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Book of Abstracts

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HOW DOES PHYSICAL EDUCATION AFFECT THE DEVELOPMENT OF LOCOMOTOR AND OBJECT CONTROL SKILLS IN PRESCHOOL CHILDREN

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Introduction Unlike other European countries, in Italian kindergartens the physical education (PE) teacher is not including in the school organic personnel. This is frequently associated with lack of opportunities to perform PE by preschool children. Therefore, the aim of this study was to analyse whether the effects of a PE program on the development of locomotor and object control skills in preschool children would depend on the hour amount of intervention. Methods This study involved 189 children (age: 4.62 ± 0.97 years; Height: 107.83 ± 7.82 cm, body weight: 19.84 ± 4.95 kg) of 8 Palermo kindergartens who were randomly divided in a control group (C, n= 29), an intervention group 1 (I1, n= 120) and an intervention group 2 (I2, n= 40). I1 and I2 children performed a PE program of 16-week length for 4 and 10 hours/week respectively (total hours: 52 and 160), carried out by PE teachers, while C children do not perform any PE program. This program was planned in 21 learning sessions aimed to develop the body schemes, basic motor skills, fine motor control, coordination abilities, confidence and autonomy, socialization, emotion and affect control. Locomotor and object control skills were evaluated with the Test of Gross Motor Development (TGM), (Ulrich, 1985) before and after PE program. Analyses of covariance (ANCOVA) were performed to compare outcomes for I1, I2 and Control groups at post-test and the covariate was the participants' measures of motor skills at pre-test. Results I1 and I2 groups showed a significant increase in both locomotor and object control skills compared with C group after PE program. I2 ability level was significant higher than I1 group. The improvement in locomotion skills was bigger than object manipulation those. The two abilities combined provide a Quotient of Gross-Motor Ability that was in the average at baseline in all groups and became high in I1 and I2 after PE program. Discussion The improvement of locomotor and object control skills in both intervention groups indicates that PE program positively affects the motor development of preschool children. We suppose that this is dependent on the duration of the intervention given the higher level of improvement showed by the I2. The difference in the ability levels between locomotor and object control skills might be associated with the maturation of nervous system and sensory-perceptual and motor experiences of children. References Ulrich DA. Test of Gross Motor Development. Austin, TX, USA: PRO-ED; 1985 Contact marianna.bellafiore@unipa.it

Physiology

DEVELOPMENT OF A NEW PREDICTIVE MODEL ENABLING THE ASSESSMENT OF THE ANAEROBIC CAPACITY FROM A STANDARD AEROBIC EXERCISE STRESS TEST

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Graded exercise stress test (GXT) is a common and widely accepted method to assess the aerobic capacity and to predict maximal oxygen consumption and cardiorespiratory fitness. The first part of the GXT is aerobic while the last part includes the anaerobic component; meaning, utilization of ATP occurs mostly via anaerobic metabolism. The anaerobic capacity can be determined by the Wingate anaerobic test (WAnT) which is an intense test, performed on a bicycle against constant resistance. Our goal is to develop a new computational simulative predictive model, enable to predict the anaerobic capacity from a single GXT. We collected data from (n=52) subjects who underwent cardiopulmonary exercise stress test (CPET) and the WAnT. We looked at two cluster of features: 49 aerobic variables/features that can be extracted from the CPET and 12 features that can only be extracted from a GXT. We used the greedy heuristic algorithm model to test the best aerobic feature at each iteration and added it into the vector of selected features in order to predict peak and mean anaerobic power output obtained from the WAnT. The model was tested separately on the two clusters. All analyses were performed on MATLAB. When using features from CPET, we observed high peak power and mean power predictions (w) of r=0.88 and r=0.87, respectively. Lower predictions of peak power and mean power were observed when the anaerobic components were normalized by the body weight (w/kg) r=0.74 and r=0.80, respectively. Relatively lower peak power and mean power (w) predictions were also observed when using features that were obtained from the GXT, r=0.68 and r=0.69, respectively and when normalized to body weight (w/kg): r=0.69 and r=0.74 for peak and mean power, respectively. Our results indicate that prediction of the anaerobic component is feasible by using advanced statistical prediction tools such as greedy heuristic algorithm. Good prediction was noted when using gas exchange data (CPET) (r=0.87), but lower prediction values when using GXT data (r=0.68). Thus, oxygen consumption and carbon dioxide production are significant factors during aerobic exercise stress test that can predict the anaerobic power output using a single exercise stress test. References Smith JC, Hill DW. (1991). British Journal of Sports Medicine, 25, 196-199. Hawley JA., Noakes, TD. (1992). Eur J Appl Physiol Occup Physiol., 65, 79-83. Luttikohlt H, McNaughton LR, Midgley AW, Bentley DJ. (2006). Int J Sports Physiol Perform., 1:122-36.

ROLE OF SODIUM–HYDROGEN EXCHANGER-1 IN THE EFFECTS OF EXERCISE ON INTERMITTENT HYPOXIA-INDUCED LEFT VENTRICULAR CARDIAC FIBROSIS

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Background: Intermittent hypoxia (IH) of obstructive sleep apnoea (OSA) can increase oxidative stress levels that exacerbates the progression of cardiac fibrosis, leading to left ventricular dysfunction. Exercise can attenuate oxidative stress-induced myocardial sodium–hydrogen exchanger-1 (NHE-1) hyperactivation, preventing IH-induced left ventricular dysfunction. However, whether exercise attenuates cardiac fibrosis by reducing myocardial NHE-1 hyperactivity is still unclear. Purpose: To investigate the role of NHE-1 in exercise-mediated cardiac fibrosis attenuation in OSA patients using an animal model mimicking the IH of OSA. Methods: Eight-week-old male Sprague–Dawley rats were randomly assigned to room air (CON), IH, exercise (EXE) or IH combined with exercise (IHEXE) group. All groups were randomly assigned to subgroups receiving a vehicle or cariporide, NHE-1 inhibitor, at the beginning of 9th week. IH rats were raised without any intervention for the first 8 weeks and exposed to 14 days of IH (2–6% O2, 2–5 s/75 s) for 8 h/day at the 9–10th week. EXE rats were subjected to an animal treadmill for 10 weeks (5 days/week, 60 min/day, 24–30 m/min, 2–10% grade) without IH exposure. IHEXE rats were made to exercise with IH at the 9–10th week. At the end of 10th week, the rats were sacrificed, and hearts were removed to determine the myocardial levels of fibrosis index (Masson's trichrome stain and Sirius red stain), lipid peroxidation, catalase activity and NHE-1 activation. Results: Compared with CON rats, IH caused an increased cardiac fibrosis, a decreased myocardial catalase activity and an increased lipid peroxidation and NHE-1 activation ($p < 0.05$, in all) that were abolished by cariporide. These changes were not