with a multi-joint exercise and after with a single-joint exercise (Augustsson et Al., 2003).
The purpose of this study was to investigate the effects of pre-exhaustion and post-exhaustion methods on gastrocnemius muscles by Diffusion Tensor Imaging (DTI) and volumetric evaluation techniques. DTI allows for a non-invasive evaluation of water diffusion and its fractional anisotropy (FA) in tissues.
Methods: Four adults men (aged 22 +/−0.81) have been divided in two groups by two different strength trainings: pre-exhaustion method (PE) and post-exhaustion (PO) method. All subjects have been performed 3 days a week for 3 months of training. Before and after training they have been subjected to conventional T1-weighted magnetic resonance.
Results: After both training protocols, have shown a growth of muscle volume differentiated in each subject, probably connected to individual variables. Moreover, we have observed that the volumetric changes are related to the FA mean and it can be assumed that this remodeling of the can't exclude, in addition to hypertrophy, phenomena of hyperplasia.
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153 MS O
Hoffa's fat pad: an anatomical study

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The infrapatellar adipose body (Hoffa's fat pad) can be regarded as a special form of adipose tissue due to its location (close to synovial layers and articulating cartilage). Analysis of the structural characteristics of Hoffa's fat pad is rarely reported.
Aim: The aims of the present study were to analyse the microscopic anatomy of the Hoffa's fat pad, through histological and ultrastructural methods and to correlate the anatomo-microscopic configuration with its mechanical properties.
Methods: Ten specimens of Hoffa's fat pad (6M, 4 F, mean age 82.3 years old) were sampled from bodies donation '*Donation to Science*' program of the University of Padova without history of osteoarthritis for histological and immuno-histochemical studies. The Hoffa's fat pad consisted of white adipose tissue, of lobular type, with lobules delimited by connective septa, which are thin.
Results: In comparison, the subcutaneous abdominal fat tissue shows large lobules and thinner interlobular septa ($p < 0.05$), whereas the subcutaneous fat of the knee shows small lobules and thicker interlobular septa ($p < 0.05$). The Hoffa'sadipocytes present a mean area of 3708 ± 1686 μ, with a large interadipose space, whereas those of the abdominal subcutaneous fat were larger (mean area of 6082 ± 2974μ; $p < 0.05$). At SEM, the adipocytes were covered by thick connective sheaths, creating a basket around the adipocytes.
Discussion: The structural characteristics of the Hoffa's fat pad (fusiform aspect of the adipose lobules, thickness of the septa with scarce elastic fibers) could account for a cushioning role in the knee joint, as a plastic portion of the knee joint aimed at absorption of pressure variation during articular activity. The prevalence of collagen component with respect to the elastic at the level of the interlobular septa suggests a possible role of mechanoreceptor.

154 MS O
The paratendineous tissues: an anatomical study of their role in the tendinopathy

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Aim: The aim of this paper was to examine the macroscopic and microscopic characteristics of the paratendineous tissues of the Achilles tendon, for better understanding of their role in the pathogenesis of "tendinitis", in cadavers and living subjects.
Methods: Ten non-embalmed legs from cadavers were used, and magnetic resonance images of the hind foot were made in 60 living subjects, with description of pathological alterations.
The paratendineous tissues are made up of three layers: paratenon, epitenon and endotenon. The paratenon is a thick fibrous layer with few elastic fibers, continuous with the crural fascia and well vascularized. The tendon is almost free of nerve fascicles, whereas the

paratendineous tissues are very well innervated. All of them are rich in hyaluronan, which also forms a layer between epitenon and paratenon.
Results: The crural fascia and paratenon can be clearly observed by MRI, appearing as homogeneous, low signal intensity bands, sharply defined in the context of subcutaneous tissue in T1-weighted sequences. The mean thickness of the crural fascia was 1.11 mm in healthy subjects and 1.30 mm in patients ($p < 0.005$). The mean value of paratenon thickness in patients was 1.34 mm, 0.85 in healthy ($p < 0.0001$).
Discussion: The paratendineous tissues were more highly vascularized and innervated than the tendon, supporting the hypothesis that they are probably the first sites to be damaged in tendinopathy, where the inflammatory reaction develops.
Conclusions: The radiological study suggests that an increase in the thickness of the paratenon more than 1.35 mm is predictive of paratendineous disease, even before the tendon damage.

155 MS O
Foam rolling myofascial release improves range of motion and performance in professional soccer players

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Aim: Static stretching has been the main method for acutely increasing joint range of motion (ROM) and alleviate pressure points but may reduce muscle performance. An alternative is the foam rolling massage (FR) but it is currently unknown its effect on ROM, agility and performance in professional athletes.
To examine the acute effects of FR on the quadriceps, hamstrings and calf on lower extremity ROM, agility and performance in professional soccer players.
Methods: Ten male professional soccer players (age: 17.5 ± 0.6 y) were recruited in a crossover design study. Athletes performed four consecutive day trials according to the following scheme: two trials of randomized foam rolling massage at a constant pressure (quadriceps: 4kg; hamstrings: 20 kg; calf 10 kg) and a constant rate (120 bpm) of each district (trial 1: 30 sec each muscle group; trial 3: 90 sec each muscle group), and two control testing sessions with no rolling intervention (trial 2 and trial 4). Functional tests included sit and reach (SaR) test for ROM, Balsom test (BT) for agility, and countermovement jump (CMJ) with arm swing for power. Tests were repeated before and after each trial with a time interval of 9 min for trial 1 and 2 and 13 min for trial 3 and 4.
Results: A significant increase in ROM was observed only following 90sec roller massager (trial 3: +2.5 %, $p < 0.05$) but not following trial 4 (+2.1 % $p>0.05$). Post test reduction in agility and CMJ appeared less pronounced following trial 3 (−3.48 % $p>0.05$) compared to trial 4 (−7.7 %, $p < 0.05$)
No difference in BT was found after trials.
Conclusions: 90 sec foam rolling acutely increases flexibility and reduces loss of power and agility due to rest in professional soccer players.

MOVEMENT AND SPORT ACTIVITY IN A SOCIOECONOMIC AND LEGAL CONTEXT

156 SL O
Altruistic physical activity and city sustainability: a policy-making perspective

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Aim: In order to better accommodate the concept of physical activity on the frame of active lifestyles performed in urban spaces, further classifications are required.
Methods: A literature and documentary review focused on the history of the relationship between physical activity and town planning has been conducted including the up-to-date Active City planning approach and the EU-acknowledged IMPALA guidelines on infrastructures for leisure time physical activity. Moreover, systematic observations ($n = 45$) and interviews ($n = 22$) had been carried out in several European countries.
Results: Even taking into account the good practices of selected northern and central Europe countries, an inadequacy of the categorization of spaces for physical activity is widespread in planning policies. The main reasons are: the underestimation of the physical-activity-enhancing planning; the lack of participatory planning; the deficiency of inter-sectorial and inter-administration policies; the mediocre formation of decision-makers; the problematic relationship between public administrations and universities.
Conclusions: Beside an up-to-date categorization of public spaces and a broader political approach, in response to physical activity demand and, ultimately, to orientate the decision-making processes concerning infrastructural, social, and educational policies aimed at promoting active lifestyles, a novel classification of physical activity in 'egoistic' and 'altruistic' should be envisaged. At policy level, both kind of activities should be supported: the 'egoistic' (fitness, health, leisure, competition) is practised for 'my own' interest and, indirectly, enhance public health; the 'altruistic' (mobility, leisure, shopping, tourism) is practised for 'my own' interest too and, being environmental friendly, directly enhance public health and city sustainability.
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157 SL O
Creating an engagement workforce. Decathlon Italia a case history

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Aim: From the past to the present, the construct of engagement (Kahn, 1990) has been a growing interest in the scientific community (Schaufeli, Salanova, Gonzalez-Romà, Bakker, 2002; Schaufeli, Bakker, 2003; Bacchini, Boda, De Leo, 2004; Pisanti, Paplomatas, Bertini, 2008; Schaufeli, Leiter, Maslach, 2009; Rolle 2010), and also hacking by many corporations, institutions, associations and companies. These and other studies regard engagement as something that is done to employees. This interest stems froma drive to renew employment practices and processes as part of a wider agenda of organization modernisation, stem from the relationship between engagement and HR functions.
Methods/Results: Through this correlation, therefore, it aimed this study which focused on the ways in which the process of work enegagement is creating and support the ability of organizations to continuously innovation: the multinational sports, Decathlon Italy S.r.l (Decathlon) retail chain and also as the "culture" promotes and further support to activistic climate by Decathlon staff members.
Work Engagement in Decathlon therefore becomes a multidimensional organizational construct, a network where the new process could be activated by the company and, simultaneously by the Staff, where employees are willing to cooperate, becoming an active and supportive and not only oppositive and passive node through engaging.
Conclusions: The analysis of tools, management practices, corporate values, it allows to understanding the corporate culture of Decathlon and the opportunities who support the goals to creating an engagement workforce.
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158 SL O
"Life after Sport"—Experiences of reintegration into daily life of ex-professional athletes

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Aim: The aim of this research was to understand what difficulties have been encountered, at the moment of the career-ending, by ex-professional athletes. Also it has gone to analyze some social reintegration projects proposed by the institutions.
Methods: Starting with an anthropological, sociological and psychological analysis of the athlete's evolution, we identified the problems which athletes undergo at the end of his career-ending.To seven athletes was dispenced a standardized interview on 20 questions concerning the problems they really had. As the last step was analyzed existing projects for the reintegration of athletes.
Results: An analysis of interviews have been highlighted some key points that lead to difficulty for ex-athletes's reinstatement. Prior specialization and commercialization of professional sport, leave little chance of school education to athletes, who are not prepared to programming the end of their careers and find themselves with no alternative employment at the social reinstatement. The lack of support from the Institutions (in education pre- or during the career) and the Federations in post career, makes the transition even more difficult. It lists some possible strategies for solving the problem.
Conclusions: It needs a career planning, taking into account the time of the end of professionalism. Most of the solutions proposed to date provide for interventions of conversion of post career. An alternative offer of vocational training school, parallel to the racing career, is the creation of "School of Sports", as the swiss pattern, organized in order to allow both study and professional activity.
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159 SL O
Economic aspects of physical activity in managing the diabetic patient: a budget impact analysis

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Aim: Nowadays, diabetes is an important health problem on a global scale. In recent years the percentage of subjects suffering from this disease in Italy has risen from 3.7 % to 5.5 %, trend destined yet to grow. According to estimations made by the Arno-Diabete Observatory, every person with diabetes generates a direct cost to the Italian Health System of about 3000 Euros, of which, 57 % for hospitalization, 29 % for drugs and 14 % for specialized services.The object of the present study, which is an integrated part of a ministerial project that has seen the University "Parthenope" as leader, is to evaluate the economic effects of using physical activity in care management of diabetic pathology.
Methods: Within the Project CCM 2012 it has been drawn up a perspective estimation of the costs that the Campania Region could avoid if physical activity was used as health instrument for managing the diabetic patient, considering it, above all, an instrument that reduces the complications of this disease. More specifically, it has been arranged a Budget Impact Analysis (BIA) in perspective of the National Health System in a five years time horizon.
Results: The results are substantiated in an estimated saving approximately of 50 million euro, at the end of the 5 years period, of which 29 million in hospitalizations, 15 million on drugs and 7 million on specialized services.
Conclusions: The results add value to the argument that the Adapted Physical Activity (APA), inserted in a reformulated Path Diagnostic Therapeutic Relief (PDTR) of the diabetic patient, as well as being a clinical choice in line with the criteria of effectiveness, it is also a health policy strategy that meets the principle of economic efficiency.
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160 SL O
Applying the moral action model to explore relations of sportspersonship with interpretation processes in female gymnasts

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Aim: The educational role of sport remains a prominent issue linked to the interpersonal variables that could affect the multidimensional construct of sportspersonship. Applying the 12-component Model of Moral Action (Shields and Bredemeier, 2001), research aimed to explore the influence of empathy and perceived motivational climate (PMC), as components of interpretation processes, on sportspersonship in a group of young gymnasts.
Methods: One-hundred and three female gymnasts (mean age = 11.2 ± 1 yrs.) filled in a package of questionnaires comprised Empathic Concern (EC), Perspective Taking (PT), PMC and the five subscales of sportspersonship (SP).
Results: Significant correlations were found between *Respect for Social Conventions* (RSC) and both EC (r = .410; $p < .001$) and PT ($r = .379$; $p < .01$), R*espect for Rules* (RR) correlated with mastery climate ($r = .277$; $p < .05$) and PT ($r = .234$; $p < .05$), *Respect for Opponents* (RO) with EC ($r = .567$; $p < .001$). A linear regression analysis revealed that EC together with PT accounted for 34 % of the variance in RO ($F(2, 70) = 20$); $p < .001$) and for 20 % in RSC ($F(2, 70) = 10.2$; $p < .001$). *Perceived motivational climate* (PMC) explained for 10 % of the variance in RR ($F(4, 68) = 3$; $p < .01$).
Conclusions: Results underlined the importance of contextual and interpersonal variables in promoting positive behaviours in athletes. PT, EC and PMC seem to be key-variables for promoting sportspersonship orientation in young female gymnasts. Findings sustain the idea that educate coaches on emotional and social skills could be an important element in fostering athlete sportspersonship.
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161 SL O
Social Networking for football Serie A clubs: a communicative tool for the economic and commercial development

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Aim: The purpose of the present work is to assess if social network constitutes a valid instrument for the ratio supporter/football club growth, consisting simultaneously an effective tool of marketing and commercial.
Method: The method used is based on the comparison between the data recorded in January 2015 and June 2015 in four social networks (Facebook, Twitter, Instagram and Google+) of all the militant football clubs for the 2014/2015 Serie A Championship season, in order to identify their possible increase in terms of use by the team's supporters.
Results: The comparison showed that for all the analyzed football clubs there was a significant increase in the number of supporters entering their social networks. In particular there has been registered a general growing rate ranging from 3.62 % to 105.39 % with an overall average of 24.9 % for the entire league. Focusing on the single social networks the average growth rate recorded is 20.21 % for Facebook, 25.59 % for Twitter, 89.04 % for Instagram and 21.48 % for Google+; in addition, it underlines that the simultaneous use of the different social networks can increase the related performance both in terms of effectiveness and efficiency.
Conclusions: Digital communication tools, such as social networks, have an increasingly important role in the supporters/society relationship thanks to their higher degree of interactivity that configures them as an opportunity for clubs to develop their commercial, marketing and communication sectors on low cost.
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162 SL O
Second screen: new frontier for sporting event experience from the viewers point of view

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Aim: The purpose of this study is to highlight how the vision of a sporting event is no longer a passive experience, but becomes more and more interactive especially through the introduction of a new trend of digital communication, the "Second Screen".
Method: After looking through the existing literature for the criticalities of the communication and digital era we are living in and how it has effected the perception of the sport viewer experience, we are going to describe the concept of second screen and how this new trend is applied to the broadcast of a sporting event, through the detailed analysis of the FIFA 2014 World Cup case as well as the "Global Stadium" a social, online and mobile hub for the FIFA 2014 World Cup.
Results: The analysis shows that "Second screen" has made our big screens more vital. Watching a show isn't just something to watch anymore but it's a way to connect. The section Global Stadium, included aggregates from all of the content surrounding the 64 matches in real time and was designed specifically for smartphone-wielding fans. The official FIFA website (FIFA.com) was designed to tie in with Twitter and Facebook. FIFA's Facebook page boasted 18 million "likes" and the organization's Twitter account for the event

racked up more than 860,000 followers; giving for the first time, evidence of "second screen" applications growing in popularity.
Conclusions: As the consumption habits are changing, and for a growing majority, sports fans now have higher expectations for the match day experience and are seeking more options, incentives, entertainment and engagement from clubs and stadiums. The "second screen" aims to provide an all-round digital companion so that billions of fans can join in and share their excitement for the same event, creating a worldwide conversation, enhancing the entire experience, representing a new frontier in communicating sports.
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MOVEMENT LEARNING AND PSYCHOPHYSIOLOGICAL DEVELOPMENT

163 ML K
Motivational climate, resilience, psychobiosocial states, and burnout in youth sport

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Aim: Using the achievement goal theory as a guiding framework, the aim of this study was to examine the effect of motivational climate (situational factor), resilience (trait-like personal factor), and psychobiosocial states (state-like personal variable) on burnout in young athletes.
Methods: Participants ($N = 290$, 136 boys and 154 girls, age range 11–14 years), practicing individual or team sports, were recruited from different sport clubs of Central Italy. Measures included the Perceived Motivational Climate in Sport Questionnaire (12 items assessing mastery and performance climate), a Resilience scale (10 items), the Psychobiosocial states inventory (20 items measuring pleasant/functional and unpleasant/dysfunctional emotion-related states), and the Athlete Burnout Questionnaire (15 items gauging emotional/physical exhaustion, reduced sense of accomplishment, and sport devaluation). Assessment was conducted in small groups prior to regular practice sessions.
Results: MANOVA results on the study variables did not yield significant differences by gender. Perceived mastery climate correlated positively with resilience and pleasant/functional psychobiosocial states, and negatively with sport devaluation (a burnout dimension). Conversely, performance climate related positively to sport devaluation and unpleasant/dysfunctional psychobiosocial states, and negatively to resilience. Hierarchical regression analysis results showed performance climate to significantly contribute to the amount of the variability in sport devaluation. Unpleasant/dysfunctional psychobiosocial states were found to further contribute to the amount of the variability in the same burnout dimension. Moreover, resilience was shown to moderate the negative effects of performance climate and unpleasant/dysfunctional states toward sport devaluation.
Conclusions: Findings suggest that a perceived mastery climate created by coaches may prevent burnout in youngsters. In contrast, a perceived performance climate could result in unpleasant/dysfunctional states and sport devaluation experiences. Despite the individual's resilience may reduce the negative consequences of a performance atmosphere, a coach created performance climate can ultimately lead to burnout in young athletes.

164 ML O
Study of rhythm for the acquisition of ability to control movements in elementary school

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Aim: Music has a positive impact on the acquisition of motor skills, replicating forms of the rhythms of the body and many aspects of human locomotion (Gulinelli, 2010). The aim of study was to verify the ability levels of rhythm and capacity to adapt movements for speed and wideness in time definite and space.
Methods: The sample group was composed of 43 students, divided in Experimental Group (EG; n: 22; age 10.2 ± 0.45 yrs; weight 42.45 ± 8.92 kg; height 144.82 ± 6.41 cm) and Control Group (CG; n: 21; age 10 ± 0.42 yrs; weight 37.52 ± 8.67 kg; height 139.62 ± 6.4 cm). EG is been educated to the rhythm knowledge through didactic program (5 months) based on perception and analysis of bio-rhythms and on rumors and sounds production, orienting movement to different modalities of moving. CG is been educated through traditional program of school education. Both groups were submitted to Piankov test, in the adapted version of Rosato (2003). During Piankov's test, the students must doing 12 steps in 8 meters of space in time of 8 seconds. The statistic analysis have been conducted through Wilcoxon test ($p < 0.05$).
Results: The data between T1–T2 show a significant improvement ($p < 0.05$) in both groups. However, the EG has a total score greater the CG (+3.79 points for EG vs +0.91 points for CG).
Conclusions: In elementary school it's essential to improve rhythmic sensibility work through specific didactic-educational programs, because these elements are the learning requirements for every kind of movement.
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165 ML O
Spatial navigation strategies and complexity: orienteering as an effective teaching practice for Special Educational Needs

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Aim: This paper argues that the sport of orienteering involves directly cognitive processes that are critical in the acquisition of the ability to take the perspective of others, and therefore is

suitable as an educational practice for pupils with special educational needs.

Methods: The theoretical framework of this argumentative study has its roots in the reversal of the classical description of the mechanisms of perception and action which "places the intentional and goal-oriented subject at the origin of the process. The subject builds his world according to his basic needs and action tools. This view has also been promoted by Bergson and Husserl" (Berthoz, 2008).

In this context, the work develops describing perceptual-cognitive skills in orienteering sports, and providing a review of the literature on the cognitive processes involved in spatial navigation and management of spatial reference systems, in the light of the contribution made by the neurosciences to this specific field of study.

Results: Skills involved in the elaboration of cognitive strategies for spatial navigation are skills that allow us to see the world from different points of view, leaving the egocentric perspective. The simultaneous manipulation of multiple spatial reference systems is an essential form of vicariance, through which the body solves local complexity—formulated in terms of problems posed to being living on each relevant level of analysis (physical-chemical, molecular, synaptic, cognitive,)—through the introduction of an ancillary complexity, a "simple" complexity reduced and recoded ad function of action.

Conclusions: The skills involved in developing strategies for spatial navigation allow us to see the world from different points of view, abandoning the egocentric perspective, and are therefore involved in educational inclusion-oriented paths. Orienteering, therefore, takes the form of an effective teaching practice in an educational context oriented to inclusion of pupils presenting Special Educational Needs.

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166 ML O
Movement related cortical potential in a professional race-car driver: differences among performance types in the framework of the MAP model

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Aim: We examined some important psychophysiological differences among performance types as conceptualized within the multi-action plan model (MAP; Bertollo et al. 2013). Assessment included the movement related cortical potential, also named Bereitschaftpotential (BP; Shibasaki et al. 2006), in a professional race-car driver.

Methods: We assessed the BP before the action execution (i.e. braking) during a racecar simulation task. We considered BP early (~ -1s), BP late (~ -500 ms) and BP peak components (~ -60ms) across performance types. A professional Formula-3 driver participated in the study. The driver's electroencephalogram was recorded using the 32 channel system (ANT-Neuro, Enschede, The Netherlands) during a 30-lap simulated race, on the A1GP racing simulator (Allinsport, Modena IT). To identify each braking event, the A1GP racing simulator was connected via BNC cable to the EEG system.

Results: Findings showed that all performance types lacked BP early component. Moreover, BP late component differed between Type 3 and Type 1 performances, with more negative values in Type 3 (-8.18μV) than in Type 1 (-5.93 μV) performance. Type 2 and Type 4 performances revealed intermediate amplitude values of -7.5 and -6.96 μV respectively. Latency of BP peak was similar in Type 1 and Type 3 performances (-143 ms, -135 ms) and appeared earlier than in Type 2 and Type 4 performances (-72 ms before the event).

Conclusions: Findings indicate no need of driver's supplementary motor area activation prior to using brakes (BP early component). The increased negativity in the BP late component suggested a more complex elaboration of motor sequence in the primary motor cortex, in particular in Type 3 performance. BP peak may explain the integration between supplementary motor area and primary motor cortex.

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167 ML O
Modulation of cortical activity during body balance tasks in athletes: a high-resolution EEG study

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Aim: The central nervous system (CNS) plays a key role in the integration of afferent information from the visual, sensory, and vestibular systems. The aim of the study was to analyze the EEG (electroencephalography) activity in athletes involved in various balance tasks executed with closed and open eyes.

Methods: Twenty-one volunteers (11 gymnasts and 10 non-athletes, aged 22 ± 5) performed four body balance tasks lasting 30s in random order with 60s of rest. EEG signal was amplified and recorded (filtered with pass-band filter from 3 to 45 Hz, sampled at 2048 Hz, gain 1 K) using a 16-channel headset placed on the scalp, according to the International standard 10–20 system with reference in Cz. After normalization and channel rejection (kurtosis/probability tests), ICA (independent component analysis) decomposition related to all 16 channels was performed. Kolmogorov-Smirnov test was used before the clustering with PCA. Two-way ANOVA test was used to highlight differences between the four body balance tasks (both-legs standing, one-leg standing, dominant one-leg standing and passé) and between two groups (athletes and non-athletes) on the same session (open eyes or closed eyes). Outliers treatment was performed by K-means algorithm (3 SD) and the level of significance was set at $p < 0.05$ with FDR applied to all p-values.

Results: Athletes show a different cortical activation that non-athletes, especially in α band, both during open and closed eyes execution of tasks. There were not statistically significant differences between the four balance tasks during open eyes executions in the two groups, whereas statistically significant differences during closed eyes tasks in non-athletes group were found: standing on both-legs showed a lower activation than other body balance tasks at all frequency bands.

Conclusions: Athletes showed a lower activation during the execution of complex tasks with respect to non-athletes, however this group showed a higher electrocortical activation with respect to non-athletes in simple task. This findings could happen because athletes, even

when the task is relatively easy, have a higher electrocortical activation in order to, or caused by, a better postural central control.

168 ML O
Influence of half marathon on first dorsal interosseous motor control

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Aim: Localized muscle fatigue increases the degree of unsteadiness during static contraction. Both central and peripheral components of muscle fatigue may contribute to the process. The aim of this study was to investigate if after half marathon (HM) central fatigue may influence the performance of the motor control in nonexercised muscle.
Method: In 11 male subjects (20–60 years old) the surface EMG and force from the first dorsal interosseus were recorded during 20 s isometric contractions at 10 % of maximal voluntary contraction (target tension) before and after HM. Signal processing: I) the rectified EMG and force signal were band-pass filtering (0.5–5 Hz) then the EMG envelope oscillation (eEMGo) and the force fluctuation (FF) were obtained; II) the average rectified value (ARV) of eEMGo was calculated through the whole contraction; III) the relative error (RE) of the motor output was calculated sample by sample as (actual output tension − target tension)/target tension·100. The total average relative error (%ERR) was the average of REs of the whole contraction. Paired t-test (significance $P < 0.05$) was used to compared %ERR and eEMGo ARV before and after HM.
Results: %ERR resulted 7.828 ± 3.333 % and 4.837 ± 1.24 % while eEMGo ARV resulted 0.0170 ± 0.00526 V·s and 0.00892 ± 0.00691 V·s before and after the race, respectively. The differences between the average values in the two conditions were statistically significant.
Conclusion: Our results suggest that aerobic exercises may provide motor control facilitation resulting in smaller error during static contraction and counteract the possible central fatigue negative effect on motor performance. This is in line with the data of Singh et al. (2014) reporting intracortical facilitation in nonexercised muscle.
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169 ML O
Timing abilities in executing motor tasks in tennis players and rowers

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Aim:. Tennis and rowing involve very different kind of movements. The improvement in precision and strength of the dominant hand is part of the training of tennis players (TP), while not of the rowers (R). The aim of this study was to investigate movement lateralization and bimanual coordination in TP and R by analysing their timing abilities.
Methods:. By using a sensor-engineered glove, 14 TP and 15 R right handed subjects executed for 45 s in synchrony with a metronome cue at 0.5 Hz (suprasecond interval) and at 2 Hz (subsecond interval) the opposition of thumb to index, medium, ring and little finger, with the right hand and with both hands. We evaluated: touch duration (TD), inter-tapping interval (ITI), and the percentage of correct movements (%SEQ). We analyzed the right hand performance on single-hand and bimanual tasks, and comparison of right- and left-hand performance during the bimanual task.
Results:. Considering either the movement lateralization and the bimanual coordination data, significantly longer TD, shorter ITI and larger number of %SEQ were shown in TP with respect to R at 0.5 Hz, while an opposite trend was shown at 2 Hz ($p < 0.05$).
Conclusions: Our results suggest that TP showed a longer TD, a shorter ITI and a higher number of %SEQ compared to R when they had to execute a motor task at suprasecond interval, while an opposite trend was shown at a subsecond interval. Since it was demonstrated that a better ability to discriminate subsecond durations is mainly associated with cerebellar activation, whereas a better performance in estimating the suprasecond range is associated with cognitive circuits and the basal ganglia we can speculate that different kinds of training between TP and R involve different neuronal circuits.
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HEALTH, FITNESS AND NUTRITION

170 HF K
Ketogenic diet and muscle hypertrophy: an oxymoron?

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The ketogenic diet (KD) is a nutritional approach consisting of high-fat and adequate protein content but insufficient levels of carbohydrates for metabolic needs (less than 20 g per day or 5 % of total daily energy intake that force the body to primarily use fat as a fuel source. The KD is a "fasting-like" state, that "mimics" energy restriction effects on AMPK, SIRT-1 and PGC1α activation. Once activated PGC1α moves to the nucleus and acts as a transcription factor increasing the expression of genes that code for proteins involved in fatty acid transport, fat oxidation, and oxidative phosphorylation. The activation by phosphorylation of PGC1α may occur in several ways involving AMPK, calcium-calmodulin-dependent protein-kinase, and p38 mitogen-activated protein kinase pathways. AMPK1 can work in two ways, either by activating PGC1α by phosphorylation or else directly by promoting expression of enzymes involved in skeletal muscle oxidative effects and metabolism, but AMPK activation also inhibits mTOR signaling a fundamental factor involved in muscle mass growth. Reducing carbohydrate intake to very low levels can lead to the activation of AMPK and SIRT-1, increased AMPK1 phosphorylation and increased skeletal muscle PGC1α deacetylation but without affecting overall amounts of AMPK, PGC1α, or SIRT 1. All these effects are positive in terms of health outcomes but KD, similar to fasting, blunts the IGF-1/AKT/mTOR pathway reducing the possibility of gaining muscle mass despite energy sufficiency. So

whilst KD can be useful in endurance performance or during a brief period for losing weight, it is an oxymoron when the athlete seeks muscle hypertrophy. Hence it appears somewhat contradictory that there is widespread use of KD in bodybuilders also during "bulk up" periods whilst all data regarding biochemical and molecular mechanisms suggests that it is very difficult to increase muscle mass during a KD; use of which should really be limited to the few days immediately prior to competition in body building.

171 HF O
Effects of nitrate supplementation on muscle blood flow during high intensity forearm exercise

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Aim: Recent studies demonstrate that acute nitrate supplementation does not augment dilation of the brachial artery or muscle blood flow during graded, non fatiguing handgrip exercise in healthy young subjects 1, 2. However, evidence from a rodent model suggests that dietary nitrate supplementation may increase O_2delivery mainly within glycolytic fast-twitch fibers 3. The aim of this study was to investigate the effects of acute nitrate supplementation on skeletal muscle blood flow during high-intensity handgrip exercise in men.
Methods: Five healthy men (26.8 ± 2.4 ys) voluntary participated in a double-blind, placebo-controlled, crossover protocol. Subjects were tested 2.5 h after the ingestion of either 140 ml of water containing nitrate (~8.4 mmol, NITR) or nitrate-free water (PLA) in random order. Participants performed six 3-min bouts of exercise at 15 %, 30 %, 45 %, 60 %, 75 % and 90 % of peak load previously determined. Rhythmic contractions were performed at a controlled rate (0.5Hz) and 1 minute recovery between bouts was allowed. Blood flow (BF) was calculated from brachial artery diameter and blood velocity (Doppler ultrasound). Microvascular blood volume was estimated by changes in total hemoglobin (Δtot[Hb+Mb]) values determined by NIRS.
Results: After NITR, BF was not significantly different from PLA at each exercise intensity ranging from ~80 ml/min at rest to ~400 ml/min at 90 %. Δtot[Hb+Mb], expressed as percentage of post-ischemic reperfusion, significantly increased after NITR respect to PLA at 60 % (61.2 ± 3.3 % vs 51.7 ± 4.3 %), 75 % (64.5 ± 4.7 % vs 56.3 ± 3.8 %) and 90 % (64.7 ± 4.6 % vs 59.7 ± 1.8 %). No differences were found in Δtot [Hb+Mb] at lower intensities.
Conclusion: The results of the present study suggest that during high intensity exercise nitrate supplementation does not affect brachial artery vasodilation but increases microvascular O_2 delivery to forearm skeletal muscle.
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172 HF O
Effects of aerobic training and cognitive stimulation on cortisol levels and behavioral disorders in patients with Alzheimer's disease

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Aim: Sundowning syndrome (SDS) in individuals with Alzheimer's disease (AD) is a clinical phenomenon characterized by the intensification of neuropsychiatric symptoms during the sunset. Currently, there are no specific treatments for SDS, but recent literature reported a strong relationship between high levels of cortisol and SDS symptoms. Both aerobic training (AT) and cognitive stimulation (CS) are capable to reduce the level of cortisol. However, it is not clear if SDS symptoms would benefit from AT and CS. Therefore, the aim of this study was to evaluate the effects of AT and CS as potential treatments of SDS. The combination effects of AT and CS (AT+CS) was also assessed.
Methods: Twenty-nine patients with advanced AD (clinical dementia rating, CDR: 2) were randomly assigned to: CS group, which was treated with a cognitive stimulation; AT group, treated with aerobic training; CS+AT group, which performed both AT and CS. All groups were compared with age-matched controls (CTRL). All treatments were performed 5 days a week, for 2 months, one hour before the sunset. Salivary levels of cortisol were collected 5 times a day before and after treatments, together with behavioral disorders and cognitive dysfunction tests (Mini-Mental State Examination (MMSE), Neuropsychiatric Inventory (NPI) and Agitated Behavior Scale (ABS)).
Results: Daily salivary levels of cortisol in AT and CS+AT groups decreased significantly by ~50 %. Behavioral disorders reduced by ~50 % in AT and CS+AT groups. Cognitive dysfunction was stable in all groups without significant changes.
Conclusions: The main outcome of this study was that a program of AT or the combination of AT and CS decreased the salivary levels of cortisol. Interestingly, SDS symptoms also decreased to a similar extent in the same groups, suggesting a possible neuro-endocrinal pathway associated with these interventions.

173 HF O
Aerobic fitness and cardiovascular risk factors in overweight or obese children and adolescents

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Aim: Aerobic fitness is an important index of health. Our aim was to evaluate the association between aerobic fitness, sedentary lifestyle and cardiovascular risk factors in a sample of overweight/obese children and adolescents.
Methods: We evaluated 124 (53.2 % males) overweight or obese children and adolescents (BMI >85th and 95th percentile, respectively), mean age 10.9 ± 1.9 years, recruited consecutively at the outpatient Obesity clinics of the AORN Santobono-Pausilipon, Naples. All subjects performed the cardiopulmonary test on cycle-ergometer in order to measure of the $VO2_{max}$ as an index of aerobic fitness. Sedentary lifestyle (amount of hours/day spent in front of television, video games and computer) and cardiovascular risk indexes as waist circumference (WC), systolic (SBP) and diastolic (DBP) blood pressure, and Triglycerides/HDL-cholesterol ratio (Tg/HDL-C), were compared in the sample stratified in tertiles of $VO2_{max}$.
Results: The amount of sedentary hours, BMI z score, CV, SBP, DBP and Tg/HDL-C were significantly higher in children/adolescents belonging to the first tertile of $VO2_{max}$ than those in the third and/or second tertiles ($p \leq 0.001$). Chronological age did not differ between the three groups ($p = 0.222$). WC (standardized beta −0.129, $p \leq 0.01$), Tg/HDL-C (standardized beta −0.267, $p \leq 0.02$) and DBP (standardized beta −0.209, $p < 0.04$) significantly predicted $VO2_{max}$, regardless of gender, age, and BMI.
Conclusions: Lower levels of aerobic fitness in overweight/obese children are associated with a lifestyle far more sedentary and higher cardiovascular risk as compared to children with higher aerobic fitness. Reducing sedentary lifestyle and increasing aerobic fitness through the promotion of physical exercise may help reduce cardiovascular risk in obese children and adolescents.
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174 HF O
High Intensity Interval Resistance Training (HIIRT): who wins between young and elderly?

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Aim: It is well know that aging induce loss of muscle mass, the increase of fat mass and a consequent decrease of muscular strength. Heavy Resistance Training is one of the most important stimuli to induce anabolic hormones and growth factors production, contributing to prevent sarcopenia and loss of functional abilities. The aim of this study is to compare the response to High Intensity Interval Resistance Training (HIIRT) between elderly and young people.
Methods: HIIRT protocol consisted in performing 2 sets of 6/2/2 reps with incomplete rest between (20") sets at 85 % 1RM. 11 healthy young subject (22.30 ± 1.80 year; 23.80 ± 2.10 BMI) and 14 healthy old subject (64.30 ± 2.60 year; 25.28 ± 2.40 BMI) took part to the study. 1RM strength test, body composition analysis and blood sample were collected before and after 2 month of training. Two way Anova test (time x age) were performed, and Post Hoc Bonferroni test were used to study statistical significant.
Results: Both groups improved their strength without any significant differences between age. Any differences were found in body composition; while significant differences were observed in blood lipoprotein profile and hormonal response: HDL improve only in elderly group, cortisol and testosterone increased in a greater way in elderly whilst IGF-1 was less expressed in elderly respect to young. Also creatinine analysis shown different responses: increasing in elderly and decreasing in young group.
Conclusion: These data suggest that elderly has the same capacity to improve muscular strength of young people. Moreover, HIIRT technique could be more effective in improve lipid profile in elderly than in young people, but it not seems to be enough efficient to contrast sarcopenia and to induce anabolic hormones production.
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175 HF O
Effects of a Pilates exercise program on muscle strength, postural control and body composition: results from a pilot study in a group of post-menopausal women

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Aim: Participation in exercise programs is heartily recommended for older adults since the level of physical fitness directly influences functional independence. The aim of this present study was to investigate the effects of supervised Pilates exercises training (PET) on the physical function, hypothesizing that a period of PET can increase overall muscle strength, body composition and balance, during single and dual-task conditions, in a group of postmenopausal women.
Methods: Twenty-five subjects, aged 59 to 66 years old, were recruited. Eligible participants were assessed prior and after 3 month of PET, performed twice per week. Muscular strength was evaluated with handgrip strength test (HGS), 30-s chair sit to stand test (30CST) and abdominal strength test (AST). Postural control and dual-task performance were measured through a stabilometric platform while dynamic balance with 8 foot up and go test. Finally, body composition was assessed by means of dual-energy X-ray absorptiometry.
Results: Statistically significant improvements were detected on HGS (+8.22 %), 30CST (+23.41 %), 8 foot up and go test (−5.95 %), AST (+30.81 %), medio-lateral oscillations in open eyes and dual-task conditions (−22.03 % and −10.37 %).
Conclusions: PET was effective in increasing upper body, lower body and abdominal muscle strength. No changes on body composition were detected. Results on this investigation indicated also that 12-week of mat Pilates is not sufficient to determine a clinical meaningful improvement on static balance in single and dual-task conditions.
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176 HF O
One repetition maximum bench press performance: a new approach for its evaluation in inexperienced males and females

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The aim of this study was to evaluate a new method to perform the one repetition maximum (1RM) bench press test, by combining previously validated predictive and practical procedures. Eight young male and 7 females participants, with no previous experience of resistance training, performed a first set of repetitions to fatigue (RTF) with a workload corresponding to 1/3 of their body mass (BM) for a maximum of 25 repetitions. Following a 5-min recovery period, a second set of RTF was performed with a workload corresponding to 1/2 of participants' BM. The number of repetitions performed in this set was then used to predict the workload to be used for the 1RM bench press test using Mayhew's equation. Oxygen consumption, heart rate and blood lactate were monitored before, during and after each 1RM attempt. A significant effect of gender was found on the maximum number of repetitions achieved during the RTF set performed with 1/2 of participants' BM (males: 25.0 ± 6.3; females: $11.0x \pm 10.6$; $t = 6.2$; $p < 0.001$). The 1RM attempt performed with the workload predicted by Mayhew's equation resulted in females performing 1.2 ± 0.7 repetitions, while males performed 4.8 ± 1.9 repetitions. All participants reached their 1RM performance within 3 attempts, thus resulting in a maximum of 5 sets required to successfully perform the 1RM bench press test. We conclude that, by combining previously validated predictive equations with practical procedures (i.e. using a fraction of participants' BM to determine the workload for an RTF set), the new method we tested appeared safe, accurate (particularly in females) and time-effective in the practical evaluation of 1RM performance in inexperienced individuals.

TRAINING, PERFORMANCE AND EVALUATION METHODS 2

177 TP2 K
A force-velocity based method for the estimate of one repetition maximum

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Aim: One repetition maximum (1RM) is typically assessed with indirect methods (IM) consisting of lifting a submaximal load until failure. Being based on regression models, accuracy of IM depends on number of repetitions, type of exercise, training background and population [1]. Aim of this study is to validate a subject-specific method for the estimate of 1RM based on force-velocity and load-velocity relations.
Methods: An inertial sensor fixed on the external resistance was used for measuring force and velocity in correspondence of at least three increasing loads [2]. 1RM was determined as the load which corresponds to the intersection between force-velocity and load-velocity curves in correspondence of the lowest velocity value (i.e., the point when the gravitational force exceeds the force that the subject can exert). The proposed force-velocity-based method (FVM) was tested on 37 participants (23.9 ± 3.1) with no particular experience with resistance training in a leg-press (LP) and chest-press (CP) exercise. The IM estimate of 1RM was also performed using trials of the FVM session. Agreement with direct measure (DM) of 1RM (performed in a separate session) was assessed using Bland-Altman's analysis.
Results: The means ($\pm$ *SD*) of measured and the FVM-estimated 1RM for CP were respectively 99.49 Kg ($\pm$ 27.01) and 100.78 Kg ($\pm$ 27.16). The means ($\pm$ *SD*) of measured and the FVM-estimated 1RM for LP were respectively 249.32 Kg ($\pm$ 60.18) and 251.08 ($\pm$ 60.26). An almost perfect correlation index (0.99; $p < 0.001$) was found between the DM and FP for both CP and LP. The mean absolute percentage error (MAPE) relative to the 1RM estimated through an IM was 9.3 % for CP and 5.2 % for LP, while FVM's MAPE was 1.5 % for CP and 0.8 % for LP.
Conclusion: The FVM-estimate of 1RM showed high accuracy with respect to DM. FVM does not depend on predictions but on measured muscular capacities.
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178 TP2 O
The role of balance training in improving soccer-specific technical skills in young soccer players

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Aim:s: Balance is very important in soccer players, due to a higher number of dynamic unilateral technical movements (e.g., shooting, passing), and the stability of the supporting foot is critical to shoot as accurately as possible (Hrysomallis, 2011). However, a lack of information on the relationship between balance training and technical ability still exists. Therefore, the aim of this study was to determine the role of balance training in learning and improving technical soccer skills in young soccer players.
Methods: Forty-three young soccer players were randomly divided into a balance training (BT; age: 10 ± 2 yrs; training experience: 4.3 ± 0.8 yrs; body mass 32 ± 8 kg; height: 1.42 ± 0.07m; mean $\pm$ SD) and a control group (Ctrl; age: 10 ± 1 yrs; training experience: 3.7 ± 1.2 yrs; body mass 34 ± 4 kg; height: 1.40 ± 0.15 m; mean $\pm$ SD). Before (T_0) and after (T_1) balance training, BT and Ctrl underwent two soccer technical tests (Loughborough Soccer Passing Test, LSPT, and Loughborough Soccer Shooting Test, LSST) and balance assessments on a stabilometry-computerized equipment (balance on stable surface, balance on unstable surface, limits of stability). Each test was performed twice at T_0 to assess the reliability

of the measurements (intraclass correlation coefficient, ICC). Only BT was involved in a progressive and specific balance-training program (static and dynamic balance on stable and unstable surfaces), for 12 weeks, three times per week, and 20 min per session.
Results: ICC values ranged from 0.753 to 0.977 for all tests. Both groups improved their soccer skills and balance ability in T_1 ($P < 0.05$). However, BT showed a significantly larger improvement than Ctrl in balance for limits of stability in T_1 (96 ± 1 *vs* 99 ± 2 % of T_0 for BT and Ctrl, respectively; $P < 0.05$) as well as for LSPT (82 ± 9 *vs* 90 ± 7 % of T_0 for BT and Ctrl, respectively; $P < 0.05$) and for LSST (153 ± 12 *vs* 131 ± 12 % of T_0 for BG and CG, respectively; $P < 0.05$).
Conclusions: The improvements in the ability to use somatosensory information induced by a specific balance training program led to a marked improvement in passing (LSPT) and shooting accuracy (precision in LSST) in young soccer players.
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179 TP2 O
The role of individual thresholds to monitor training load in elite young soccer players

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Recent works have shown that metabolic power is the best estimator of the high-intensity demands of soccer training. Moreover, Gaudino et al (2015) showed that high-intensity running distance and number of accelerations/decelerations are likely to be strong predictors of training load, estimated by rate of perceived exertion multiplied by session duration (RPE-TL), in elite soccer players. However, up to date absolute speed/power zones have been utilized to define high-intensity activities without accounting for individual physiological capacity.
Aim: Aim of this study was to evaluate the relationship between RPE-TL and high-intensity distance (HID) determined by individual power thresholds in elite young soccer players.
Methods: 18 U15 soccer players were investigated. All subjects performed a YO-YO IRT1 to determine maximal velocity (V_{max}). HID was calculated utilizing: a) the most common power threshold used for young soccer players ($Th_{P\text{-}st}$, $17.5W*kg^{-1}$); b) an individual threshold based on the equivalent metabolic power at V_{max} ($Th_{P\text{-}ind}$). During 16 training sessions 203 individual observations were recorded using a 10Hz GPS devise (K-Sport, Italy). RPE was collected 30 minutes after each training session using the CR-10 Borg scale. Linear regression analyses were made between RPE-TL and HID.
Results:. Training sessions lasted 112 ± 21 min. Mean total distance covered was 6532 ± 1418 m. HID was 1772 ± 637 m and 1365 ± 493 m by $Th_{P\text{-}st}$ and $Th_{P\text{-}ind}$, respectively. HID was significantly related to RPE-TL ($p < 0.001$) and the best correlation was found when employing $Th_{P\text{-}ind}$ ($r^2 = 0.42$).
Conclusion: The present findings suggest that high-intensity distance determined by an individual power threshold seems to be an effective tool to predict training load of elite young soccer players. This observation may support coaches and sport scientists to better monitor and design training.

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180 TP2 O
Body weight neuromuscular training improves performance on Y-Balance Test in female National basketball players

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Aim: Lower Quarter Y-Balance Test (YBT) is a functional and inexpensive postural control measurement tool that can identify individuals at an elevated risk of injury (1). The aim of this study was to investigate if bodyweight neuromuscular intervention could improve performances on YBT in female basketball players in order to postural stability and therefore a reduction of lower limbs injuries.
Methods: In this longitudinal randomized controlled study, twenty-eight healthy female basketball players (age: 20 ± 2 years old; body mass 63 ± 7 kg; height: 1.72 ± 0.07 cm; weekly training volume 7 ± 1 hours) participated to the study. Subjects were randomized into training group ($n = 14$) and control group ($n = 14$). All subjects were tested at baseline and after 8 weeks of conventional basketball training program during the national regular season. In each testing session data on anthropometry and YBT were collected. The experimental group underwent instead of the standard warm-up, 30 min of body-weight neuromuscular training intervention using plyometric and core stability exercises, designed for improve lower extremity strength and core strength.
Results: The two-way repeated measure analysis of variance ANOVA shows that the experimental group significantly improved posteromedial ($p < 0.05$) posterolateral ($p < 0.05$) and composite score ($p < 0.01$) of YBT for both limbs. No differences for the anterior direction for both groups were detected. In addition, the experimental group significantly improved the performances on posteromedial (right $p < 0.05$; left: $p < 0.01$) and composite score (right $p < 0.01$; left: $p < 0.01$) respect the control group.
Conclusions: These findings illustrate that this type of body-weight neuromuscular training used as warm-up improve lower extremity stability assessed with YBT in junior female basketball players reducing therefore the risk lower limb injuries.
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181 TP2 O
Circuit training and fencing: a longitudinal study

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Aim: To investigate, in two groups of competitive fencers, the variation in dynamic equilibrium, muscle tendon flexibility (MTF), vertical jump ability and speed of attack execution, after a period of 8 weeks' circuit training (CT).
Methods: 15 athletes were studied, 8 males and 7 females, of which 11 used foil and 4 épée, divided into two groups: the experimental group (EG), which contained 4 males and 4 females, of which 6 used foil and 2 épée (age 16 ± 2 years, height 170 ± 11 cm, weight 62 ± 12 kg and 6 ± 4 years of training); control group (CG), composed of 7 athletes, 4 males and 3 females, of which 5 used foil and 2 épée (age 16 ± 3 years, height 170 ± 10 cm, weight 63 ± 7 kg and 8 ± 5 years of training). The EG performed a specific protocol OF CT while the GC maintained its traditional training.
The devices used for the functional evaluation were: 1) Libra platform (Easy Tech, Italy) for propioceptive control: 2) Sit and Reach with distancemeter (Bosch, Germany) for measuring the MTF, and the OptoJump® (Microgate, Italy) for the evaluation SJ, CMJ and CMJ free arms, and for the evaluation of reaction time to visual stimulus in the 5 meters and lunge test.
Result The CT used in EG and performed over 8 weeks shows for body balance (Mon Dx FB Area Tot, Anova $p < 0.01$; post hoc T0vsT2 $p < 0.01, -27.3$ %), an increase in SJ (Anova $p < 0.05$; post hoc T0vsT2 $p < 0.05, +6$ %), an increase in the FMT (Anova $p < 0.001$, T0vsT2 post hoc $p < 0.01, +9$ %), and a reduction of the execution time of the 5 meters and lunge test (Anova $p < 0.001$; T0 vs T2, post hoc $p < 0.01, -6$ %).
Conclusions:. The circuit training protocol, acting on all the fundamental muscle groups involved in fencing, improves explosive strength and the speed of the execution of an attack.

182 TP2 O
A profile of Italian players of American football: anthropometric and physical performance differences among playing positions and comparison with non-drafted USA players

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Aim: Previous studies have demonstrated that height, body weight and body composition are different among American football players and this is due to the different speed and movement demands for each playing position (Kraemer WJ et al., 2005). Recruits that join the NFL draft have to perform the NFL Combines and the results of these tests are different for playing position (Sierer SP. et al., 2008). The purpose of this study was to examine anthropometric and performance differences among football players of a top Italian team (Rhinos Milan AFT) and to compare these values with previous data of nondrafted American players reported in the scientific literature.
Methods: Participants (N = 50) were categorized by position in 3 groups based on playing position: Skill players (SP), Big skill players (BSP) and Lineman (LM). Body weight and percentage of body fat were determined using the bioelectrical impedance analysis with the TANITA Body Composition Monitor BC-418 and we obtained performance results of the following NFL Combine drills: 40-yard dash, 225-lb bench press test, vertical jump, broad jump, 20-yard shuttle and the 3-cone drill.
Results: The one-way ANOVA followed by the Tukey-Kramer post-hoc test showed that LM had higher anthropometric and body composition values than SP ($p<0.001$) and BSP ($p<0.01$) while they performed significantly worse in the physical tests, except for the 225-lb bench press test. We calculated and compared the 95% confidence limits for each anthropometric and physical test: American non drafted players had higher values for all the anthropometric and physical tests variables than Italian players.
Conclusion: Administrators of professional football teams in Italy need to improve players physical attributes so the league can become more competitive and the gap that currently exists between Italy and USA can be reduced.
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183 TP2 O
Age-Related changes in Upper Body Strength of Italian Firefighters

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Aim: Considering that the decrease in strength can be observed with aging and that muscular endurance and strength are essential factors for firefighting effectiveness in critical situations (Michaelides et al. 2008), the aim of this study was to evaluate the Upper Body (UBS) and Grip (GS) Strength of Italian Firefighters and to compare the results in relation to the age.
Methods: Bench press (1RM, kg) and Maximal peak grip strength (MPGS, N) were used to analysed 185 firefighters (age: 38 ± 8 yr; height: 1.77 ± 0.06 cm, weight: 76.6 ± 8.6 kg, BMI: 24.2 ± 2.2 kg m^{-2}). Analysis of Variance (ANOVA) was applied to anthropometric and physical fitness values to assess significant difference ($p < 0.05$) between age groups: ≤30 yrs, 31–35 yrs, 36–40 yrs, 41–45 yrs, and >45 yrs. When a significant effect was found, post hoc Fisher protected least significant difference were used.
Results: Anthropometric values showed differences among ages groups for height and BMI. Despite 1RM showed significant differences among age group ($F_{(4.178)} = 6.96$; $p < 0.001$), no statistical differences emerged between age group in MPGS values. In particular, 1RM showed no difference between < 30 yr 31–35 age groups and significant a decrease in 36–40 yr group. A decrease of 14 % in 1RM was reached between < 30yrs and >45yrs.
Conclusions: The results of this study could provide useful information to development appropriate UBS conditioning programs to increase the job performance and decrease the percentage of risks due to increased age in firefighters. With the knowledge of the limiting factors of age in strength performance of firefighters, the strength and conditioning firefighters instructor can more effectively tailor the training so that a job performance increase can be achieved in safety.
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SUNDAY POSTER SESSION MOVEMENT AND SPORT ACTIVITY IN A SOCIOECONOMIC AND LEGAL CONTEXT

184 SL P
Sport experience marketing: Scampia case

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Aim: Sport generates multiple levels of physical, mental, emotional, social and spiritual involvement. Currently the emotional involvement should be seen as an important component concerning the sports experience. The purpose of the research was to evaluate the effectiveness of experiential marketing activities carried out by sport operators in the Scampia district as to the possibility to generate social and economical benefits for the community. Paying particular attention to the contrast of the phenomena of juvenile delinquency, particularly intense in the involved area.
Methods: The research points out several case studies conducted on all operators working in the sports sector in the Scampia district. Interviews were intended to: (a) conduct a census on the initiatives related to marketing in order to have positive experiences in sport for the young at risk; (b) assess the results obtained by the cases of interest; (c) define the strengths and weaknesses to improve subsequent initiatives.
Results: The research shows that the studied area and other similar districts represent a favorable environment to implement strategies of experiential marketing in sports. Infact, the experiential marketing is an instrument to attract young people to sport, especially in contexts where it is necessary to feed the symbolic values of sport (a dream, a sense of belonging, emulation, etc.).
Conclusions: Sport can be a solution for preparing a reaction to juvenile delinquency. Increasing the organization of events enables to generate emotional involvement which can indeed fight the phenomenon of NEET (Not in Education, Employment or Training), representing a recruitment pool for the organized delinquency.
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185 SL P
The role of the ICT devices in enhancing active lifestyles in primary school children

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Aim: The objective of this PhD research is to study ways to enhance active lifestyles in children through two parallel approaches. The first aims to understand the role of portable ICT devices and to build prototypes for applications to motivate children's physical activity, and to measure the environmental characteristics in their daily routes. The second investigates children's independent mobility on the frame of their rights.
Methods: The literature review has focused on the use of portable ICT devices by children aged 6–11 with attention to the digital divide. Furthermore, an in-depth longitudinal research-intervention on a case of walk-to-school action in Cassino has begun with the aim to define the criteria to promote active commuting to schools.
The "ICT" research will involve selected groups of children in the creation of an app prototype. The study on walk to school action has been made by administering questionnaires (n = 750) to children aged 8-11, and their parents (n = 713) attending three primary schools in Cassino (IT), two of which are participating in walk to school projects.
Results: The results will derive from both researches. We hypothesize that these two approaches will enhance children's motivation to be physically active.
Conclusions: The research aims to show that a participatory approach in building applications, in parallel with a walk-to-school action can play a role of scaffolding for children's physical activity.
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186 SL P
"Portale dello Sport" at UNIPV, a project to improve physical activity among students

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Aim: The purpose of the project is to increase culture about sport practice and physical activity and to promote wellbeing and health prevention among about 22.000 University students living in Pavia and Province.
A web portal was created and linked to University website and homepage to connect sport and fitness centers and their activities proposed to the students and University staff in the district area.
Method: Starting from January 2014 facilities, sport centers and clubs were surveyed in 189 municipalities of Pavia Province using addresses from National Olympic Committee (CONI).
By email or telephone calls we offered to every entity a free accreditation to the Portale dello Sport.
Companies were divided into sport category and they could show special prices, classes and offers dedicated to the University students and staff. Moreover there is a special map research to provide localization of the companies and sports by Province area.

Results: To date, 60 companies have been registered and they provided to offer special activities and discounted prices for students and University staff popularizing minor sports and local facilities.
Conclusion: The project has been welcomed from local sport and fitness centers that derived new possibilities of business and activities development with young people.
In the future data update of activities, prices and offers is going to be managed directly to companies and web portal will be linked to the main social networks.

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187 SL P
Criteria for Kinesiology Degree choosing and work expectation in a sample of University of Pavia students

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Aim: The purpose of the project is to examine study criteria for choosing, sport and work expectation in a sample of second year students of University of Pavia belonging to Kinesiology Degree Course.
Method: 222 students (148 males and 74 females) attending the second year of degree filled a questionnaire about current sport practice, motivation for Kinesiology Degree choice, additional sport certifications and expectations for professional career.
Results: 55 % of the sample practices agonistic sport (20 % national competitions), 39 % recreative activities and 6 % is sedentary. 99 students (45 %) chose Kinesiology Degree as the "right choice for the career" while 88 (39.5 %) because they had a "passion for sport" and for 35 (15.5 %) students Kinesiology Degree is a "second choice" instead of a different career. Sport certifications are poorly widespread among students (31 %) and the most popular is swimming trainer certify (12 %). Finally expectation for the profession is mainly placed in reeducation and preventive and adapted activities (42.5 %) and sport coaching (30 %) while 15 % of the sample would be a physical education teacher and only 8.5 % would like to work in sport management.
Conclusion: Sport experience and practice, regardless of level, seems to address young students' choice of University career. During the course of study few students achieve sport certifications probably because of the preference for an employ in reeducation field.

188 SL P
Economic aspects of physical activity in managing the diabetic patient: a budget impact analysis

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Aim: Nowadays, diabetes is an important health problem on a global scale. In recent years the percentage of subjects suffering from this disease in Italy has risen from 3.7 % to 5.5 %, trend destined yet to grow. According to estimations made by the Arno-Diabete Observatory, every person with diabetes generates a direct cost to the Italian Health System of about 3000 Euros, of which, 57 % for hospitalization, 29 % for drugs and 14 % for specialized services. The object of the present study, which is an integrated part of a ministerial project that has seen the University "Parthenope" as leader, is to evaluate the economic effects of using physical activity in care management of diabetic pathology.
Methods: Within the Project CCM 2012 it has been drawn up a perspective estimation of the costs that the Campania Region could avoid if physical activity was used as health instrument for managing the diabetic patient, considering it, above all, an instrument that reduces the complications of this disease. More specifically, it has been arranged a Budget Impact Analysis (BIA) in perspective of the National Health System in a five years time horizon.
Results: The results are substantiated in an estimated saving approximately of 50 million euro, at the end of the 5 years period, of which 29 million in hospitalizations, 15 million on drugs and 7 million on specialized services.
Conclusions: The results add value to the argument that the Adapted Physical Activity (APA), inserted in a reformulated Path Diagnostic Therapeutic Relief (PDTR) of the diabetic patient, as well as being a clinical choice in line with the criteria of effectiveness, it is also a health policy strategy that meets the principle of economic efficiency.

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189 SL P
Comparative analysis of sport coach education pathways in Italy

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The research investigates the training of sport coaches in Italy. The study is divided into three parts: the first describes the International Sport Coaching Framework, the second analyses the training courses conducted by National Sports Federation in Italy, while the third part carries out a comparative analysis of the paths for obtaining sport coaches qualifications of higher level in seven different countries. The system described in the first part is studied through the analysis of the main aspects that characterize it, such as the different operational contexts, coach functions, levels of qualification, knowledge and skills, the main types of learning and the characteristics of coaches. The second part examines the various training courses of Italian Sports Federations. 27 federations were analysed by studying the following aspects: the articulation in levels of education, methodology and educational content, methods of assessment, adherence to and SNaQ changes; It also describes the quantitative dimension of coaches for each Federation for the different levels and describes the important figure of the Federal

Responsible of coach education. In the third part has conducted a comparative analysis of the education of the higher qualification acquired in seven different countries: Canada, France, Germany, Holland, Swisterland, New Zealand and Italy. It has compared the main elements of the paths, such as entrance prerequisites, academic staff, the duration, content and teaching methods, costs, methods of evaluation, etc. Research results show that both grew up considering that the sports coach functions very complex and articulated and are increasingly operating context and that for this reason, it requires a more effective education aimed at the acquisition of skills and competences Training courses, despite the enormous progress in recent years due to the increasing number of scientific research in the sector and to the analysis of best practices, are far from being harmonized, both nationally (between the different federations) that internationally (in different countries). It still lacks an effective integration between the education provided by the federations and the education provided by academic institutions. Then further studies are recommended in future research projects that investigate this important aspect.

190 SL P
Impact of infrastructure changes on people active mobility: a case study

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Aim: The main aim of the PhD research is to study the impact of interior and exterior structural changes on people lifestyle. The focal points are two: the road connecting Cassino centre and University Campus, which has been object of safety improvement through the construction of a pedestrian and bicycle path; the planned creation of artwork on stairs within the Campus main building, jointly with programs aimed at motivate people to take them.
Method: The in-depth literature review has focused on the impact of structural changes influencing the lifestyle of the people. A pre and post intervention measurement of the number of pedestrians and cyclists was made through observation. The same procedure will be applied for stairs whose use will be object of a research-intervention. Follow-up periods for both studies will be implemented until June 2016. All data will be entered in the HEAT, a tool developed by the WHO used to estimate the economic benefits of infrastructural interventions facilitating physical activity through active mobility. Moreover, an on-line questionnaire and qualitative interviews will be used in parallel.
Results: Preliminary data show how, during observation hours 9–11, male pedestrians boosted from a daily average of 26.67 (±9.65) to 77.59 (±10.45), female pedestrians from 76.17 (±10.70) to 163.67 (±36.13); men taking bus unchanged (33.5 on average) while women decreased from 148.17 (±3.49) to 89.68 (±18.66).
Conclusions: The data show a prospective effectiveness of the intervention. After the completion of the follow-up, the results given by HEAT and by the research on stairs' use, a more complete comprehension of the correlations is expected. Additionally, data will be supposedly useful for the Local Authority for further improvement aimed at safety and enhancement of active lifestyles.
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191 SL P
The multi-purpose stadiums: strength for football clubs owners and…what else?

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Aim: In recent years, the multifunctional venues are becoming more and more a point of strength for economic and sporting renewal for the clubs. The aim of this work, following-up to what has been presented during the previous congress, is to confirm the economic performance of football clubs estimated the previous year and furthermore to broad the analysis of the benefits that multifunctional venues are able to generate for the entire society.
Methods: Starting from the comparative analysis of monetary income of the European football clubs, this study mainly focuses on the comparison between the most recent data and those previously analyzed. Subsequently, the attention is drawn on the impact of the venue on an economic, social and territorial level of the area in which it stands, by the analysis of data regarding the Juventus Stadium.
Results: The performed data comparison supports the proposed hypotheses, highlighting how a multifunctional venue positively influences the budgets of sports clubs that hold their property. In addition, the construction of these structures leads to a sharp revaluation of the surrounding territory, resulting in a chain reaction of socio-economic benefits such as the development of the commercial and employment sector, the creation of a new tourist attraction and an urban regeneration able to encourage the development of the real estate sector and construction sector.
Conclusions: The multifunctional venues can be considered a solid perspective for economic and social development for both football clubs owning it and for the entire society.
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192 SL P
The responsibility of coaches and referees for athletes' injuries in training and competitions. An Italy-UK comparison

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Aim: Illustrating the main aspects of the regulations of the responsibility of coaches and referees with particular regard to the issue of the "sport risk to which athletes consent" and of the specific precautions to be adopted in training and competitions.

Methods: After an excursus on the European, British and Italian sources of sports law and on the referee regulations of certain sports, we will deal with the issue of the civil and criminal liability of coaches and referees, with specific reference to the relation between the violation of sports rules and criminal responsibility.
Results: On an abstract level, in Italian law, a civil, contractual and extra-contractual liability is norms. In extreme cases, also intentional criminal liability is possible. In UK are applicable the ordinary principles of the law of negligence and coaches must provide "reasonable care".
Conclusions: In Italy, there is a double level of prudence and diligence, depending on whether the sport event is professional or amateur. In particular, a higher standard of prudence has to be respected in (non-professional) performances or in training, due to the objective limits of the event and to the greater limits of the athletic condition of the participants.
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193 SL P
Doping in Italy: an last analyses and its development

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Aim: Doping affects all levels of sport competition, in all countries, both among amateurs and professionals, and in all sports. Its explosive spread has triggered the response before of sports' entities and then of government institutions. The aims of this study were to know the spread of doping in Italy between able and disable athletes, what were the most used substances and/or method and in which sports it was more common. Moreover, what instruments were used to contrast it.
Methods: We have analysed the doping's spread in Italy since 2003. The data come from the databases of government and sports Italians institutions. Therefore, we have compared those data and focused our attention on substances and/or methods discovered in athletes of various sports federations. Furthermore, data's combination showed the reason of drug addiction.
Results: In Italy, only 3 % of checked athletes is doped, many of them are men and young athletes dope less than the older ones. Moreover, doped athletes play mainly cycling, athletics, swimming and football. The prominent peak of them is in the Central and Southern Italy in 2008 and 2010. Moreover, the analysis of data relating to galenic preparations declared during the year 2012, shows that 75 % of the prescribed substances are diuretics and masking agents, anabolic steroids and stimulant. Regarding the substances, cannabinoids and stimulants have recorded the highest consumption.
Conclusion: Every substances that give pleasant sensations or help the subject in his activity will bring him to repeat the consumption. Every banned substances by WADA has a particular effect on athletes' body and over the time, they constantly change. For this reason, to contrast doping in sport, there are legislation instruments together with various funded projects.
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SPORT BIOMECHANICs

194 SB P
A semi-automated lower limb thermal image post-processing software for sport data analysis

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Aim: Many recent studies use thermal imaging for skin temperature data acquisition [1]. Nevertheless, a standardization of the thermal image post-processing is still lacking. The aim of this study is to propose a semi-automated thermal imaging post-processing. The procedure was used to analyse the lower limb skin temperature in a group of basket players before and after a light warm-up.
Methods: Frontal and back lower limb thermograms of ten basket-players were acquired after acclimation (Basal) and after a light warm-up (Post warm_up). The protocol was repeated in three days. Thermograms were acquired by a near infrared camera (Flir Systems Inc., USA). For data post-processing lower limb was divided in two body segments (thigh and leg) and a custom made software has been developed. This allows to: 1. calculate and position the region of interest (ROI) whose shape and dimensions are based on the morphology and the anthropometric measure of subject's body; 2. calculate the mean value and the variance of ROI temperature. For each body segment, for ROI mean temperature and variance, Δ (basal value − Warm_up value) parameter was computed. Statistical analysis was performed.
Results: For each segment: 1. the skin temperature significantly decreased after the warm_up; 2. the variance significantly increased after the warm_up. Δ temperature was significantly different among the body segments. No differences were found in the results of the three acquisition days.
Conclusions: The results confirm a skin temperature reduction immediately after a dynamic exercise [2]. This phenomenon is probably due to a skin vessels vasoconstriction mechanism allowing blood flow redistribution from the skin to active muscles. Maybe due to the differences in the innervation distribution and the skin vascularization [2], skin temperature reduction is not uniform throughout the body segments and within the single segment. The repeatability of the results among the three acquisition days confirms the reliability of the proposed image post-processing software.
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195 SB P
The head position can affect the swimmer's passive drag?

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Aim: In human swimming, the total drag is determined by the resistance forces acting opposite to the direction of travel, and the intensity of these forces is related to the speed. As proposed by literature (Mollendorf et al., 2004), the changes in head position can affect the hydrodynamic performance of the glide. The purpose of our study was to investigate the influence of the head position on passive drag by a direct pool experiment with a swimmer's in-line towing.
Methods: The tests were performed on ten male swimmers with regional level swimming skills and at least 10 years of competitive swimming experience (age: 21 ± 2 years; stature: 1.80 ± 0.06 m; body mass: 75.9 ± 6.9 kg). They were towed underwater (at a depth of 60 cm) using an electro-mechanical device (Swim-Spektro, Talamonti Spa, Ascoli Piceno, Italy) at three speeds (1.5, 1.7 and 1.9 m/s) and in two body positions (LA = arms above the swimmer's head; SA = arms alongside the body). Each glide prone position was repeated with the three different swimmer's head positions: head-up, head-middle and head-down in relation to the body's horizontal alignment.
Results: Passive drag was significantly larger (+17.6 %) in SA condition than in LA condition. In SA condition, the results show a reduction of 4–5.2 % in average passive drag in comparison to the head-up position. In LA condition there was a major decrease of 10.4–10.9 % in passive drag when the head was down or aligned.
Conclusions: The swimmer's head location may play an important role in reducing the hydrodynamic resistance during passive underwater gliding.
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196 SB P
Estimation of swimmer's power propulsion: comparison between power thrust and power drag

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Aim: If the swimmer action is covered at constant average speed is possible to investigate the balance between thrust force (Ft) and resistant drag force (Fd) (Toussaint, 1992). The towing passive drag in a hydrodynamic stable position has been showed a remarkable consistency method to measure the swimmer's drag. Fully tethered swimming is a useful tool to asses the Ft and it has a high correlation with the swimming sprint performances (v). In relationship to 25m speed (v25), we compared the estimation of the swimming power propulsion obtained with the power thrust experiments (15s all-out of front crawl tethered) and the power drag method estimated from the passive towing measurement (Gatta, 2015).
Methods: The power propulsion of 16 international front crawlers (11 male 22.8 ± 3.3 years; 5 female 21.6 ± 3.2 years) was estimated according to eq.1 (Pt = Ft * V) and eq. 2 (Pd = Fd * V) in a collaborative study between the University of Bologna and Italian Swimming Federation.
Results: The mean force was 161.4 ± 30.4 N and 166.6 ± 30.8 N (respectively for Ft and Fd). The average v25 was 2.11 ± 0.13 m/s. A significant correlation ($p < 0.05$) for power propulsion was found between the two methods (344.6 ± 84.2 W and 355.2 ± 84.0 W, respectively for thrust and drag methods).
Conclusions: The correlation between power thrust experiments and power drag method in order to estimate the swimmer's power propulsion supports the use of power thrust method, reducing processing time and costs.
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197 SB P
Kinematics of the cartwheel in artistic and rhythmic gymnastics

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Aim: A cartwheel is a sideways rotary movement of the body performed by bringing the hands to the floor one at a time while the body inverts. When both hands are on the floor, the legs travel over the body and feet return to the floor one at a time, ending with the performer standing upright (Sands et al. 2011). The cartwheel is one of the basic elements of gymnastic but whereas in artistic gymnastics (AG) it is introduced as a basic skill to learn the round-off, in rhythmic gymnastics (RG) it is a basic choreographic element. The purpose of this study was to analyse the kinematic differences in the cartwheel performed in artistic and rhythmic gymnastics.
Methods: Fourteen young female gymnasts (7 artistic and 7 rhythmic) with 5 ± 1 years of experience participated to this study. They were asked to perform the cartwheel while being video recorded (Nikon Coolpix P520, 50 Hz). Times and distances were defined as follows: t0 and d0: initial position; t1 and d1 = loading feet; t2 and d2 = first hand touch; t3 and d3: second hand touch; t4 and d4: first foot touch; t5 and d5: second foot touch.
Results: The movement amplitude was smaller in RG vs. AG ($p < 0.05$): d1–d0 = 0.49 ± 0.12m vs. 0.91 ± 0.45 m; d2–d1 = 0.31 ± 0.12 m vs. 0.64 ± 0.19 m; d4–d2: 0.26 ± 0.07 m vs. 0.45 ± 0.16 m; d5–d0 = 2.13 ± 0.26 vs. 3.08 ± 0.72 m. The movement duration was also smaller in RG vs. AG ($p < 0.05$): t1–t0 = 0.85 ± 0.24 s vs. 0.54 ± 0.30 s; t2–t1 = 0.12 ± 0.03 s vs. 0.09 ± 0.01 s. In the loading phase (t1–t0), the knee angle was smaller ($p < 0.05$) in RG (148.05 ± 7.15°) than in AG (136.8 ± 2.19°). No differences were found in thigh's mean angular velocity (rad/s). The maximal vertical displacement of the hip (d5–d0) was smaller ($p < 0.05$) for RG (0.25 ± 0.04 m) than for AG (0.34 ± 0.09 m).

Conclusions: In RG the movement is "less curvilinear" than in AG: for the same angular speed, the knee angle in the loading phase is smaller and hence the vertical displacement of the hip is also smaller. As a consequence movement amplitude and duration are smaller in RG than in AG.

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198 SB P

In vivo" flexibility of ski-boots: the effect of boot hinges and ankle joint centre alignment on flex curves

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Aim: Stiffness properties of ski-boots are fundamental in characterizing their level of performance (Petrone et al. 2013) because they have to transmit loads from the skier to the skis. From a biomechanical point of view, for an optimal transmission of forces and moments, the rotational axis between shell and cuff should be as close as possible to the ankle rotational axis. The aim of the present study was to compare the bending moment of 4 different boots when calculated with respect to the boot hinge or to the ankle joint centre while performing simulated in-vivo forward flexions on a force platform at different levels of buckle closure.

Method: One recreational skier was involved in the study. Kinematic data were recorded with a six camera motion capture system. A Nordica Doberman SLR 165 ski was fixed on a force platform allowing kinetic data collection. Protocol consisted in (i) capturing the subject standing on platforms without boots, (ii) wearing the boots, (iii) performing five "mild" and five "strong" forward flexions with each of the four boots on the force platform, at two different levels of buckle closure ("soft" and "hard").

Results: The bending moment was calculated from the force platform data with respect to the ankle joint centre, and with respect to the boot hinge joint centre, defined as the midpoint between the two hinges. Results showed different values of bending moment considering both these two points and the different boot models.

Discussion: and conclusion: Results of the study showed a misalignment between the estimated ankle joint centre and the hinge joint centre for the involved subject. Boot manufacturers should take into account the results of this study to design properly their products according to the anthropometry of the skier's ankle.

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199 SB P

Sprint running: how changes in stride frequency affect leg and vertical stiffness at "maximal running speed"

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Aim: Sprint running can be described by "spring mass" parameters (such as stiffness). This study aimed to investigate the changes in selected biomechanical variables during 80-m sprints while imposing changes in step frequency. Moreover, we wanted to investigate the possible differences due to gender and training level.

Methods: Forty athletes (10 male and 10 female elite, 10 male and 10 female non-elite) performed 5 trials at maximal running speed: at the self-selected stride frequency (0 %SF) and at ±15 % and ±30 %SF. Contact (CT) and flight time (FT), step length (SL) and frequency (SF) were recorded by means of a 8 m Optojump (1000 Hz). The leg and vertical stiffness (k_{leg}, k_{vert}) were calculated according to Morin et al. (2006) based on data of maximal vertical force (F_{max}) and "spring compression" (ΔL and Δy, respectively) A one-way ANOVA for repeated measures was applied for statistical analysis.

Results: In all groups maximal sprinting speed (RS) was achieved at the self-selected frequency (it decreased of about 10-15 % at ± 30 %SF). Only small changes (1.5 %) in F_{max} were observed as a function of SF. CT, FT, Δy and SL decreased with increasing SF ($p < 0.001$) and k_{vert} increased with it ($p < 0.001$). ΔL was the largest at 0 %SF (it decreased of about 25 % at ± 30 %SF) and k_{leg} was the lowest at 0 %SF (it increased of about 20 % at ± 30 %SF). Significant gender differences (*post hoc* analysis) were observed for all parameters ($p < 0.05$) but ΔL. Significant training differences (*post hoc* analysis) were observed for SF, RS, F_{max}, Δy, k_{leg} and k_{vert} ($p < 0.001$).

Conclusion: Imposed changes in step frequency at "maximal speed" affect k_{leg} and k_{vert} in a different manner. This behavior cannot be attributed to differences in F_{max} but, rather, on Δy (which depends on CT only) and ΔL (which depends on CT and RS). Data reported in this study furthermore indicate that manipulating SF does not allow improving running speed either in trained or untrained subjects (of both genders).

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200 SB P

The use of new technologies as a tool for performance analysis in water sports

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The use of new technologies as a tool for performance analysis in water sports

Aim: The studies by new technologies applied to assessment of sport performances have being focused on the complexity of the phenomenon and analyzing the particular aspect. The performance is evaluated by quantitative data for biomechanics and bioenergetics and qualitative data by video analysis related single performance to evaluate specific indicators and descriptors . The aim is to take in relationship quantitative data and qualitative one in water sports.

Methods: Method is theoretical-argument on specific experimental studies of the whole phenomenon

Results:. Water polo study evaluates the correlation between tactics scheme and outcome and correlation between swimming velocity ball handling and without ball in athlete types.Cliff diving, which means diving from 28 meters with speed 24 m/s) study evaluates correlation between biomechanics of water impact and technical model. Synchronized swimming study evaluates

correlation between biomechanical aspects of technical elements and score indicators and descriptors. Swimming study evaluates correlation between morphological diseases and pain in water polo athletes.

Conclusions: Investigation of water sports utilizes ecological and integrated method that joins qualitative and quantitative aspects, thus it could be to use new technologies to address the use of technical instruments by global vision of sport performance to help the coaches in monitoring and assessment.

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201 SB P
Vertical stiffness in running: a comparison among three methods

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Aim: During running, the body could be modeled as a spring-mass system: its vertical stiffness (K_{vert}) can be calculated as the ratio of maximum vertical ground reaction force (F_{max}) to the vertical center of mass displacement (Δy). F_{max} and Δy can be derived from force platform data (Cavagna, 1975) or estimated with the spring mass model (Morin et al., 2005). Our aim was to investigate the influence of different methods in the measure of K_{vert} before, during and after an half marathon (RunForScience, organized by the University of Verona).

Methods: Thirteen male runners participated to the study. Before and immediately after the race, they were asked to run along an indoor track where an OptoGait system was positioned across a Kistler force plate, integrated into the track. During the half marathon, they were video-recorded (Canon Exilim, 30Hz) in correspondence to the 7, 14 and 21 km distance. Force platform data (**F**): F_{max} was directly measured, and Dy was calculated through double integration of vertical acceleration according to Cavagna (1975). Optojump (O) and video (V) data: F_{max}, Dy and K_{vert} were calculated as proposed by Morin et al. (2005).

Results: No differences were observed in K_{vert} as a function of the distance covered (V) nor before and after the run (O and F). The running speed was the same in outdoor and indoor measurements. Data were therefore pooled together: pre-test O and F values were compared to V at 7 km, and post-test O and F values to V at 21 km ($N = 26$). The values of K_{vert} were similar among methods: 24.6 ± 4.0, 26.7 ± 3.6 and 26.6 ± 3.9 kN/m for O, V and F, respectively. No differences were observed in K_{vert} between V and F but K_{vert} was lower in O than in V ($p = 0.005$).

Conclusions: A simple 2D video analysis allows determining vertical stiffness in ecological conditions (during the race).

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202 SB P
The benefits of running on a centrifugal track: a pilot study

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Aim: Sprint-specific strength-training is typically performed by means of external resistances applied to the athlete during running (sled/parachute towing). The external resistance, generally applied to the waist/trunk, may result in a localized overload of the musculoskeletal system with negative alteration of the athlete's posture [1]. Aim of this study is to analyze the mechanics of running on a centrifugal track as an alternative sprint-specific training method.

Methods: The centrifugal track (CT) [2] consisted of a basin-shaped track characterized by a plate with a parabolic section (radius *r* ranging from 2.5 m to 3.5 m). A mathematical relationship exists between the incline of the plate and running velocity so that the longitudinal axis of the athlete is perpendicular to the plate. While running, the athlete has to change direction at every support phase to maintain a circular trajectory, giving rise to a centripetal acceleration which is added to gravity resulting in an equally-distributed (rather than localized) "overweight" of the athlete. A 3D video-based motion analysis system was used to compare the kinematic characteristics of four young sprinters running on the CT at 6 m/s (incline = 44°) with respect to level running approximately at the same speed. The mechanical work (MW) exerted by external forces, estimated as the variation of the mechanical energy associated to the athlete's center of mass, was used to verify the training effect of running on the CT.

Results: Running on the CT resulted in a 24 % increase of MW compared to level running ($p < 0.05$). No significant postural changes were found between the two running typologies ($p > 0.05$).

Conclusion: These preliminary results showed that the CT can be a valid alternative to commonly used resisted-sprint training methodologies.

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203 SB P
Application of the Functional Movement Screen in the gym

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Aim:. This research is aimed to verify the large-scale application of the Functional Movement ScreenTM by Gray Cook in a gym dedicated to fitness, to find out what are the average results as a function

of body mass index, age, sex and physical activity previously performed. This method was developed with the goal of integrating training strategies and reducing the risk of injuries.

Method. It was examined 541 people attending the gym, aged between 9 and 65, with a mean age 29.99 ± 12.04 (Mean ± SD), after an initial interview in which data were recorded, test briefly explained, and a consent to the use of personal data and its recording obtained. Studied individuals were divided into groups based on BMI, age, gender, sport training experience. Seven movements were tested (score 0–3) plus three "clearing exams" verification for pain.

Results: The results seem to agree with those obtained from previous researches. The average score was 14, with a slight difference between men and women. The differences among various classes, divided by age and BMI, were not significant. The averages found among the three groups (sedentary, sports experience, gym experienced) were similar, slightly higher for some decimal for the athletes' group. Surprisingly, the result of the "gym" group achieved a lower score respect to sedentary one.

Conclusions: Obtained data are consistent with those in previous studies: this method represents a useful tool to highlight, and communicate with other instructors, any customers' problems and address them to the best choice of exercises. It has been highlighted a difficulty for women to get a good score in the push-up, due to an obvious lack of strength in the trunk.

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204 SB P

The neuromuscular control about the elbow joint is not affected by karate practice: a comparison between elite karateka and sedentary people

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Aim: In the last years, a huge body of evidence has focused on karate. This body of literature evidenced that during karate combat competition the greater part of the technical actions performed involves punching (Chaabène et al 2014). Therefore, this study aims at investigating the neuromuscular control of the upper limb, in particular about the elbow joint, in elite karate athletes during isokinetic elbow flexion and extension.

Methods: Seven elite karateka and four sedentary people volunteered to participate in this study. Volunteers were asked to perform a set of isokinetic elbow flexion/extensions at different angular velocities (AV: 0; 30; 60; 90; 120; 180; 240°/s). Surface electromyograms (sEMG) of Biceps (BB) and Triceps Brachii (TB) were recorded with a 16 linear electrodes array. Mechanical and sEMG data were recorded synchronously at 2048Hz. The peak flexion/extension torque (PT-FL; PT-EX) and the peak power (PP-FL; PP-EX) were computed for any angular velocity. The amplitude (RMS) and frequency content (MDF) of the sEMG signal of the BB (RMS-BB; MDF-BB) and the TB (RMS-TB; MDF-TB) were computed on 0.125 s epochs. In addition, muscle fibre conduction velocity (CV) was estimated for the BB muscle (CV-BB). RM-ANOVA (AV as a within factor) was performed to test the effect of group and muscle. Statistical significance was set to $p < 0.05$.

Results: For any considered angular velocity, no difference between the two groups emerged in mechanical (PT-FL, PT-EX, PP-FL, PP-EX) and sEMG variables (RMS-BB; MDF-BB RMS-TB; MDF-TB; CV-BB). Similarly, no significant group times muscle interactions were observed.

Conclusions: Our results show that the neuromuscular control about the elbow joint is not affected by karate practice. Future studies investigating the neuromuscular control during punching actions are needed to gain further insight into the neuromuscular control of elite karateka.

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205 SB P

New diagnostic method to assess the "break-point" in Nordic Hamstring Exercise: a pilot study

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Aim: Nordic Hamstring Exercise (NHE) is frequently used as a valid test to assess the motor-control related to injury risk with poor scientific rigor (Engebretsen et al. 2010; Sconce 2015). For this aim we purposed a new scientific approach to assess the "break-point" (BK) during the NHE exercise.

Method: Twelve female young basketball players (16 ± 0 yrs) were filmed (Casio FH20, Japan; 30 Hz) during a NHE session. Each subject performed on three NHE and the best trial was chosen for the analysis. Three markers were applied on subjects: lateral malleolus, lateral knee and trochanter major of the right leg on 2D plane for the motion capture and analyzed with the a video analysis software (Dartfish 6.0, Fribourg, Switzeland). For each NHE the time (sec)/angle (°) diagram of the knee was measured and analyzed. The data analysis were calculated with an algorithm to assess the BK in which the subjects lost the control of the exercise falling frontward.

Results: The time of the NHE was 2.3 ± 0.5s with CV 21 %, the BK stopped at 69 % of the angular-movement after 1.6 ± 0.5s with 30 CV %. The BK occurred at 17.3 ± 2.8° (CV 16 %) of NHE although the 58 % of the subjects maintained a correct alignment after 30° of movement.

Conclusion: The used algorithm is useful in the tested population and allows to discriminate the dynamic BK from the posterior angle of the knee. These results avoid the subjective observation process that is used in other evaluation protocols of the NHE (Engebretsen et al. 2010; Sconce 2015). Further studies on this new algorithm and its validity are needed.

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206 SB P
Biomechanics characteristic of the patellofemoral instability

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Aim: In normal condition, patellar stability is assured by both *bone factors* (patellar and trochlear morphology) and *muscular-ligamentous factors* (patellofemoral ligament, patellar tendon, quadriceps and vastus medialis oblique muscles). When this stability is not guaranteed,the phenomenon of the PatelloFemoral (PF) instability occurs producing knee anterior pain, Patello-Femoral Pain Syndrome and cartilage erosion [1]. In dynamic condition, the biomechanical analysis of forces and torque of knee joint allows to investigating the pathogenesis of the PF disturb which has a high influence in the context of sports.
Methods: Biomechanical studies, aimed to investigate the PF instability during the knee flexion-extension, analyze the different forces acting on the three anatomical planes [1–3]. In particular, the stabilizing force (F_s), defined on the sagittal plane, and the destabilizing force (F_d), defined on the
coronal plane, are combined to compute the resultant force (R) on the transverse plane [2].F_s and F_d, and consequently R, change in magnitude and direction in relation to the changes of the degree of knee joint flexion/extension. Moreover, based on the knee joint geometry a triangle of security has been defined [2].
Results: We have observed that with concomitant anatomical factors (misalignment, patellar and/or trochlear dysplasia, retraction of soft tissues) and depending on the degree of knee joint flexion/extension, the force R can fall on the triangle of security edges (lateral hyper-pressure) or outside it(subluxation or a luxation), producing PF instability. Moreover, the critical range of the knee joint flexion/extension, in which R tends to fall out of the triangle of stability, seems to be that between 20° and 30° of flexion. These values of knee joint flexion correspond to a posture frequently adopted in sports.
Conclusion. The biomechanical analysis of the PF joint is fundamental to understand the pathogenesis of the PF instability and to define new rehabilitation protocols.
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207 SB P
Giakuzuki karate punch: a comparison between techniques

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Aim: One of the most used karate techniques is the Giakuzuki punch (classic technique, CT) (e.g. Cesari and Bertucco 2007, Gulledge and Dapena 2008). Since a modified form of Giakuzuki was recently introduced (sports technique, ST), the aim of this study was to investigate the differences in performance between CT and ST.
Methods: Ten athletes with 12.9 ± 7.25 years of experience were recruited. They were asked to perform maximal punches with each technique (CT and ST) against a target (a basketball); these punches were video-recorded (Casio Exilim, 240Hz) and data were analyzed with Skill-Spector. Elbow, shoulder and knee angles were determined frame-by-frame. Punch (vp) and ball velocity (vb), punch-ball contact time (Δt), the trajectory of the punch and the ankle-wrist distance were computed. Based on these data the ball's linear momentum ($m \cdot vb$), the punch force ($F = m \cdot vb / F \cdot \Delta t$) and power ($P = F \cdot vb$) were calculated.
Results: Ankle, shoulder and knee angle at impact were 136 ± 32; 70 ± 27; 171 ± 18° for CT and 136 ± 25; 75 ± 19; 152 ± 19° for ST. Only the knee angle was significantly different ($p < 0.05$) in the two techniques. The distance travelled by the wrist (punch's trajectory) was significantly longer ($p < 0.05$) in ST than in CT (1.62 ± 0.22 and 1.21 ± 0.17 m, respectively) but the ankle-wrist distance was similar (1.45 ± 0.16 in ST and 1.47 ± 0.12m in CT). Albeit not to a significant level, the punch and ball velocities were larger in ST (10.10 ± 1.72 and 10.23 ± 2.37 m/s, respectively) than in CT (8.91 ± 2.27 and 9.23 ± 1.96 m/s, respectively) and punch force was larger in ST than in CT (721 ± 190 and 640 ± 193N, respectively). Punch power was significantly larger ($p < 0.05$) in ST than in CT (7484 ± 3029 and 5820 ± 2495W, respectively).
Conclusion: The modified technique of Giakuzuki allows expressing a larger power output than the classic technique: a closer knee angle and longer punch trajectory (in ST) seem responsible for the better performance.
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208 SB P
Paddling, kayak on-water arrangement and propulsion management in the elite canoeist

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Aim: The behavior of the kayak-canoeist complex (KCC) on water represents a crucial issue for pursuing optimal performance in terms of paddling effort, kayak on-water arrangement and over-race propulsion management.
Methods: For this aim, one elite senior canoeist (age 25 yrs, body-height 1.78 m, body-mass 81.50 kg, BMI 25.72 $kg \cdot m^{-2}$) performed two all-out 200-m bouts with the boat (Nelo Vanquish III) to investigate the behavior of KCC by means electronic devices. Particularly, the monitored variables were: race time (stop-watch), paddles antero-posterior force (custom-made sensorized paddle, Ferrari, Maranello, Italy), pitch/roll/yaw angles (gyroscope, Magneti Marelli GIP 220, Corbetta, Italy) and 3D accelerations (accelerometer, ADXL330, Analog Devices, Norwood, MA, USA). All devices were connected each other *via* Bluetooth and synchronized by means of CoreMeter software (V.0.43; Latina Italy).
Results: Speeds resulted 5.69 and 5.88 m/s. Associated with best performance, it were found—in terms of bout mean values—higher paddles force with higher right ones (left force: 35.2 *vs.* 30.5 kg_f, right force: 40.3 *vs.* 34.9 kg_f, total force: 75.5 *vs.* 65.3 kg_f), lower total force over-bout decay (−.800 *vs.* −1.864 kg_f/s), higher positive—i.e., clockwise/right-side—roll (7.0 *vs.* 2.9 rad), lower 10" post-start positive—i.e., right-side yaw (0.4 *vs.* 0.7 rad), and higher antero-posterior acceleration (.014 *vs.* .007 m/s^2) with lower variability (CV −35 %).
Conclusions: With the inherent limitations featuring a two-measures case study like this, there are preliminary indications that optimal performance is obtained by means of some KCC adjustments:
1. Higher and less over-bout decreasing paddling force;
2. Higher and more constant kayak antero-posterior acceleration;
3. A concurrent dynamically asymmetric paddling and corresponding kayak roll, possibly decreasing the kayak draught (with consequent lower hydrodynamic drag), which however do not impair
4. A low diverging yaw. Further investigations on the matter are necessary to strengthen these preliminary observations.

209 SB P
Reactivity using accelerometer in a mixed urban and natural outdoor setting

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Aim: The use of motion sensors (pedometers and accelerometers) seems to strengthen the results of physical activity (PA) promotion interventions. Nevertheless many studies identified reactivity as a possible bias in this measures. Reactivity is a phenomenon that occurs when individuals alter their performance when observed and, usually, is investigated measuring day by day variability with the same sensor or evaluating wrong feedback effects. However no study explained if reactivity occurs in the same context with the same conditions. Additionally it's not clear if there is a perception of it. Therefore, the aim of this study was to test reactivity in acute during a PA outdoor setting and verify if there is perceived performance (PP).
Method: 38 university students (20 males and 18 females), mean age 22.05 ± 2.56 years and Body Mass Index 22.29 ± 2.60, completed a familiarization trial and two 20 minutes session of self-selected pace PA on a mixed urban and natural measured track. The exertional responses (Borg 6–20) (RPE) and PP (Visual Analogue Scale) were recorded at the end of every session. In a randomized order subjects wore accelerometers (A) or not (NA). Paired-samples t-test was used to determine whether there was a statistically significant ($p < 0.05$) mean difference between distance, RPE and PP during A and NA.
Results: Participants paced further during A (2,302.90 ± 653.22m) as opposed to NA (2,144.74 ± 653.22,) with an increase of 158.16 m (95 % CI, 24.29 to 292.03), there was a greater PP in A (4.97 ± 2.07 vs 4.16 ± 2.11), of 0.82 (95 % CI, 0.07 to 1.56) and a greater RPE in A (11.32 ± 2.31 vs 10.47 ± 2.40) of 0.84 (95 % CI, 0.15 to 1.53).
Conclusion: Accordingly with many studies, reactivity to accelerometers use occurs in acute condition too. This condition leads to a better performance and PP and a greater RPE. Reactivity has, definitively, to be considered in field-base researches.

210 SB P
Maximal power output in cycling: the effect of ankle flexibility

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Introduction: Ankle injuries are more common in runners than in cyclists but can affect triathletes (Spiker et al. 2012). Ankle braces can be used to stabilize/protect the joint but this brings about a restriction in flexibility that is expected to impair cycling performance.
Aim: The aim of this study was to investigate the changes in the mechanical power output of cycling due to a reduction in ankle flexibility.
Methods: 5 males (183 ± 9 cm; 73.6 ± 8.4 kg; 21.6 ± 3.2 yr) and 5 females (165 ± 3 cm; 61.2 ± 9.8 kg; 19.2 ± 0.5 yr) in cycling from 3.8 ± 2.4 and 10 ± 2.7 yr respectively, were asked to perform 5 maximal sprints (5s with 5 min of active recovery) in two different conditions: with (AB) and without (N) ankle braces (A2, Zamst). Passive ankle flexibility was assessed with a goniometer. The load was changed by changing the gear ratio (2, 3, 4, 5, 7) of an ergometer (SRM IT) and the values of power and pedaling cadence were assessed by means of a software (SRMWin). During these sprints the hip, knee and ankle angles were measured in different crank positions: (0,90,180,270°) for gears 3–5–7 by means of a software (Kinovea).
Results: The use of AB has been found to reduce ankle flexibility of about 10° both in active and passive conditions. The ankle angle was larger in AB than in N (122° vs. 115°, on avg) at 0° and 90° whereas no changes for the other positions (180,270°) and in the other joints. Power output was larger with the use of AB with significant differences (t-test: $p < 0.05$) at the two extreme gear ratios (2,7). On the average maximal power output was increased with AB both in absolute values (781 vs. 755 W, $p < 0.005$) and when normalized by body mass (11.6 vs. 11.2 W/kg, $p < 0.005$).The linear relationships between force (F,N) and cadence (C,rpm) (AB:$F = -2.48C+668$, $R^2 = 0.999$,$n = 5$; N:$F = -2.38C+645$, $R^2 = 0.999$, $n = 5$) indicates that maximal theoretical force increased (668 vs. 654 N) with the use of the ankle braces.
Conclusion: Rather than decreasing maximal power output the use of an ankle brace was found to increase power output in cycling. This finding can be attributed to a better stabilization of the ankle joint leading to a better expression of force.
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MOVEMENT LEARNING AND PSYCHO-PHYSIOLOGICAL DEVELOPMENT

211 ML P
Motor control, reaction times and movement times in Taekwondo. Difference between amateur and elite athletes

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Aim: Mental processes and information processing determine reaction and movement time in sport (Wrisberg and Schmidt, 2000). The study estimated and compared neuromotor reaction times and the execution of different techniques of kicks in Taekwondo, response to visual information (default and random,) of amateur and elite Taekwondo competitive athletes, regardless of gender differences.
Methods: Eight male athletes, divided in four èlite (age 21.5 ± 5.50) and four amateur (age 19.5 ± 4.65), performed two different kicking techniques on a dummy wearing a chest gear, starting from the same guard stance.. Two different tests were proposed for each athlete: 1 stimulus with simple reaction time (SRT), when the LED turn on the athlete has to performs a front kick; 2 stimuli with Reaction Time Choice (RTC), when the blue light turn on the athlete has to perform a front kick or a roundhouse kick when the red light turn on. Led lights were turn on in a randomizer order. The reaction time was defined as the lapse of time between the initial visual stimulus and the release of the rear foot (take off) from a contact platform.
Results: This study showed that elite athletes' reaction times are less than those of amateur athletes, and they are lower both in the motor execution, in which a simple execution is required ($p < .001$), and also in random execution ($P < .05$).
Conclusions: Actions in blocks do not require a choice and, therefore, the technical-agonistic level is decisive for the reaction times. If the number of alternative stimulus-response increases, logarithmically, then the response time increases too. Reducing the response time can be achieved by reducing the situational complexity, associating with each possible stimulus "one and only one possible response" so that each response falls within the "simple reaction" time pattern.
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212 ML P
Training of fundamental movements of the upper limbs in children

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Aim: Fundamental Movement Skills are considered fundamental ability involved in specialized movement necessary for the activity of every day (print, draw, write, etc.) for children, and adults. The aim of this study, is to evaluate if an intervention of juggling and tennis could influence FMS, linked with dexterity and hand-eye coordination.
Methods: The subjects involved are 209 children of three different class-age (1°: 6–7 years-old; 3°: 8–9 years;—old 5°:10–11 years-old) of four primary school, which two for Control Group (CG) and two for Experimental Group (EG). EG protocol is organized in four lessons of juggling and four of tennis, playing during the hour of physical activity in the school. FMS was evaluated with: Korperkoordinations Test fur Kinder (KTK) to evaluated gross motor coordination (Vandorpe, 2011); Test Avanti 50 % (A50 %) (Donati, 2002) and 9 Hole Peg Test (9HPT) (Smith, 2000) to evaluate dexterity and hand-eye coordination.
Results: There isn't any interaction between pre-post x group in KTK test. 9HP Test don't show different trends between the two groups that increase in a similar manner. There is a significant tendency to improve performance with increasing age of the subjects ($p < 0.001$). A50 % showed values at limit of significance in overall variation pre-post ($p = 0.053$) and in interaction between groups and time ($p = 0.085$). Apparently EG realized a large improvement (39.5 %) in the contrast to the stability of CG. The results of class 3° and 5° are significant better than 1° class ($p < 0.001$).
Conclusions: Data show a trend which improve FMS on upper limb. We suppose that this experiment could show more significant results increasing stimulus of training.
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213 ML P
DT at school. Dual-task performance in a group of Italian students

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Aim: Only rarely motor performances in everyday activities are carried out alone, but often with a concurrent additional task. These activities, named dual-task performances, are considered an attention-demanding task even in young adults (Nascinbeni et al., 2014; Patel et al., 2013). However, few studies evaluated how different functional tasks may affect the motor performance in young adults. This study assessed the impact of functional tasks on walking performance in a sample of high-school students.
Methods: Sixty young high-school students (25 females and 35 males, mean range 18–19 years) participated in the study. Participants walked for 8 meters at their usual speed under single (WT) and under

dual-task conditions. The dual-task conditions included a walking while carrying a glass of water (WTW) and while carrying a ball on a round tray (WTB). Walking speed was calculated for the different conditions. Data were analyzed with parametric statistics. The level of significance was set at $p < .05$.

Results: A repeated-measures analysis showed a significant decrease in the walking speed ($F_{2,118} = 17.728$, $p < 0.05$) among the WT ($M = 1.748 \pm 0.197$ m/s), the WTW ($M = 1.657 \pm 0.211$ m/s) and the WTB ($M = 1.64 \pm 0.245$ m/s). Post hoc analysis with a Bonferroni adjustment revealed a significant difference between WT and WTW and between WT and WTB.

Conclusion: The study confirms the interference of additional functional tasks during walking, as reported with additional cognitive tasks (Patel et al., 2013). However, no difference in walking speed was observed between different functional tasks.

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214 ML P
Transcranial Direct Current Stimulation (tDCS) on Anticipatory Postural Adjustments in Fitts' law

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Aim: Transcranial direct current stimulation (tDCS) is considered a neuromodulatory intervention that induces changes in the excitability of the human motor cortex, but the real nature of this change is still unknown (Brunori et al 2012). Here we test whether the Anticipatory Postural Adjustments (APAs) parameters such as onset and magnitude change after a cathodal and anodal tDCS stimulation

Methods: Eighteen subjects (9 males and 9 females) with no sensory or motor dysfunctions were enrolled in the experiment. tDCS stimuli were delivered for 20 minutes before performing the task, in three randomized sessions (anodal vs. cathodal and sham as a control). The task was to point with the big toe to targets having different sizes and positioned at different distances to obtain several indices of difficulties following a typical Fitt's law protocol (Bertucco and Cesari 2010 and 2013).

Results: APA's onset and magnitude modulated linearly with the Index of Difficulty after a sham stimulation while this modulation was not present but in a diverse way after an anodal and cathodal tDCS application.

Conclusions: For the first time we showed that tDCS application changes the motor cortex plasticity by specifically modulating APAs parameters as the time and the amount of muscle recruitment necessary for action preparation.

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PHYSICAL EDUCATION AND SPORT PEDAGOGY

215 PE P
Physical skills and academic achievement in primary school children

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Aims: Research[1] has shown a correlation between cognition (e.g. academic achievement) and physical activity or fitness levels. However, researches on physical skills or capacities and academic achievement in children are still limited. The aim of our study is to verify the correlations between physical skills and academic achievement in children at the end of primary school (10–11 y.o.).

Methods:. One hundred and fifty (150) children (79 female and 71 male) underwent at some tests: Cooper test (CT) for endurance, Standing Long Jump (SLJ) for strength (lower limb power) and the 9 Hole Pole test (9HP) for hand coordination. Academic evaluations in Italian (I), Mathematics (M), and Physical Education (PE) were also collected. Correlations and multiple linear regression analyses were conducted.

Results:. All considered factors are significantly correlated, although with quite different values. The multiple linear regression analyses show that: gender weakly explains evaluation on I (ß = .378; $p < .05$) and CT levels (ß = −.336, $p < .001$); the evaluation on M explains the evaluation on I (ß = .697, $p < .001$), the evaluation on PE (ß = .181, $p < .001$), and 9HP with left hand (ß = −.149, $p < .013$); the evaluation on I explained the evaluation on M (ß = .867, $p < .001$); PE's evaluation moderately explains the evaluation on M (β = .468, $p < .001$), and performance of SLJ (ß = .292; $p < .001$); SLJ explains moderately performance in CT (ß = .366, $p < .001$) and the evaluation on PE (ß = .289, $p < .001$); finally, CT explains the SLJ performance (ß = .368, $p < .001$). The values of hand coordination (9HP) do not significantly explain none of the other parameters.

Discussion: The study confirms positive correlations among physical skills and academic achievement in primary school children. The overall picture obtained from results is not clear and further researches should investigate the role of confounding factors such as the economic and social conditions. Furthermore, future researches should consider motor skills, cognitive, neuropsychological, and neurophysiological parameters.

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216 PE P
Physical education for a healthy lifestyle: the role of perceived and actual competence

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Aim: The aim of the study was to examine the effect of perceived competence, actual competence, psychobiosocial states, and motivational factors experienced in the physical education context toward the intention to practice exercise or sport in out-of-school settings.
Methods: Inactive female students ($N = 191$, age range 14–19 years) took part in the study. Measures included perceived competence (a single item), actual competence (teachers' assessment), the Psychobiosocial states inventory (20 items measuring pleasant/functional and unpleasant/dysfunctional emotion-related states), the Situational Motivation Scale (16 items assessing intrinsic motivation, identified regulation, external regulation, and amotivation), and intention to practice exercise or sport outside of school (a single item).
Results: Correlational results showed the intention to practice out-of-school physical activity or sport to negatively relate with unpleasant/dysfunctional states, external regulation, and amotivation, and to positively relate with all the other variables, including actual and perceived competence. Two hierarchical regression analyses were run by entering intention to practice out-of-school physical activity or sport as the dependent variable, while motivational factors and perceived competence (first analysis) or actual competence (second analysis) were entered as predictors. Results showed identified regulation to significantly contribute to the amount of the variability in the intention to practice physical activity outside of school. In the second analysis, actual competence further contributed to the amount of the variability.
Conclusions: Findings suggest that both actual and perceived competence are important factors in promoting participation in physical activities or sport outside of school. During physical education lessons, teachers can increase both actual and perceived competence of their students in order to motivate them toward the adoption of a healthy lifestyle.

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The effect of a physical education program focused on acrobatic and balance skills in a High School of Piedmont

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Aim: The aim of this study was to examine the relationship between the Acrobatics and Balance Test (Robazza and Bortoli, 2004) and type and quantity of years dedicated to sports activities on High School students. Moreover, we examined the effect of a specific program focused on acrobatic and balance skills.
Methods: Participants were 72 students (48 % females), attending the 1st grade of a High School in Biella. They were divided into active control (48.6 %) and experimental groups (51.4 %). The experimental group followed a program of 16 lessons, focused to improve acrobatic and balance skills, while the control group followed the normal physical activity school program. The acrobatic and balance skills were measured before and after the intervention. A Pearson's correlation was used to assess the relationship between the Acrobatics and Balance Test and type and quantity of years dedicated to sports activities. ANOVA analysis was performed to examine the effects of the intervention program on acrobatics and balance skills ($p < .05$).
Results: Twenty-two students performed sport activities for less than 8 years (30.6 %) and 50 for more than 8 years (69.4 %). Moreover, 26 students have been practicing sport with specific components of acrobatic and balance skills, (36.1 %) and 46 with no specific components of acrobatic and balance skills (63.9 %). A significant positive correlation was observed between quantity of years dedicated to sports activities and Acrobatics and Balance Test ($r = .385$; $p < .001$). ANOVA analysis showed a statistically significant interaction between time and groups ($F_{1,70} = 11.527$; $p < .001$).
Conclusion: The results highlight the relationship between the time spent in sport activity and the ability in acrobatic and balance performances. Moreover, this study showed the positive effect of a physical education program focused on acrobatic and balance skills on High school students. Future studies are needed, in order to increase the sample, to increase the investigated variables and to compare the effects of interventions with those of a different kind of physical activity programs.

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218 PE P
Music and physical activity for L2 vocabulary acquisition in first graders

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Aim: The purpose of this work was to experiment a didactic method to enhance learning of L2 by using psychomotor development in a first class of an Italian primary school.
Methods: Two fundamental questions were posed at the outset of the project: (a) can activities based on psycho-motor tasks enhance target language vocabulary acquisition in a group of first graders?; (b) can creating a reggae/hip-hop song, improve pronunciation and retention of basic target language vocabulary? The target sample, consisted of 66 children from first grade, was divided into two groups (control vs experimental group). The protocol contents were taught over a period of 20 weeks and were closely related to those of the program of English.
Results: The significance of score differences in the entrance test and the final test was quantified through the analysis of the variance. The analysis of the results showed an improvement in the experimental group compared to the control group with respect to the acquisition and retention of L2 vocabulary. On the other hand, the data regarding pronunciation of the target language vocabulary tell a different story, with no significant difference emerging between the two groups.

Conclusions: This experimental project allowed us to verify how physical activity and play, used as the primary teaching tool, can enhance L2 learning in primary school.

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Body and activity in the middle of the child educational process in the pre-school

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Aim: In the curriculum proposed for the pre-schools (National Guidelines, 2012), are defined the scopes of experience according to which the didactical programming is organized. The aim of the study was to demonstrate the effectiveness of a learning path in the pre-school in the field of "Body and activity" and "The self and the other".
Methods: The experimentation has been focused on a group-class of the pre-school "E-Salgari" of Turin, divided in Experimental Group (EG; n: 25 children; age 3 yrs) and Control Group (CG; n: 25 children; age 3 yrs). The activities proposed to the EG included period of "free play", educational activities to experience tactile sensations and produce music-linked image, period of creative elaboration and contents verbalization.
The criteria defined in the starting phase in the subject of "Body and Activity" were 17, among which "The pupil can walk/run in an harmonious way, can do a standing jump, can match different colours". In the subject of "The self and the other" has been defined 12 criteria among which "the pupil seeks others children, is autonomous in the practical activity, can express his own needs and feelings".

The CG has followed the traditional scholastic programming. The statistical analysis has been conducted with the Wilcoxon test (between differences T1–T2 on each groups).
Results: The EG has obtained values of 960 points in T1 and 1122 points in T2, while the CG scored 961 points in T1 and 1031 points in T2, on the variables investigated.
Conclusions: We can assert that children active participation in play-motility activity and ludic experimentation is fundamental to strengthen the basic motor schemes in the researching of the indipendence and the deep knowledge of the self.
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220 PE P
Relationship between bioethics and sport

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Aim: The term bioethics, is a term coined by VanPotter R., who in 1970 thought of a discipline, capable of contributing to a better quality of human life and the cosmos. At first he intended bioethics as a wisdom capable of creating a bridge between bios and ethos, and between bio-experimental science and ethical-anthropological sciences. Similarly, the modern sport is presented as a polysemic phenomenon, pluris value. From the beginning, the sport is included in the discussion of bioethical problems with doping. Today, the ethical problems of the sport are not only ascribable to doping; the medicalization of society, techniques for enhancement, violence, fraud, corruption, even the acceptance of anthropological transhumanist theories. Our purpose is to shed light on these issues so that there is a discernment, a fine-tuning also in educational programs, for the protection of all the sport from a scientist adrift, which would lead to an imbalance of values.
Method: Reading, textual and documentary analysis, evaluation of critical examples.
Results: H. VanderZwaag, in ancient times, asked: how many athletic directors have read works of sport philosophy, or humanities? Along with E.A. Zeigler NASSM, are recognized as pioneers of educational Sport Management. Comes the need to leave the confines of a scientific field, in order to deal with other than itself.
Conclusion: The quantitative sciences attracts more funds than qualitative ones; the philosopher Nussbaum, has relaunched the idea that the training of students will have to be more disinterested than utilitarian, offering arguments against the choice of anti-classical, analyzing and comparing different educational systems. Schools, Universities, must assign a prominent place in the program of study to the humanistic, cultivating a participation that can activate and improve the ability to see the world through the eyes of another person. In order to form citizens who play their role in society, science and technology alone are not enough, we need disciplines that are able to cultivate critical thinking, respect for diversity, solidarity, the judgment, the freedom of expression. According to A. Camelli, the humanities faculties prepare for that life-long learning, which will characterize tomorrow's jobs.

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Relationship between Wingate test and vertical jump in young female volleyball players

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Aims: Maximum vertical jump is an important component in performing spike and block skill in volleyball and is a reflection of explosive muscle strength [1]. The Wingate test (WT) has commonly used to evaluate anaerobic performance by measuring muscle power during short-term, high-intensity exercise [2,3]. The aim of this study was twofold: to investigate the possible relationship between power performance on the Wingate test (WT) and explosive leg strength performed during a vertical counter-movement jump test (CMJ) and whether anaerobic power assessed could identify players with the best performance (i.e. those with the highest CMJ).
Methods: 14 young female volleyball players, age 16–26 years, were grouped by performance (those with a CMJ $> 75^{th}$ that was > 38 cm were grouped as high-performance group while those with a CMJ $\leq$ 38 cm. were classified as low-performance). Wingate Test was completed, and peak power (PP), average power (AP), time-to peak power (tPP), and power drop (PD) were collected for each athlete.
Results: Athletes with the best performance were lighter, had lower BMI and fat mass as compared to low-performance group. Among muscle power parameters, average power indexed was significantly higher in high-performance as compared to low-performance group. By ROC analysis, fat mass was able to perfectly discriminate between

2 groups (AUC 1.0, sensitivity and specificity 100 %). Among anaerobic power parameters, average power ≥6.99 had the highest accuracy (AUC 0.79, Sensitivity 100 %, Specificity 75 %).

Conclusions: Anthropometric characteristics, and especially fat mass, are critical to determine performance in female volleyball players. Anaerobic power, as assessed by average power at Wingate test, is higher in best performance athletes and is significantly associated to vertical jump at counter movement jump test.

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222 PE P

Physical Education and Science of teaching: the teacher academy knowledge and professional practice

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Aim: The study analyzed the Physical Education teacher academy knowledge and professional practice for innovation of Science of teaching(ICSPEE, 2008) . The new knowledge from: neuroscience and scientific date access by new technology web based and education based on evidence ecological and socio-constructivist physical education paradigm and philosophy of the science were the elements for innovative Physical Education as Science of teaching of the physical activity.

Methods: The study was based on a questionnaire, by descriptive analysis through frequency tables and percentages. Differences were detected by the Pearson's chi-square test and the Fisher exact test. Sample: subjects 434 Physical Education (PE) teachers (166 males, 261 females,); aged (24–63y, media 33.5). The teaching experience from 1 to 41 years, media 7 years. The sample was divided into group A (182 teachers with teaching experience) and B (197 pre-service teachers)

Results: Question 1: The teaching profession is based on . practice and knowledge (A21.99 % and B52.79 %, the is very significant difference (p-value = 0.00)

Question 2: The research is a right and duty of the teacher: positive response (group A 48.35 %; group B 92.89 %) very significant difference (p-value = 0.00)

Question 3: In designing teaching the teacher it refers to: 1. tradition, 2. beliefs, c. customs, d. personal insights, and. scientific evidence. The most frequent response (26.37 % and 60.41 %) was d. personal insights, for both groups.

Conclusions: The data show that teaching is more practice-oriented in the group in-service and research-oriented in pre-service PE teacher. But in the designing teaching all the group are personal-insights oriented.

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Physical Education +plus: physical activity breaking for improve the attention in the learning school process

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Aim: The aim of this study was to analyze physical activity breaking for improve the attention in the learning school process. The physical activity was factor for facilitation of the learning processes in the school by Global recommendations on physical activity for health (Who, 2010) and How exercise can boosty oung Brian (Hilman et al. 2014) .Physical Activity (PA) breaking every day (+plus two Physical Education-PE two hour weekly) improved the level of concentration in the learning school setting and the positive classroom climate. (Cazzoli et al. 2014).

The study was based experimental approach. Hypothesis: the physical activity breaking improve the level of concentration in the school process of learning. The sample were 2 group: a. experimental; b. control; 40 students aged 6–7 years; period April–May 2014; 11 physical activity break intervention (15 minutes, movement game, dance, respiration and relaxation exercises with the music); attention test (TEST MF—sustained attention, impulsivity control; Stroop with number; TEST CP sustained attention).

Results: The data collected showed: experimental group (Total exact tests score 170; total tests wrong score 50); control group (Total exact tests score 120; total tests wrong score 80).

Conclusion The data analysis showed the physical activity breaking improved the general level of concentration in the sample. Implication for the future: inserting physical activity breaks alternating with sedentary class activity class for improve concentration and facilitate learning

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224 PE P

Muovimondo: a handbook for intercultural promotion of healthy lifestyles at school

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Aim: According to the survey *Okkio alla Salute* (2014) 30.7 % of Italian children are overweight/obese; 16 % didn't perform physical activity (PA) the day before the interview, 18 % didn't practice sport and only 25 % went to school walking or by bicycle. *MuoverSì* (the Veneto Regional Program for PA Promotion, www.muoversidipiu.it) therefore implements actions to increase PA in children, adults and elders. *MuoverSì* collaborates with the network *Tante Tinte* (TT)—Provincial Education Office, Verona, in prevention programs on healthy lifestyles for children. *TT* promotes the integration of Italians and immigrants by means of activities for pupils, teachers and families.
Methods: *Muovimondo* is a handbook (written together with *TT*) for teachers of primary and secondary school; it was published and delivered during years 2013/15 (2,500 copies) to schools in all the 21 Local Health Services (ULSS) in Veneto. *Muovimondo* consists of interdisciplinary learning units about walking promotion, use of bicycle and other healthy lifestyles; moreover, the book describes some movement street games from various countries and other ones planned to facilitate language learning. The handbook proposes learning units with games and experiential activities about healthy lifestyles by means of an intercultural and interdisciplinary approach
Results: So far the training involved 360 teachers in 6 of 7 Territorial School Offices in Veneto. 38 classes in 10 institutes used the handbook for the didactics of healthy lifestyle. We are evaluating the intervention, also by means of qualitative techniques. Most teachers sent positive feedback about both the contents and the applicability of the handbook. Other training sessions are planned in 2015/16 for more schools, also by means experiential laboratories that will be held in Verona
Conclusions: Thanks to *Muovimondo* teachers have a better opportunity to promote PA and healthy eating, by means of an intercultural and interdisciplinary approach based on fun and curiosity. This is an effective and ecological way to increase psychophysical health and also to achieve better cognitive performances
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225 PE P
Assessment of levels of physical activity and of the motor development in childhood. An observatory for school, health, sport

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Aim: The school is the privileged context for the measures to promote health and the physical education will help prevent many diseases. Assessing of physical activity levels and of motor development in childhood, is a priority to monitor the trends and implement measures to prevent sedentary habits (Gillis et al. 2013). Aims of the study: assess of the physical activity levels and the development of the motor abilities in relation to the Body Mass Index, in secondary school; create a databank for the local school, health, sport.
Methods: They have been proposed to a sample of 577 middle school students (284 boys and 293 girls, aged 11 to 13 years), divided into two groups, normal weight and overweight-obese, in relation to the differences of BMI, the motor tests: standing long jump, 2 kg medicine-ball throw, 10 × 5m shuttle-run, one mile run and the self-report Physical Activity Questionnaire for Children (PAQ_C) for assessment the physical activity levels.
Results: Apart from the descriptive statistics (M ± DS), Student's T Test was carried out, in order to highlight the significant differences within the *group*. The significativity index was set to $p < .05$.
ANOVA 2 (group) showed significant differences in the two groups, for males and females, in motor tests ($p < .001$) and in the self-report PAQ_C (boys $p = .000$; girls $p = .002$). No difference in the test 2kg medicine ball-throw for boys.
Conclusions: Physical education in school is a tool to increase awareness of the benefits of physical activity (HEPA) and it contributes to achieving the key objectives outlined in the Europe 2020 program (Langford et al 2015). The monitoring of physical activity levels and motor performance is an educational process which involves different institutions to design interventions curricular and extracurricular.
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226 PE P
Sport practice influences pupils' aggressive behaviours perceived by teachers at school

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Aim: It has been observed that sport effects on aggression depend on specific characteristics of each discipline, such as being an individual or a team sport, the level of physical contact required and the frequency of competitions (Bredemeier and Shields, 2006). Most studies investigated the effects of these variables on aggression in the sportive context only, while few examined effects in other contexts of everyday life. The aim of this study was to explore how the characteristics of sport played by primary school pupils affect aggressive behaviours perceived by their teachers.
Methods: A sample of 111 children (boys = 55; girls = 56; mean age = 10.4 ± 0.6 years) from 4 primary schools filled in a questionnaire on the characteristics of their extra-curricular sport (individual/team; collision/contact/no-contact; competitions frequency). Their teachers (5 women; mean age = 48.8 ± 9.9 years) filled in the 6-item Proactive and Reactive Aggression Questionnaire (Corrigan, 2003) for each pupil.
Results: Independent sample t-test shown that teachers perceive pupils playing team sports as significantly more aggressive than those playing individual sports, both for pro-active ($p = .05$) and reactive aggression ($p = .04$). One-way ANOVA showed that pupils playing no contact sports are perceived as significantly less aggressive at school than those playing contact and collision sports as for reactive ($p = .01$), but not as for pro-active aggression. Finally, teachers reported that pupils weekly involved in competitions had higher levels of reactive ($p = .01$) and pro-active ($p = .01$) aggression, than those who occasionally or never participate in competitions.
Conclusion: Data showed that pupils practising collision/contact sports and/or team sports, involved regularly in competitions, were perceived by their school teachers with higher aggressive behaviours compared to their peers. Results confirm that aggressive behaviours characterizing some sport context, can be reported also in the school setting.

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227 PE P
Learning mathematics trough the body

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Aim: The present study focused on the educational and teaching aspects related to the development of logical and mathematical thinking of the child. Neuroscience has shown that mind and body are strictly linked and shape all aspects of knowledge through a dialectical relationship with the external environment. According to these scientific assumptions, this study was based on a survey carried out by the Third International Mathematics Science Study conducted in 1998, which showed the difficulty that children encounter in different types of schools when dealing with mathematical reasoning. The aim of this study was to verify if a teaching/learning strategy based on active and constructive action that encourages exploration and research of the child, allowing better logical-mathematical competencies.
Methods: The sample consisted of forty pupils attending primary school, aged from five and a half to six years with different verbal language capabilities. The pupils were divided into an experimental group consisting of 23 pupils (16 males and 7 females), and a control group of 17 pupils (10 females and 7 males).
The methodology started with a recreational sensorimotor phase in which the child becomes aware of the proposed objective, followed by a second phase which is characterized by the representation of the experience perceived through the body on an abstract level. The final phase included a structured test to assess the knowledge and skills acquired and to provide the data to compare the control and experimental groups.
Results: The analysis of the data highlighted that the experimental group acquired and assimilated more knowledge and skills. This showed the value of the methodology applied and that the body, mind and environment, coexist with each other, allowing the child to assimilate mathematical symbolism easily when applying it to real life situations.
Conclusion: The child would literally 'learn by doing'. In conclusion, schools should encourage a methodology that puts learning through movement high on their agenda, not only to learn mathematics but also for other subjects.

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228 PE P
Preliminary results of the application of ecological model "PiùVitaSana"

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Aim: In the framework of a substantial missing of a national program many projects promote physical education or sport in primary school using different approaches. The project "PiùVitaSana", developed in 2014 by University of Verona and DNA Sport Consulting, aims to integrate physical activity (PA) and dietary education (DE) to develop an ecological model to educate for a proper lifestyle on a selected samples of schools in Verona and Vicenza provinces.
Methods: In 2015, 32 primary schools in Verona and 28 primary schools in Vicenza attended the project. The experimental group (EG, 405 students) and the control group (CG, 192 students) were composed by students aged 8–10 years. We administered a questionnaire after five weeks since the beginning of the project to the two groups of students related to knowledge of PA and dietary benefits and two different ones to teachers (39) and parents (263) respectively.
Results: Analysis of students' questionnaires shows that almost all the factors investigated reported a significant difference (t-test = .00) between the EG and CG, in fact 7 of 12 total questions prove significant differences about the knowledge of both groups. The most important data are: the CG show 32.6 % less of knowledge in three questions on healthy habits if compared with EG, the 15.0 % in five questions and 10.9 % only in two questions. Teachers seem to evaluate as "excellent" (43.6 %) or "good" (56.4 %) in the overall the project and judge as "excellent" (51.3 %) or "good" (48.7 %) the students' involvement. Parents reported that their children proposed at home some PA project proposals (29.3 %) and value as "excellent" (23.2 %) the dietary project proposals.
Conclusion: The project "PiùVitaSana" starts from school environment to reach students and their family. Teachers and parents are important figures around the children, who is the real project's protagonist. This project could be a promising solution to educate children to healthy lifestyles starting from primary schools.

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Motor competences, education and research for the health promotion in primary school

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Aim: The teaching of motor competences in primary school helps: to educate children physically active lifestyle; to promote the learning of life skills. The promotion of physical activity requires: training of specialist teachers; changes in curricular organization; joint training of general teachers and parents; agreements and cross-sector partnerships. There is proposed a *model of regional training*, intersectoral, sustainable, to promote compliance with the guidelines of physical activity daily, the physical education curriculum, the introduction to the sport of children (Castelli et al 2014).
Methods: The multi-year project aims to promote the practice of daily physical activities at school, through three components: *organization, training, research*. Children play physical activity before entering school; during the day and after school. On time extracurricular, optional, the introduction to the sport. The training covers: specialist teachers (methodology), parents (physical activity daily, health,

nutrition), a staff of assistants. It will do: monitoring of the physical activity levels and motor development; analysis of the relationship between the motor and cognitive variables. The project is cross between: schools, municipalities, coni, university, health, transport.
Results: The results include the evaluation of variables: systematic monitoring of physical activity levels; BMI; motor development; physical self-efficacy; enjoyment; analysis of school performance in relation to the variables considered; eating habits (Ciotto and Fede, 2014).
Conclusions: The school is the privileged context for implementing interventions: to promote health; to integrate different skills into the curriculum and to monitor processes and results (Langford et al. 2015).
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230 PE P
Correlation between physical activity level assessed by IPAQ-A and physical fitness in Italian adolescents: Differences by gender

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Aim: Regular physical activity and physical fitness have numerous health benefits for individuals of all ages particularly for young people. The aim of this want to examine the correlation between physical activity level assessed by IPAQ-A and physical fitness in Italian adolescents in relation to gender.
Methods: 330 adolescents (boys:N = 181; girls: N = 149), aged 15–17 years, attending the 2nd and the 3rd class of secondary school, were assessed during physical education lessons. Physical activity level was evaluated by 7-days self-reported questionnaire IPAQ-A. Weekly total physical activity (TPA), walking (W), moderate (MPA) and vigorous physical activity (VPA), expressed in MET-minutes per week, were recorded. Physical fitness were assessed by standing broad jump (SBJ), 2 Kg Overhead Medicine ball throw (MBT), 10 × 5 m shuttle Run test (10 × 5 m) and Léger test (VO_2Max). Pearson's correlation was performed to examine the relationship between IPAQ-A and the physical fitness according to gender. Data were analyzed by SPSS ver.13 and significance was set at $p < 0.05$.
Results: In males were found positive correlations between TPA and MBT ($r = 0.22$; $p < 0.01$), TPA and VO_2Max ($r = 0.37$; $p < 0.0005$), MPA and SBJ ($r = 0.19$; $p < 0.05$), MPA and MBT ($r = 0.17$; $p < 0.05$), MPA and VO_2Max ($r = 0.32$; $p < 0.0005$), VPA and VO_2Max ($r = 0.23$; $p < 0.01$), whereas negative correlations were found between TPA and 10 × 5m ($r = -0.20$; $p < 0.05$), MPA and 10 × 5 m ($r = -0.20$; $p < 0.05$). In females were found positive correlations between TPA and SBJ ($r = 0.28$; $p < 0.01$), TPA and MBT ($r = 0.22$; $p < 0.05$), TPA and VO_2Max ($r = 0.31$; $p < 0.01$), MPA and VO_2Max ($r = 0.29$; $p < 0.01$), VPA and SBJ ($r = 0.37$; $p < 0.0005$), VPA and MBT ($r = 0.27$; $p < 0.01$), VPA and VO_2Max ($r = 0.28$; $p < 0.01$).
Conclusions: The results of this study were underlined how physical activity is correlated with physical fitness in Italian adolescents. In particular, vigorous physical activity is correlated with physical fitness, especially in females (Taber et al., 2014).
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231 PE P
Differences between European guidelines and Italian experiences in Physical Education programme at primary school: evidences and perspectives

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Aim: European Union young citizens are moving very fast toward overweigth (about 33 % in 2014) and many programmes are actually running to counteract this evolution. The aim is to evaluate two very recent italian projects in the primary school and to compare them with European guidelines (Report of the Eurydice).
Methods: Critical analysis between national project "Sport di Classe" (SdC) and local project "PiùVitaSana" (+VS) in relation to European guidelines.
Results: 1. time dedicated to PE in school curricula: EU →109 min/week. SdC→ 60 min/week for 5 months, +VS → 60 min/week of theoretical PE and 60 min/week of practical PE.
2. implementation of integrated programmes between PE and nutrition education: EU → nutrition programmes are integrated with other compulsory subjects, SdC → NE isn't integrated with PE, +VS → 60 min/week of theoretical NE and 60 min/week of practical NE for 5 weeks.
3. involvement of highly qualified professionals: EU → generalist qualified personnel teaches PE (69 %), Sdc → a qualified teacher only during the project, +VS → during the project a qualified teacher in PA and a generalist teacher in NE.
4. building partnership pathways between schools and their communities: EU → public authorities and federations are often involved, there is not a partnership pathway with families, SdC → it doesn't provide partnership pathway, +VS → it provides the collaboration with families.
5. monitoring and evaluation of results: EU → 11/19 education systems monitor their strategies, Sdc → there is evaluation only of hours done, +VS → evaluation of project effectiveness about lifestyle habits.
Conclusion: The local project "Più Vita Sana" appears to be compliant to the EU guidelines. Furthermore, it involves not only children and their families, but also teachers and deans, including them in the evaluation phase. However, PE and NE are not always carried out by qualified professionals.

232 PE P
Aerobic gymnastic for a meaningful life training

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Aim: The pedagogical value of the bodily dimension and movement is gradually becoming the center of the interest of different scientific disciplines. According to the latest neuroscience research (Caruana & Borghi, 2013), the body is the mediator of the knowledge in an educational act, aimed to the harmonious development of the person in his totality. Specially for disabled people, movement becomes an effective tool for social recognition and reward.
Methods: The project promoted the Aerobic Gymnastics as a sport that enhanced the educational aspects aimed to increase the satisfaction level of physical activity, increase the improvement of self-esteem, social relationship. The purpose was to organize 20 lessons, aiming to exploit autonomy, self-determination and self-esteem of the person with intellectual disabilities, improving the quality of living condition. The Physical Activity Enjoyment Scale (Kendzireski and DeCarlo, 1991) was used for assessing the enjoyment in motor activity and TMA (Bruce A. Bracken, 2003) to evaluate disabled person's self-esteem. The two tests were useful to examine the relationship between multidimensional self-esteem and other psychological constructs.
Results: By comparing the different responses from the beginning to the end of the program, there was an exponential growth as regards the satisfaction questionnaire of disabled people. Regarding the test on self-esteem, the children showed a significant increase, reaching high levels of self-esteem compared with baseline.
Conclusion: This work could be a life plan that will lead to good results both educational and social. Movement can help children with disabilities to achieve a better life through sport, seen as leisure, entertainment and motor improvement and social development.
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233 PE P
The potential of "sociomotricità" for integration and development of social skills: two interventions in Congo and Brazil

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Objective: "Sociomotricità" can use consciously the play, the competitive game and sport to promoting the development of social skills. By means of observation and classification it enables us to recognize, within each gaming activity or sport, aspects concerning social interactions, thus offering the possibility of organizing initiatives of education for sociability, through competitive and non-competitive games and sport. This method is suitable in contexts of social marginalization with children and adolescents where the conflict among peers can be exacerbated and dangerous.
Method: The method of "sociomotricità" was used in two separate projects for international cooperation in Africa and Brazil: in the first case with teenagers former child soldiers; in the second case with children in a rural poverty contest. Through observation and structured analysis of the features of the game (game action, player roles, playing field, relations between players, etc.) we were able to make a classification of the games adopted and use them to help improvement of social skills. Data about enjoyment and impact of the activities were collected with validated and "ad hoc" questionnaires.
Results:. In both projects emerged a satisfaction for activities; in African experience, gaming activities have fostered attitudes of collaboration and sharing rather than isolation. As for the experience in Brazil, instead, the proposed activities have fostered a positive climate, stress-free groups and encouraged positive feelings against those considered negative.
Conclusions: The practical application of sociomotricità in the design and planning of activities, seems to have given positive responses. It remains to be investigated as the operator, his or her personality, his or her ability to manage interpersonal relations, etc. may have a significant effect on the results.

234 PE P
Values orientation in Sport Science students and Physical Education teachers

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Aim: This work intended to explore the values orientation of individuals (students and teachers) involved in Sport Science and Sport Pedagogy fields.
Methods: 147 individuals (mean ± SD age: 30 ± 6.8 years, range 23–53 years, 79 females and 68 males) enrolled either in a Master's Degree in Sport Science (36.7 %) or enrolled in PE Teaching specialisation courses for Secondary School (TFA 42.9 %; PAS 20.4 %) at the Catholic University of Milan were recruited for this study. The participants completed an ad-hoc prepared socio-anagraphic questionnaire and the PVQ (Portrait Values Questionnaire), a list of 40 item that describe the values of a general person and the subjects express how much they perceive themselves similar to the hypothetical person (in a Likert 6 points scale). The values orientation is organized in two bipolar dimensions: self-enhancement versus self-transcendence; conservatism versus open to change.
Results: Regarding the bipolar values orientation, the sample showed higher values in self-transcendence (mean 4.77) and open to change (mean 4.39). Self-enhancement was higher in men (Student's t-Test, $p < 0.01$) and in young people (Pearsons' $r = -.334$, $p < 0.01$); instead self-transcendence was greater in the teachers, who were also the eldest (positive correlation with age; $r = .223$, $p < 0.01$).
Conclusions: Individuals involved in physical activity seem to have a good social predisposition (prevalent values orientation of self-transcendence), especially those who chose a teaching career and are interested in other people's wellbeing.
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235 HF P
Functional training and weight training: a longitudinal study

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Aim: The aim of the research was to evaluate the changes in power and resistance strength in Olympic *Greco*-Roman wrestlers and freestyle wrestlers subjected to two training methods: one involved the use of barbells and dumbbells, the other kettlebell exercises, Bulgarian bags, ropes and training hanging straps.
Methods: Athletes were assigned to the functional training group (FT), composed of 10 males and 4 females (age 19 ± 3 years, weight 65 ± 15 kg, height 169 ± 8 cm, years of training experience 7 ± 4 years) and to the barbells and dumbbells group (BD), consisting of 10 males and 4 females aged 18 ± 2 years, weight 63 ± 13 kg, height 173 ± 13 cm and years of training 7 ± 4).
The research lasted for 8 weeks, during which the two groups performed training twice a week according to the protocols. The athletes were subjected to an initial test (T1) one week before the training, an intermediate test (T2) after 4 weeks of training and a final test (T3) the week following the end of the training period (4 weeks from T2).
Results: The FT Group showed a significant increase in power in the parallel exercise ($p < 0.05$; +5 %). The BD group showed a significant improvement in the 15-second squat jump test for the parameters of muscle power ($p < 0.05$; +4 %) and height ($p < 0.05$; +10 %), and in the 15-second parallel exercise, for the parameters of strength ($p < 0.05$; +19 %), power ($p < 0.05$; +55 %) and speed ($p < 0.05$; + 34 %).
Conclusion: These results show that exercises with barbells and dumbbells improve stamina strength and should therefore be essential for a wrestler's training.

236 HF P
Effects of kettlebell training on lower limb power, body balance, blood pressure and heart rate in a group of dancers

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Aim: To evaluate the effects of a 5 month kettlebell-based training on jumping performance, body balance, basal arterial blood pressure and heart rate (HR) in female classical dancers.
Methods: Two groups of dancers, homogeneous with respect to age, gender, training type and frequency, were selected. One group, the kettlebell group (KG) consisting of 13 female dancers (23.77 ± 2.35 years, 168.61 ± 5.29 cm, 55.15 ± 6.86 kg), observed the kettlebell Simple & Sinister protocol, while the other group consisting of 10 female dancers (19.10 ± 1.59 years, 167.70 ± 5.12 cm, 53.00 ± 4.47 kg) and serving as the control group (CG), kept on doing the usual training. Specifically, kettlebell training completely replaced the jump and balance section of classical dance classes and, according to the protocol, consisted of 100 swings to be performed in 5 minutes and 5 Turkish get-ups on each side to be performed in 10 minutes. The kettlebell weight was increased each time the protocol had been performed correctly in the required time. Both groups underwent body balance and jumping performance tests (counter-movement jump without and with turnout) before and after 5 months of training. Moreover, basal blood arterial pressure and HR were measured. Two-way ANOVA with Bonferroni post-hoc test was used.
Results: The KG's pre- and post-experiment measurements showed significant improvements in Romberg balance tests (eyes open sway path: −35.5 %, $p < 0.05$) as well as in all kinds of jump exercises (unrotated: +39.13 %, $p < 0.005$; with turnout: +53.15 %, $p < 0.005$), while maximum and minimum arterial pressure and HR decreased significantly (max: −7.90 %, $p < 0.05$; min: −9.86 %, $p < 0.05$; HR: −17.07 %, $p < 0.01$).
Conclusions: Kettlebell workout has proved to be very effective for classical dancers, resulting in statistically significant improvements in both jump and balance performance even in the absence of dedicated exercises. Moreover, kettlebell training seems to be able to decrease HR and arterial blood pressure too.

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237 HF P
The effects of pilates exercise training on physical fitness and wellbeing in the elderly: a systematic review for future exercise prescription

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Aim: This systematic review aims to summarize the effects of Pilates exercise training (PET) in elderly population on physical fitness, balance and fall prevention, and its effects on mood states, quality of life and independence in the daily living activities.
Methods: Keyword "Pilates" associated with "elderly", "aging" and "old subjects" were identified as terms for the literature research in MEDLINE, Embase, PubMed, Scopus, PsycINFO and SPORTDiscus. Only studies published in peer-reviewed journals written in English language were considered. A meta-analysis was performed and effect sizes (ES) calculated.
Results: 10 studies were identified (6 RCTs and 4 uncontrolled trials); age ranged from 60 to 80 years. Overall, PET showed large ES to improve muscle strength (ES = 1.23), walking and gait performances (ES = 1.39), activities of daily living, mood states and quality of life (ES = 0.94), moderate to high effect on dynamic balance (ES = 0.77), small effects on static balance (ES = 0.34) and flexibility (ES = 0.31), while a small effect on cardio-metabolic outcomes (ES = 0.07).
Conclusions: PET should be taken into account as a way to improve quality of life in the elderly, due to the imparted benefits of fall prevention, physical fitness, and mood states. In this context, physicians might include PET as a tool for exercise prescriptions for the elderly.

238 HF P
Assessment of explosive strength in volleyball players: an experimental project by means of the use of fascial treatment

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Aim: The purpose of this study was to assess a sample of volleyball players if performance of an osteopathic treatment targeted to the muscle groups of the lower limb, would be to able to enhance the explosive strength of explosive limbs, correcting convulsions, tension and releasing the tissues and correcting the posture.
Methods: 57 athletes took part in the research, all the athletes were male and semi-professional volleyball players. A randomized controlled trial was performed which had the aim of evaluating whether to submit a sample of athletes to osteopathic manipulative treatment would be able to affect the muscle strength of the lower limbs. The sample was divided randomly into two groups, one group was subjected to osteopathic treatment (GTO) made up of 30 athletes and a group was used as control (GC) consisting of 27 athletes. The evaluation of the power of the lower limbs was performed through the use of the jumping test, two different methods were used: the squatting jump (SJ) and the counter movement jump (CMJ).
Results: The results obtained in both the Squatting Jump and in the Counter Movement Jump show that there is an improvement in the GTO that is statistically significant between the values obtained at the start (first treatment) and those after 30 days whereas it does not observe any statistically significance in the control group (GC).
Conclusions: Running an osteopathic treatment targeted at the muscles of the lower limb has shown positive results in improving the explosive strength of the explosive limbs, in correcting spasms and tension, releasing tissues and correcting posture.
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239 HF P
Influence of water pool motor activity as part of a standard physical activity program in older people

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Aim: Analyze and quantify the improvements of some physical skills in a group of subjects over 65 years old, who practice, beyond the normal and regular activities in the gym, physical activity in microgravity environment.
Methods: 88 subjects (68.2 ± 7.2 years) who perform, twice a week (50 'per session) for a period of 8 months, a regular physical activity adapted and controlled to the age. One group (44 subjects) performs both weekly workouts at the gym, the other group conducts one training session in gym and one in water pool. The tests assess the hamstring flexibility, shoulder mobility, abdominal and legs strength and body balance. Both groups, in the baseline anthropometric and performance parameters measures was homogeneous.
Results: Either groups showed significant improvements in all muscular performance analysed in this study. In particular the group that performs both training sessions, in the gym and in water pool, compared to the Gym group, showed a exponentially increase in flexibility (more than 25 %), in balance more of the 50 %, while in the muscular strength it was observed the same improvements in both groups.
Conclusions: The integration of water pool motor activity as part of a physical activity program in older people seems to be highly effective to counteract the physiological degenerative process of the elderly.
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240 HF P
Exercise Science as a profession: the world of fitness certification

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Aim: Exercise professionals need to have extensive knowledge and technical skills in order to be safe and effective. In Italy and in most of European and non-EU countries, individuals working in exercise settings such health and fitness clubs, were not necessarily required to have specialized education and training in exercise science. However, survey research indicates that a bachelor's degree in exercise science and a professional certification are strong predictors of a professional's trainer knowledge. Aim of these preliminary study is to compare some non-EU personal trainer certification.
Methods: An internet research was conducted with key words "fitness", "certification", "education". 13 USA certifications was selected from a plethora of courses for these research and characteristics was compared from data present in the web page of each organization. Data was plotted and organized for: company info, exam information, study tools, professionals benefits, continuing education information.
Results: Organizational model is non-profit ($n = 5$) or for profit ($n = 8$); $n = 10$ are accredited by National Commission for Certifying Agencies and $n = 5$ meet industry standards to join the European Register of Exercise Professionals (EREPS); 18 years of age is eligibility requirement for all and for $n = 6$ a High School Diploma or equivalent, too. Exam format is proctored by third-part for $n = 10$, with number of questions ranged between 100 and 200. Access to industry research is provided for $n = 6$.
Conclusions: The bottom line is that not all exercise science and fitness certifications are equal. This leads to confusion for the consumer in terms of knowing who is and who is not highly trained and qualified as an exercise professional. The right road seems to be the certification by a third-part accrediting agency.

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241 HF P

Correlation between a new aerobic fitness shuttle test and YoYo-intermittent recovery level 1. A preliminary research

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Aim: The two Yo–Yo intermittent recovery (IR) test evaluate an individual's ability to repeatedly perform intense exercise. The YoYo-IR level-1 (YoYo-IR1) is a maximal test focuses on the capacity to carry out intermittent exercise leading to a maximal activation of the aerobic system, with an average duration of 18 minutes and a distance of run of 20 m before change directions (Bangsbo, 2008). The aim of this preliminary study is to evaluate the correlation between YoYo-IR1 and a new incremental shuttle test (IST).
Methods: 19 young soccer players of professional sports team (age: 18.5 ± 0.6 years, height: 178.9 ± 7.6 cm; body mass: 71.1 ± 8.7 kg) performed YoYo-IR1 and IST which consists in a test with a duration of 8', a run of 40.32 m (width of soccer's penalty area) before change directions without rest. Starting speed was set at 12.5 $km \cdot h^{-1}$, with an increase of 0.5 $km \cdot h^{-1}$at each step of 1 min. An acoustic signal must be respected at three points set at 0, 20.16 and 40.32 m. With this protocol final speed results at 16 $km \cdot h^{-1}$. Test finished when a subject was not able to run and match the acoustic signal.
Results: The total distance covered during the YoYo-IR1 test was 2434 ± 309 m, time spent was 19 ± 2.4 min and session RPE (CR10) was 6.4 ± 0.7. The total distance covered during IST test was 1581 ± 240 m, time spent was 6.5 ± 0.9 min and session RPE (CR10) was 5.7 ± 1.0. Distance in IST shows a good correlation with YoYo-IR1 ($r = 0.85, p < 0.001$); RPE found a difference of 9.9 % ($p < 0.01$).
Conclusions: Trainers are always looking for methods low cost, non-invasive and of short duration to assess physical fitness. In this preliminary study, data suggest the use of this IST to assess the aerobic fitness in young soccer players. For practical purposes the shorter duration and lower intensity should involve both trained and untrained players and become a useful tool for the trainer. Obviously more research is needed to better define this new IST.

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242 HF P

A smartphone application to encourage an active lifestyle and healthy behaviors among elderly people

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Aim: This study, a PhD project whose aims are to develop a case-study research and a prototype application for mobile devices, explores the role of ICT as a tool to support the elderly towards the acquisition of active lifestyles and healthy behaviors.
Method: Starting from the literature review, particular attention was paid to the identification of programs put in place by municipalities for active aging through the use of ICT. The collected data represent the basis for the development of the prototype: this process will be characterized by the active participation of "senior developers", a convenience group selected according to their ability to use technological devices. The group will be formed after the compilation of a questionnaire aimed at investigating the use of ICTs. A pre-test of the questionnaire will be carried out by administering the same to a group of seniors attending social centers in Cassino.
Results: The technology is an increasing presence in the life of elderly. However, the studies based on the development of ICT in favour of the movement, of social inclusion and overcoming barriers to physical activity, are still limited. Extending the focus to analyse the project experiences, it was possible to report the presence of numerous initiatives promoting active aging through the use of ICT. Although many of them are directed to rehabilitation and e-health, several experiences, through different approaches and types of intervention, focus on the issues investigated in our research.
Conclusion: The ICTs are more and more announced as elders-friendly; however, we suppose that only technologies developed together with elderly people are really useful in supporting their everyday physical activity.

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243 HF P

Three-month trial of Ai-jutsu martial art training in healthy seniors: Effects on memory and quality of life

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Aim: Aging is a natural phenomenon associated with profound changes and reduced efficacy in a set of psychological processes[1]. Martial arts are believed to have beneficial effects on cognition, and psychological aspects[2]. The aim of this study was to investigate the effect of a 3-months ai-jutsu martial art program on memory function, life satisfaction and affect in healthy elderly adults.
Method: Forty-six healthy adults (16 men and 20 women; mean age: 66.6 ± 4.1) were randomly assigned to a 3-months ai-jutsu class, or a 3-months waiting-list control group.
Outcome assessments performed at baseline and after the 3-months period included Immediate and Delayed Memory Index test, Satisfaction Profile (SAT-P) and Positive and Negative Affective Scale (PANAS). Differences in satisfaction, memory and affect, in the two group were determined using an Independent *t*-test.
Results: Ai-jutsu practitioners showed statistically significant increase in satisfaction measures (psychological, physical and social subscales) compared to controls. ($p < .05$). On the other hand, there were no significant effect from either of the group on any of the memory measures or the positive and negative affect.
Conclusion: According to the data of this study a 3-months ai-jutsu martial art program seems to be a valid treatment to improve quality-of-life among healthy seniors. On the other hand those in the ai- jutsu-group did not show improvements of memory function or affect compared to control group. These results could be explained by the difficulty to elevate the already high standard of the sample at baseline. Additional studies in populations with memory deficit would be of great interest to develop these findings.

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244 HF P
Supplementation and physical activity among Kinesiology students

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Aim: Supplements are commonly used in many sports and physical activities. The aim of this study was to examine the use of supplements in relation to the practice of sport and physical activity (PA) among students of the University of Pavia.
Methods: A questionnaire was administrated to 361 students (246 males and 114 females). The information required included sport level, PA intensity per week, sport type, supplements type, time duration and weekly frequency of supplements taken. T test for independent groups was run to test differences in age, BMI and sport level.
Results: The 49.4 % of students were classified as "amateurs players" (133 M, 45 F), 42.7 % as "athletes" (98 M, 54 F) and 8.6 % as "sedentary" (16 M, 15 F). 60 students use nutritional/sport supplements (16.6 % of total subject; 44 M, 16 F): 25 athletes (16.2 % of total athletes; 16 M and 9 F), 26 amateurs players (14.6 % of total amateurs players; 23 M and 3 F) and 9 sedentary (29 % of total sedentary subjects; 5 M and 4 F). 41 supplement users add to their usual diet protein/aminoacids (30 M, 11F), 18 were taking other supplements (e.g. creatine, vitamin and minerals, omega-3 fatty acids, etc.; 14 M, 4 F) and only one female takes carbohydrates supplement based. 27 students did not compile the questionnaire (7.5 %, 17 M, 10 F). No differences were found in age, BMI and sport level between supplements users and no supplements users.
Conclusions: Our data show that supplements use is a ordinary practice among students. Interestingly the use of supplements is more common into sedentary group. Protein/aminoacids supplementation is widespread probably with different aims: improving of muscle recovery/hypertrophy or optimizing body composition.

245 HF P
Chronotype influences the perception of effort in relation to an aerobic physical test in different times of day

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Aim: The purpose of this study is to evaluate if the chronotype could influence the physical performance, the response of the heart rate and the perception of effort before and after physical activity performed in different times of the day.Be Morning-type or Evening-type is indicative of a strong trend in being active in the first third of the day or morning (Morning-types), in the second third of the day (Neither-types) or the last third of the day or night (Evening-types) (Vitale JA., et al., 2015).
Methods: 502 subjects compiled the Horne-Ostberg Morningness-Eveningness Questionnaire for the assessment of chronotype obtained by comparing the scores of the questionnaire with the scale of Morningness-Eveningness of Horne and Ostberg (Horne J. A. and Ostberg O., 1976).From this sample we recruited 27 subjects (mean age = 21.3; SD = 2.37) that performed twice the Cooper Test, in the morning (08.30 a.m.) and in the afternoon (04.00 p.m.).They wore a heart rate monitor (Polar S810) to detect the heart rate during the test. To evaluate the perception of effort we used the CR-10 Borg's scale.
Results: There were no statistically significant differences between M-types and E-types in the heart rate response and in the results of the physical test in both sessions. Referring to the perception of effort there is a statistical difference between subjects M-type and E-type for the values reported both in the morning ($p < 0.05$) and in the afternoon session ($p < 0.05$) following the taking of the Cooper's Test.
Conclusions: The results suggest that the chronotype can influence the perception of effort before and after the execution of an aerobic test performed at different times of day.

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246 HF P
Bone health, physical activity, and quality of life in postmenopausal women

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Aim: Osteoporosis is the most common metabolic bone disease and is one of the major concerns for postmenopausal women. It is characterized by low bone mass leading to enhanced bone fragility, an increase of fracture risk, and a consequent reduction of quality of life. Inactive lifestyle is an important factor associated with the risk of osteoporosis. The purpose of this study was to assess the relationship among bone status, physical activity, and quality of life in postmenopausal women.
Methods: 60 postmenopausal middle-aged women (mean age $M = 61.00 \pm 7.32$ years; range 47–79 years) underwent T-score evaluation by their General Practitioner using ultrasonography (Sahara bone densitometer, Hologic Inc., USA). All women drew a questionnaire of demographic characteristics, the International Physical Activity Questionnaire (IPAQ), and the 12-item Shorter Health Survey (SF-12).
Results: T-score was normal (> -1.00) in 21 (35 %) women, while it was in the osteopenic range (< -1.00 and > -2.5) in 39 (65 %) women. Thirty-nine (65 %) women reported a low level, 18 a moderate level and 3 a high level of physical activity. No significant association was observed between T-score and physical activity level. According to SF-12 the physical health score was lower in osteopenic women.
Conclusion: This study highlights that the majority of postmenopausal women has a sedentary lifestyle and a low T-score. As a better T-score is associated with a higher self-reported physical health, this study supports the importance of promoting physical activity in postmenopausal middle-aged women.
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247 HF P
Influence of living in rural/urban setting and adiposity status on children's cardiovascular endurance

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Aim: Living in urban or rural setting is an important conditioning factor for participation in physical activity (PA) and for the development of its components (Gallotta, 2009). Moreover, overweight children perform more poorly on cardiorespiratory fitness tests than their thinner peers. Aim of this study was to assess whether rural or urban setting may influence children's physical fitness, also related to adiposity status.
Methods:. 286 children (125 urban, 161 rural, aged 8–11 years, 3–4–5 Grade of primary school) were recruited for this study. Anthropometric data were assessed. Children were classified in: under fat (UF), normal fat (NF), or obese (OB) based to their fat mass percentage (%FM) according to the McCarthy's age-sex specific cut-offs (McCarthy, 2006). The *Pacer Test* was used to assess cardiovascular endurance (The Cooper Institute, 2006).
Results: Data were analysed using a analysis of variance (ANOVA) with Group (Urban Group *vs* Rural Group), Adiposity Status (Under fat *vs* Normal fat *vs* Obese) as factors. The main effects of living Setting (43.2 ± 3.0 *vs* 41.1 ± 1.7 $ml \cdot kg^{-1}min^{-1}$, rural vs urban) and adiposity status (UF: 43.5 ± 2.9, NF: 42.1 ± 2.4, and OB: 41.1 ± 2.5 $ml \cdot kg^{-1}min^{-1}$) were observed, $p < 0.0001$.
Conclusion: Living in rural or urban setting may influence children's physical fitness independently from adiposity status. Specifically, either low fatness or rural setting factor had positive effect on children cardiovascular endurance.
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248 HF P
Lifestyle changes in obese pregnant woman

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Aim: A wrong lifestyle, in terms of physical activity and eating habits, in pregnant woman is associated with poor outcomes. The aim is to investigate the modification in body composition after a lifestyle change during pregnancy.
Methods: 7 female (age 36.6 ± 5.8 yrs, BMI 41.45 ± 3.15 kg/m^2) in early pregnancy were enrolled. At the first examination it were evaluated:
—Body composition by anthropometry, skinfold thickness and bioelectrical impedance;
—Aerobic capacity with the six minute walking test;
—Eating habits with a food diary.

Daily walking were establish for each subject in term of duration (30 minutes) and intensity (heart rate from walking test, steps per minute and self perceived of exertion. Individualized corrections were provided for eating habits.

The efficacy of the program were establish by body composition assessment: data before and after 30 days were compared (t-test for paired data).

Results: No significant change occurs in anthropometrics parameters. After one month a significant reduction in fat mass were observed (T0 = 41.35 ± 8.84; T1 = 39.35 ± 8.22 kg; p = 0.02) manly dependent from biceps (T0 = 20.80 ± 4.88; T1 = 15.74 ± 1.59 mm; p = 0.02) and triceps (T0 = 33.41 ± 6.70; T1 = 28.29 ± 6.48 mm; p = 0.003) skinfold. An increase in fat free mass were also found (T0 = 64.43 ± 8.41; T1 = 65.85 ± 8.75 kg; p = 0.02).
A redistribution in body water occurs with an increase in extra cellular compartment as adaptation to training (T0 = 19.54 ± 3.27; T1 = 20.33 ± 2.82 L; p = 0.04), mainly dependent by a reduction in reactance value (T0 = 46.71 ± 7.57; T1 = 43.14 ± 4.85 Ω; p = 0.03).
Conclusions: During pregnancy, many women increase the amount of sedentary behavior. This predispose to risk of gestational diabetes, hypertension and also risk to the fetus. Regular walking activity during this period decreases the risk associated with fat mass even after only 30 days.
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249 HF P
Effects of rhythmical and extra-rhythmical qualities of music on stationary bike activity

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Aim: The aim of this study was to evaluate the effects of rhythmical (tempo) and extra-rhythmical (melodies and harmony) qualities of music on the Heart Rate (HR) and rates of perceived exertion (RPE), during exercise at sub-maximal intensity on stationary bike.
Methods: HR of 28 female adult participants was monitored during two sessions of physical activity, performed under two different music conditions: Hi-BPM (music with 150–170 BPM), and RHYTHM (rhythmical qualities of Hi-BPM music). Four parameters were analysed: the highest HR value (High-HR), High-HR minus starting HR (ΔHR), time to reach 75 % of Maximal HR (HRmax) (TimeTo75 %), and duration of time spent over 75 % HRmax (TimeOver75 %). HR trend analysis was performed to evaluate differences between the two conditions. The OMNI-Cycle Scale was administered to evaluate RPE.
Results: MANOVA showed significant differences between the two conditions in TimeOver75 %, ΔHR, High-HR ($p < 0.001$) and TimeTo75 % ($p < 0.05$). In the RHYTHM condition, after reaching 75 % MHR, the HR increases were significantly lower than in the Hi-BPM condition ($p < 0.001$). No significant differences were found in OMNI-Cycle Scale scores.
Conclusions: Hi-BPM music allowed a fast achievement of the aerobic HR training zone and higher work intensity after the attainment of 75 % HRmax. These findings suggest that musicality, such as extra-rhythmical qualities, motivates the continuation of physical activity, maintaining or increasing HR levels.
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250 HF P
Local and systemic effects of high intensity interval resistance training (HIIRT) in a population of older adults

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It is well known that the constant practise of Resistance Training (RT) could contrast sarcopenia (Skelton 1995), improve cardiovascular fitness and body composition (Steib 2010). But considering the numerous variables of RT (Paoli 2012), the differences between training modalities has been till now poorly investigated.
Aim: The aim of this study was to asses the effects of two different intensity of RT on muscle strength, body composition and some blood parameters in older adults.
Methods: After 4 month of the same progressive RT protocol, 37 subjects were randomly divided in two groups: High Intensity Interval Resistance Training (HIIRT) and Traditional Resistance Training (TRT). HIIRT protocol consisted in performing 2 sets of 6/2/2 reps with incomplete rest between (20") sets at 85 % 1RM while TRT consisted of 3 sets x 8 reps with 1'30" of rest between sets at 75 % 1RM.
Results: Before and after 24 weeks of training 1RM test, body composition and blood analysis were performed. Both groups increase strength but no differences were found between training methods. No change in body composition was found in HIIRT group, whilst in TRT fat free mass decreased significantly. In both groups the anabolic hormones (IGF-1, GH and testosterone) decreased and cortisol increased significantly. Total cholesterol improved in both group, but HIIRT group showed a greater decrease in LDL value compared to TRT.
Conclusion Our findings suggest that a less time commitment resistance training technique is, at least, equally effective to induce an increase in strength in older adult, but is seems to has greater effects on muscle mass conservation. Moreover, high intensity resistance training improves lipid profile more than a traditional resistance training protocol.
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251 HF P
The role of physical frailty in the explanation of autonomy in daily life: a study on Italian community-dwelling older adults

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Aim: frailty is one of the risk factors for and the precursor of adverse geriatric outcomes (Fried et al., 2001; Gobbens et al., 2010). It arises from many factors and is a state of vulnerability associated with ageing (Rockwood, 2005). The present study constitutes the first step of the SAIFE research project and aims to evaluate the ability of physical frailty to explain the autonomy in the Activities of Daily Living (ADLs) and to identify which components of physical frailty provide a better explanation of ADLs in a sample of older adults.
Methods: 267 community-dwelling older adults (age 73 ± 6, 60 % were women) living in Piemonte Region. Physical frailty was assessed using the five criteria of Fried et al. (2001), consisting in shrinking, weakness, poor endurance and energy, slowness, and low physical activity level. The outcome investigated is the autonomy in ADLs using the Groningen Activities Restriction Scale (GARS). Descriptive, frequencies and regression analysis, controlling for age and gender, were conducted.
Results: 26 % of subjects were robust, 67 % were pre-frail, and 7 % were frail. Physical frailty explains the 28 % of autonomy in ADLs ($p < .001$). Physical frailty components that had the largest effect on autonomy in ADLs are low physical activity level ($\beta = .301$, $R^2 = .192$, $\Delta R^2 = .090$, $p < .001$), poor endurance and energy ($\beta = .282$, $R^2 = .180$, $\Delta R^2 = .079$, $p < .001$), and slowness ($\beta = .229$, $R^2 = .144$, $\Delta R^2 = .042$, $p < .001$).
Conclusions: our findings confirm the negative impact of physical frailty on autonomy of older adults. Among the physical frailty components, physical activity level is the major contributing factor in autonomy of ADLs, highlighting that a regular physical activity is required for health benefits in older adults.
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252 HF P
What pregnant women prefer among analytical and functional exercises

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Aim: Physical Activity (PA) during pregnancy leads to numerous psychophysiological benefits, however there are few women that stay active during this period. People who experience positive feelings during training, tend to repeat it. Moreover a set of exercises appreciated by subjects could promote exercise practice. The aim of this preliminary study was to determine which one between analytical (A) and functional (F) sequence was preferred. The second aim was to evaluate the relationship between pre-pregnancy (PP) PA habits, age, number of pregnancy (1st or more) and preferred sequence to suggest a prescription of exercises.
Methods: Twenty-three pregnant women (2nd trimester, healthy, PP normal weight) volunteered in the study. A familiarization session was performed to learn exercises and the use of Feeling Scale (FS), main outcome to establish preferred sequence. Two exercises sequences were performed, separated by a 5minute rest period, in a randomized order: A, based on analytical movements, and F, based on global movements. Each sequence was composed by 5 exercises (1 min work-15 sec rest). After every sequence, subjects expressed FS score to identify the preferred sequence.
Independent t-test and X^2, for quantitative and qualitative data respectively, were applied to investigate study hypothesis.
Results: 61 % of the sample (mean ± sd: PP BMI 21.6 ± 1.9 kg/m^2, age 32.4 ± 5.3 years) preferred A sequence (14 A, 9 F). No main effects of age, number of pregnancy, PP PA were found ($p > 0.05$).
Conclusions: Results suggest that the preferred sequence could be poor related to age, number of pregnancy, PP PA practice. Because of the small sample and the limited age range of the participants, results represent just a trend. More researches with a larger sample are necessary to identify possible predictive factors.
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253 HF P
Effects of Strength and standard low intensity training methods in the elderly

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Aim: Compare and evaluate the effects of two different training methods on elderly people: one, the most common, is focused on breathing and joint mobility exercises, the other focused on strength training only.
Methods: 90 subjects (73.71 ± 6.19 years), who exercise regular physical activity two times a weeks (50 'per session) for a period of nine months, divided into two groups: one, the standard "Low Intensity Group" (LIG) 45 subjects, who practices physical activity based on breathing, muscular flexibility and joint mobility and the other group, on the "muscular strength group" (SG), who performed overall abdominal and leg strength training. In both groups it was assessed the hamstrings flexibility, the abdominal and legs muscles strength and body balance.
Results: Both groups showed significant improvements in the hamstring flexibility and body balance. In particular the SG showed, compared to LIG, a higher increase in the flexibility (+39 %) and in the body balance (+47 %). Considering the muscular strength, differently from BJMG, the SG showed a significant increase, compared to baseline values, of 43 % in the leg muscles and 38 % in the abdominal muscles.
Conclusions: The strength training method seems to be effective to counteract the degenerative process of the neuromuscular system in

the old age whereas the LI methods was able to increase body balance and muscular flexibility. Probably a multilateral training method could be useful to reduce the risk of morbidity and mortality in elderly people.

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254 HF P
Effects of dietary nitrate supplementation on exercise tolerance in obese adolescents

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Aim: Previuos study showed a higher O_2 cost of exercise, and therefore a reduced exercise tolerance, in obese patients during constant work-rate exercise compared to healthy subjects (1). Dietary nitrate supplementation has been shown to increase time to exhaustion and reduce V'O_2, for a given work rate, in sedentary, healthy subjects (2). Aim of this study was to evaluate the effects of beetroot juice (rich in nitrate) supplementation on the main physiological variables associated with exercise tolerance in obese adolescents.

Methods: Six obese adolescents (age 16.2 ± 1.1 years; BMI 36.1 ± 5.5 kg/m^2) participated in a crossover double blind placebo-controlled study. Subjects were tested after 6 days of supplementation with beetroot juice (NO_3^- 4.2 mmol)(BR) or placebo (PLA). Participants performed: i) a cycle-ergometer maximal incremental test; ii) two repetitions of 6-min sub-maximal moderate (80 %GET) constant work-rate exercise and iii) one high-intensity (65 %Δpeak-GET) constant work-rate exercise until exhaustion.

Results: Blood nitrate concentration was significantly higher after BR (90.7 ± 20.3 μM) vs PLA (10.9 ± 4.4 μM). Resting O_2 consumption was significantly lower after BR (0.358 ± 0.05 L/min) vs PLA (0.327 ± 0.04 L/min) ($p = 0.001$). O_2 cost of moderate-intensity exercise was similar between BR and PLA. During high-intensity exercise, in BR time to exhaustion was not different from PLA. On the other hand, V'O_2 peak was higher in BR (2.593 ± 0.55 L/min) than in PLA (2.472 ± 0.52 L/min) ($p < 0.01$).

Conclusions: The results of the present study suggest that, in obese adolescents, dietary nitrate supplementation is not effective in improving exercise tolerance, during both moderate and high-intensity constant work-rate exercises. Moreover, the reduction of resting O_2 consumption induced by nitrate supplementation may negatively affect the weight loss programm of obese patients.

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255 HF P
Nutritional Supplements for Boxers

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Aim: The use of nutritional supplements (NS) among athletes is common. The aim of this study was to analyze the knowledge about the NS, what kind of NS the boxers intake, the reasons that push to intake them, where they buy them and if there are people who suggest their consumption. Lastly, we have focused our attention on Italian and European laws regarding the NS.

Methods: We have analysed the data of anonymous questionnaires distributed to boxers in Campania between October and December 2012. We have searched the literature concerning NS on various web scientific and institutional databases.

Results: On 214 questionnaire, only 169 are completed. Concerning the age of boxers analyzed, many of them are 18–28 old and 88.1 % are men against 11.8 % women. They practice sport mainly for health and for fun and intake supplements for nutritional deficiencies and energy. Indeed the total number on answers about the consumption of NS recorded higher values in mineral salts ($n = 88$) and vitamins ($n = 85$) than the others substances. The coach is the mainly person who recommends the consumption of NS in the competitive athletes ($n = 33$) while between the non competitive boxer is the doctor ($n = 25$). Many of boxers buy the supplements in the drugstore.

Conclusion: Various are reasons that push the boxer to intake the NS but mainly for increase the performance. The athletes don't know the effect that the NS could have on the body. Moreover, they could contain undeclared illicit drug banned by WADA. Italian's and European's government collaborate in order to uniform the supplements regulation. Indeed the Italian decree n. 169/2004 carry out the EU directive 2002/46.

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256 HF P
Dietary habits and intake in young rugby league players

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Aim: Dietary habits and intake are key-point to ensuring the optimal growth, a good state of health and a low fat mass in young athletes. Children obesity and overweight prevalence is increasing in Italy as in the rest of the World. An Obese or overweight child will be an obese

adult that will have cardiovascular problems or NCD. The aim of the present study was to detect eating habits and the obese and overweight prevalence in a group of young rugby league players.
Methods: Seventy-four young rugby league players (8–17 years old) grouped by age (Under10–Under12–Under14–Under16–Under20) were enrolled at the beginning of the season. To assess dietary intake was used a modified diet history interview at beginning of season. All anthropometric measures were taken at the beginning and at the end of the season. To evaluate obesity and overweight, anthropometric measures (height, weight, waist circumference, arm circumference) were registered.
Results: The diet is highly unbalanced in all groups. A too low intake in carbohydrates and an exuberant intake of protein and lipid was registered as follows: Protein = 17–19 %, Lipids = 31–33 %, Carbohydrates = 47–51 %. Furthermore was registered an excessive simple sugars intake and, as regards lipids, a too low content of monounsaturated and polyunsaturated fatty acids. The higher percentage of overweight players, according to Cole et al., were found in Under 14 (62 %) and Under12 (53 %) Under16 (33 %) Under10 (15 %) Under20 (10 %) while higher percentage of obese players were found in Under20 (40 %) Under10 (23 %) Under16 (17 %) Under14 (15 %) Under12 (10 %).
Conclusion: Registered diet's irrationalities emphasize the importance of knowing children's dietary habits and intake to optimize their psychophysical growth and to help them to achieve the best conditions to perform their sport activities.
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257 HF P
Validity of consumer based devices for physical activity quantification

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Aim: Use of objective methods to quantify physical activity (PA) is worldwide increasing as a research and consumer-based tool. Commercial devices, such as wearable accelerometers or integrated sensors systems, provide information about PA and energy expenditure (EE) in free living condition. However, little is known about the accuracy of these devices. The aim of this study was to evaluate the validity of EE estimation provided by 4 consumer-based PA monitors in a setting of free living activities in comparison to a portable metabolic analyzer (PMA).
Method: 21 subjects (10 males and 11 females), mean age 23.1 ± 4.2 years, after a 10min basal condition evaluation, were tested in a setting of 9 conditions lasting 5 minute each. The activities were divided into sedentary (watching video, reading), moderate (walking on treadmill or over ground) moderate to vigorous (WII gaming, walking on stairs) vigorous (running on treadmill and over ground, playing football). The monitors included Fitbit One worn on the belt, Fitbit Flex on the wrist, Sensewear Armband on the non-dominant arm and Actiheart on the chest. Mean absolute percentage error (MAPE) was calculate to assess the validity of each instrument in comparison to PMA (K4, Cosmed). Pearson correlation between each device and PMA was calculated and significance was assessed at $p < 0.05$.
Results: In overall comparison MAPEs were 10.7 % for Fitbit One ($r = .70$; $p < .001$), 15.3 % for Fitbit Flex ($r = .34$; n.s.), 9.3 % for Sensewear Armband ($r = .82$; $p < .0001$) and 13.6 % for Actiheart ($r = .79$; $p < .0001$).
Conclusion: Preliminary results show a good general accuracy. Probably due the typology of mixed free living conditions, wrist band was less precise. For young adults, commercial PA monitors seem to provide a quite accurate estimate of EE. More data are required to set validity in different ages and kind of population.

258 HF P
Long term effects of High Intensity Interval Resistance Training (HIIRT) in young people

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It is well known that the constant practise of Resistance Training (RT) could increase strength, improve cardiovascular fitness and body composition (Steib 2010). But considering the numerous variables of RT (Paoli 2012), the differences between training modalities has been till now poorly investigated.
Aim: The aim of this study was to asses the effects of two different intensity of RT on muscle strength, body composition, REE, QR and some blood parameters in young adults (ages 22.2 ± 2.0 years).
Methods: After 2 weeks of the same progressive RT protocol, 20 subjects were randomly divided in two groups: High Intensity Interval Resistance Training (HIIRT) and Traditional Resistance Training (TRT). HIIRT protocol consisted in performing 2 sets of 6/2/2 reps with incomplete rest between (20") sets at 85 % 1RM while TRT consisted of 3 sets x 15 reps with 75" of rest between sets at 75 % 1RM.
Results: Before and after 6 weeks of training 1RM test, handgrip test, squat jump test, aerobic power test, body composition, blood analysis, REE and QR tests were performed. Both groups increase strength but no differences were found between training methods in every test. Lean mass increased in both groups but in HIIRT group it increased in a greater way ($p < 0.05$). No significantly changes in fat free mass was found. Both groups increased VO_{2max} and VO_{2max}/kg values ($p < 0.05$). Work rate increase in both groups (TRT+ 10 %; HIIRT +19 %) but only in HIIRT is significantly changed ($p < 0.05$). Blood analysis and REE didn't changed in both groups.
Conclusion Our findings suggest that HIIRT is equally effective to increase muscular strength in young adults than a less intense technique, but it seems that HIIRT has a greater effects on muscle mass and aerobic power improvements, whilst it isn't able to improve rest metabolism.
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Gender difference in anxiety on Italian triathlon athletes

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Aim: Anxiety is one of psychological factors that may influence performance of athletes (Woodman et al., 2003). However, mixed results were reported on gender differences about anxiety among endurance athletes (Dolan et al., 2011). The aim of this study was to investigate the gender difference in anxiety on a sample of Italian triathlon athletes.
Methods: Seventy-nine triathlon athletes (age: $M = 28.54 \pm 8.46$ years, 23 females), involved in National and International competitions, were enrolled into the study. The sample filled out the Competitive State Anxiety Inventory-2 (CSAI-2) (Martens et al., 1990). The CSAI-2 includes three subscales of somatic anxiety, cognitive anxiety and self-confidence. Data were analyzed with parametric statistics. Significant level was set at $p < .05$.
Results: One-way ANOVAs showed a significant gender difference in cognitive anxiety ($F_{1,77} = 5.707$, $p < .05$) between males ($M = 17.35 \pm 6.00$) and females ($M = 20.95 \pm 6.28$) and in somatic anxiety ($F_{1,77} = 5.112$, $p < .05$; males: $M = 19.00 \pm 4.9$; females: $M = 21.82 \pm 5.38$). The self-confidence was significantly higher ($F_{1,77} = 11.406$, $p < .01$) in males ($M = 24.50 \pm 4.06$) compared to females ($M = 21.04 \pm 4.29$).
Conclusions: The results of this study highlighted a difference in anxiety level between male and female triathlon athletes. Specifically, the results underlined that male athletes presented lower scores in cognitive and somatic anxiety, and higher scores in self-confidence.
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260 SP P
Body image perception and its association with nutrient intakes among young gym goers

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Aim: Many adolescents and young adults engage in nutritional control and/or exercise in order to achieve their ideal body image. Our aim was to evaluate body image perception and satisfaction and its associations with nutrient intake in a sample of young gym goers.
Methods: 48 female and 52 male gym goers aged 14 to 30 years were enrolled at A.S.D Salus Sport, Teggiano, Salerno. Participants underwent measurements for body mass index calculation. Body image perception and satisfaction were measured using ratings of female or male bodies on a weight perception scale. Nutrition intake was assessed by a 5-day dietary recall method and analyzed by Winfood software.
Results: 81.1 % of the whole sample showed body image dissatisfaction; specifically 34.1 % males and 2.2 % females desired a silhouette larger than that they currently perceived, while 40.9 % males and 84.8 % females desired a smaller silhouette ($p < 0.001$). Among subjects who desired a larger silhouette, 14 males (93.3 %) and only 1 female (6.7 %) had normal weight, while among subjects who desired a smaller silhouette, 5 males (27.8 %) and 25 females (61.5 %) had normal weight ($p < 0.05$). Subjects who desired a larger silhouette had higher energy intakes($p < 0.001$) and higher protein intakes($p < 0.05$)than the other two groups. All the groups had an unbalanced diet containing more protein % and less carbohydrates % than indicated by dietary recommendations.
Conclusions: Females had a higher tendency to consider thinness as the preferred body image, instead males desired to be more muscular. Due to the high prevalence of body image dissatisfaction, there is a need of education about balanced nutrition to be addressed to gym goers.
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261 SP P
Drop-out rate of Italian Ranger trainees: a pilot study

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Aim: In spite of a very selective enrolment, the Italian army Rangers 2-years training program (ARTP) is characterized by a 50 % drop-out (DO) rate, 63 % of which occurring in the first 6 months. This pilot observational study was aimed at determining the causes of DO during this period identifying possible predictor characteristics.
Methods: In a total of 103 male recruits (26 ± 2 yrs) from 3 different courses we monitored DO date and cause (clustered in Personal P, Technical T, and Medical M) and measured anthropometric (body mass; stature; plicometry) and functional characteristics (pull-ups; dips; push-ups; sit-ups; 2 km run). The possible association of specific anthropometric or functional parameters with DO was evaluated by unpaired t-test between the successful (S) *vs* DO groups (D).
Results: The body weight, stature, fat mass and the results of the functional tests were similar to those reported in the literature for special forces trainees in Europe. 61 recruits (59 % of the total) completed the 6 months of the OBOS training phase. 42 recruits (41 % of the total) abandoned the program. The main cause of DO was voluntary withdraw for personal reasons (25 subjects, 60 % of total drop-outs); 13 (30 %) recruits were excluded from the program for medical and 4 (10 %) for technical reasons (*e.g.* discipline issues, fail of technical exams or physical requirements). Significant differences between S and D groups were limited to % body fat (11 ± 3 *vs* 13 ± 3) and the number of pull-ups (12 ± 3 *vs* 11 ± 4).

Conclusions: Ours are the first available data on Italian Army Ranger trainees. These preliminary data suggest targeting individual motivation, self-efficacy and resilience upon admittance to the program as potential factors affecting DO. Furthermore, optimal physical preparation practices (including gradual overload and injury prevention strategies) and optimal medical treatment could potentially reduce DO for medical and technical reasons.

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Play fighting to cope with reactive and pro-active aggression in young adolescents from low-income urban communities

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Aim: Aggressive behaviour is one of the most frequent antisocial behaviours in adolescents, particularly in those living in low-income urban communities. Participation in sport, particularly in those involving significant physical contact like play fighting, has been proved having positive effects in reducing young adolescents' aggression (Carraro et al., 2014). The purpose of this study was to analyse the effects of play fighting on self-reported aggression in a group of youths from low-income urban communities.
Methods: A sample of 98 young adolescents (boys = 66; girls = 32; mean age = 13.4 ± 1.2 years) from eight Youth Recreation Centres for adolescents with problematic background were involved in the study. Participants were invited to take part in a play fighting activity and 33 joined it constituting the play fighting group (PFG), while 65 did not attend any extra activities and constituted the control group (CG). The PFG participated in 12 1-hour per week sessions on wrestling games. All participants filled in the Reactive Proactive Aggression Questionnaire (Raine et al., 2006) pre and post intervention. Twenty-two youths dropped out, so 76 completed the study (PFG n = 31; CG n = 45).
Results: Independent sample t-tests shown no significant differences between PFG and CG at the baseline in both the pro-active and reactive aggression sub-scales of the questionnaire. A One-way ANOVA on gain scores was used to check for pre-post differences between groups. In the PFG pro-active ($F = 10.67$; $p < .01$) and reactive ($F = 5.66$; $p < .05$) aggression significantly decreased in comparison with the CG.
Conclusion: Results suggest a positive effect of play fighting games in reducing pro-active and reactive aggression.
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263 SP P
Measuring sport motivation in children and adolescence

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Aim: Most part of children and adolescents regularly attend sport centres, sport teams or sport associations. Trainers report that a relevant part of them drops out, after few months. Motivation underlying decision to start and to continue a sport is often unknown to trainers. Weak motivation or secondary benefits can be responsible for drops out. In order to better understand motivation in children and adolescent, we built up a questionnaire assessing sport motivation.
Methods: The questionnaire investigates three main features: self-efficacy, socialization degree and parental models. Three versions of the questionnaire (elementary, secondary and high school) have been tested on a large sample of 1817 participants.
Results: We found that self-efficacy, socialization degree and parental models largely affect sport attendance. In particular, when parents (especially fathers) practice sports, sons and daughters more regularly attend sport centres compared to those that are exposed to different parental models.
Conclusions: A detailed motivation profile can prevent drop out and help trainers to better understand their athletes.

264 SP P
Promoting physical activity among university students: a pilot study

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Aim: Physical activity (PA) has been proved to be a key factor in the prevention of non-communicable diseases. Nonetheless, one third of the world population is estimated to don't reach the recommended levels of PA. Promotion of PA among university students seems to be important to establish lifelong healthy lifestyle. Yet, research in the field is limited in quantity, quality and generalizability. The aim of this study was to test the efficacy of two PA promotion programs on a sample of not regularly active university students.
Methods: 33 students from the University of Padova participated in a 12-week randomized controlled trial to test the effectiveness of two programs to promote PA. Participants were randomised into 3 groups: a group attended individual counselling sessions (ICG), a group used commercial accelerometers (Technogym Mywellness Key) (AG) and a control group (CG). Individual counselling was based on the Transtheoretical model of behaviour change and on the Social-cognitive theory, and was delivered via online video calls. AG group was asked to use the accelerometer along with the dedicated websites. Informative e-mails about PA were sent both to ICG and to AG. CG didn't receive any intervention. Measures of energy expenditure and state of change of participants were taken before the randomization (t_0), at the end of the intervention (t_1) and after a 3-month follow-up

(t_2). Repeated measures analysis of variance and dependent samples t-tests were used to assess the effects of the intervention on PA levels. Friedman test and Wilcoxon signed-rank test were used to analyse variation in stages of change.

Results: Students in ICG increased energy expenditure between t_0 and t_1, and maintained this improvement to t_2. Progression through states of changes was observed in ICG at t_1, followed by some relapses at t_2. No significant differences were found in AG and in CG.

Conclusions: Results suggest that the individual counselling program was effective to promote PA among university students compared to a program based on accelerometers and to a no-intervention condition.

265 SP P
Physical frailty—health perceptions fluctuations and health outcomes: from an empirical study to a theoretical hypothesis

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Aim: frailty has been defined as a "*dynamic state affecting an individual who experiences losses in one or more domains of human functioning"* (Gobbens, et al., 2010). Frail subjects loss their ability to cope with life events (Fried, et al., 2001) resulting in negative health outcomes (van Kan, et al., 2010). The purpose of this study is to analyze the relations among physical frailty, the fluctuations of health perceptions and health.

Methods: 22 institutionalized older adults (84 ± 6 years, 68 % Female) were enrolled in this longitudinal study (100 days). Physical frailty was assessed in baseline with SHARE-FI. Health perceptions were measured on a daily basis with a VAS scale. Health outcomes, assessed in post-test, were: disability, measured with GARS and HRQOL measured with SF-12. Fluctuations were: day-to-day variability, dispersion and entropy. Analyses were made with Pearson's correlations and one-way ANOVA.

Results: correlations indicate that frail status is associated with disability ($r = -.67$, $p = .001$), MCS ($r = -.49$, $p = .022$), variability ($r = .50$, $p = .019$), dispersion ($r = .55$; $p = .008$) and entropy ($r = .540$, $p = .009$). Furthermore, the one-way ANOVA shows that frail subjects have higher variability ($F(2–19) = 3.798$, $p = .041$), dispersion ($F(2–19) = 5.071$, $p = .017$), entropy ($F(2–19) = 6.577$, $p = .007$), level of disability ($F(2–19) = 14.923$, $p < .001$), and lower level of mental health ($F(2–19) = 3.921$, $p = .038$).

Conclusions: from this preliminary study, physical frailty, health perceptions fluctuations and health outcomes resulted related. It is possible to suggest the hypothesis that physical frailty reduces the ability to cope with life events, increasing the levels of fluctuations of health perceptions causing a reduction of health outcomes. This hypothesis has to be tested in a larger mediation model design.

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