

*Dario Colella<sup>1</sup>*  
*Milena Morano<sup>2</sup>*

*Original scientific paper*

*<sup>1</sup>University of Foggia, Foggia, Italy*

*<sup>2</sup>Laboratory of Didactics of Motor Activities, University of Foggia, Foggia, Italy*

## **EFFECTS OF AN EXTRA-CURRICULAR PHYSICAL EDUCATION PROGRAMME ON CHILDREN AND YOUNG ADULTS' MOTOR PERFORMANCE**

### **INTRODUCTION**

Within schools, physical activity and sport are an essential component of the educational process and a key factor of a person's social, motor, emotional and cognitive growth (Bailey, 2006). Several studies confirmed that physical activity is an essential factor for children's learning, motor and psycho-emotional development and has a positive influence on school success (Strong et al., 2005; Hellal et al., 2006; Castelli et al., 2007).

The „Global Recommendations on Physical Activity for Health” (World Health Organization, 2010a) is addressed to 5-17-year-old children and can be summarized as follows: **a.** children and young people should engage in at least 60 minutes of moderate- to vigorous-intensity physical activity daily; physical activity longer than 60 minutes provides additional health benefits; **b.** most of the daily physical activity should be aerobic; vigorous-intensity activities (such as strengthening muscle and bone) should be incorporated at least 3 times per week; **c.** children and youth should participate in a variety of enjoyable and age-appropriate activities designed to achieve optimal health, wellness, fitness, and performance benefits. Guthold et al. (2010) carried out a survey to compare different levels of physical activity and sedentariness of school-age children and young adults, coming from 34 countries of 5 WHO regions. It highlights the high percentage of students who do not respect the recommendations about physical activity, showing in fact high levels of sedentariness. Over the last years, PE classes at school have been reduced in many European countries (Hardman, 2008). Italian primary school provides physical activity syllabi, but teachers are not experts. Therefore, many institutions and associations propose extra-curricular programmes of motor and sport activities to schools and families, in order to face sedentariness and encourage sport practice. As a result of this increasing sedentariness, the levels of development of children and young adults' motor abilities and motor skills tend to be reduced. Researches carried out in many EU countries pointed out the decrease in the levels of regular physical activity and consequently the reduction of motor abilities and skills development (Tomkinson et al., 2007). This exposes the organism

in developmental age to the risk of diseases and restricts the opportunities of motor learning and social interaction. The survey by Kopecký et al. (2008) compares motor performances among girls (N: 562; age 7-15) at different periods (1966-1968-2002) and highlights a decline and a stagnancy in the levels of motor performance and an increase of BMI values. Several researches highlighted the reduction in the levels of physical activity and the decline in children and young adults' motor performances. Nevertheless, no efficient strategy of intervention encouraging physical activity at school age has been proposed. In addition, a gap between the research-intervention on physical activity and the delivery of programmes in the educational practice (good practices) was identified. Evaluation studies rarely lead to the adjustment of the interventions, as was evaluated afterwards on a wider scale (De Meij et al., 2010).

## **PARTICIPANTS**

This work is aimed at evaluating the motor performances for strength, speed, motor coordination and the development of motor skills at different ages and at comparing the results of the participants of the extra-curricular (supplementary) PE programme with the results of pupils attending the traditional PE programme. The sample (Table 1) is composed of 491 children and young adults (M: 235, F: 256), attending primary and secondary school, divided into three age groups: 8-9, 10-11, and 12-13 years. It was assumed that pupils participating in a 6-month extra-curricular programme of physical activities would show a higher level of motor skills than the pupils involved in a traditional PE programme. Each participant carried out motor tests at the end of the attended programme (June 2010). Participants' BMI values were then compared.

## **METHODS**

The following motor tests have been proposed: standing long jump (SLJ), 20-m sprint from a standing position and 20-m dribbling (Morrow et al., 2000). The internationally accepted cut off points published by Cole et al. (2000) have been adopted in order to determine predictable values of body mass index (BMI) for overweight (>25) and obesity (>30) in adult age.

### **Data analysis**

Besides the descriptive statistics ( $M \pm DS$ ), t-test was used (Table 2) in order to highlight the possible significant differences related to the *group*. The significance level was set at  $p < 0,05$ . ANOVA 2 (group) x 3 (age: 8-9, 10-11, and 12-13 years) highlighted significant differences of motor performances on all the motor tests (Tab. 2; Fig. 1, 2, 3, 4) with regard to the practice of extra-curricular physical activities, not

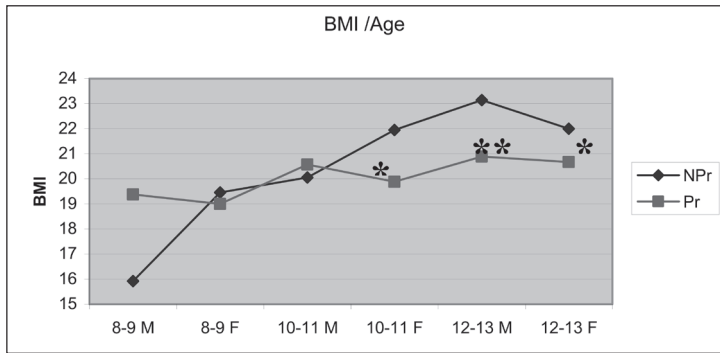
linked to gender differences. On the standing long jump test significant differences were found for males (age 8-9:  $p = 0,04$ ; 10-11:  $p = 0,000$ ; 12-13:  $p = 0,01$ ) and females (age 10-11  $p = 0,04$ ). On the 20-m sprint test significant differences were found for females (age 8-9; 10-11; 12-13:  $p = 0,04$ ) and males (age 10-11, 12-13:  $p = 0,000$ ). In the 20-m dribbling test significant differences were found for males (age 8-9:  $p = 0,03$ ; 10-11  $p = 0,003$ ; 12-13  $p = 0,000$ ) and females (age 8-9:  $p = 0,04$ ; 10-11:  $p = 0,03$ ; 12-13  $p = 0,04$ ).

*Table 1. Research sample*

Tab. 1- Sample			
Gender	Group	Age (M $\pm$ SD)	N
Female	P	8-9 (8,47 $\pm$ 0,50)	35
	Np	8-9 (8,35 $\pm$ 0,49)	35
Male	P	8-9 (8,47 $\pm$ 0,50)	34
	Np	8-9 (8,52 $\pm$ 0,50)	25
Female	P	10-11 (10,7 $\pm$ 0,48)	35
	Np	10-11 (10 $\pm$ 0,50)	35
Male	P	10-11 (10,44 $\pm$ 0,50)	45
	Np	10-11 (10,33 $\pm$ 0,49)	45
Female	P	12-13 (12,75 $\pm$ 0,75)	58
	Np	12-13 (13 $\pm$ 0,7)	58
Male	P	12-13 (12,65 $\pm$ 0,72)	43
	Np	12-13 (12,88 $\pm$ 0,99)	43
Total			491

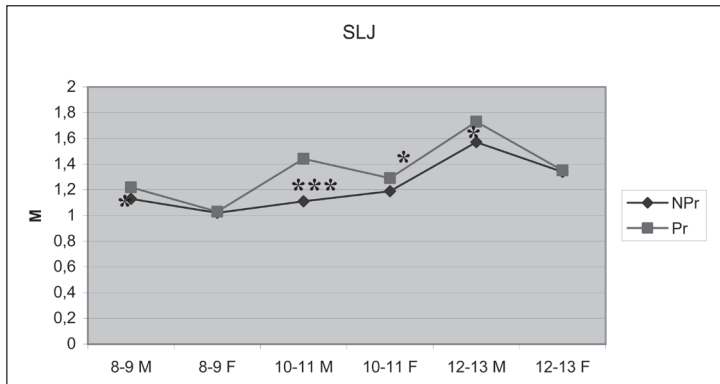
*Table 2. Results of descriptive statistics of all measures*

TAB. 2 - MEASURES										
Gender	Group	Age	BMI		SLJ		20m sprint (sec)		20m dribbling	
			MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
Female	P	8-9	19	3,19	1,03	0,14	4,77	0,33	14,15	3,58
	Np	8-9	19,46	4,15	1,01	0,19	4,99	0,52	16,95	7,06
Male	P	8-9	19,37	4,00	1,22	0,17	4,53	0,38	11,31	5,61
	Np	8-9	15,91	4,09	1,34	0,14	4,56	0,47	14,39	5,41
Female	P	10-11	19,88	4,12	1,29	0,17	4,23	0,45	10,23	3,58
	Np	10-11	21,95	3,77	1,19	0,22	4,42	0,37	12,27	4,34
Male	P	10-11	20,57	2,90	1,44	0,20	3,99	0,25	10,03	8,02
	Np	10-11	20,05	4,07	1,11	0,25	4,71	0,51	15,0	7,70
Female	P	12-13	20,67	2,86	1,35	0,15	4,02	0,29	8,50	1,70
	Np	12-13	22,00	4,20	1,34	0,22	4,14	0,31	9,44	2,98
Male	P	12-13	20,89	2,71	1,73	0,26	3,71	0,29	6,06	1,13
	Np	12-13	23,14	4,53	1,57	0,27	4,09	0,61	7,74	2,22



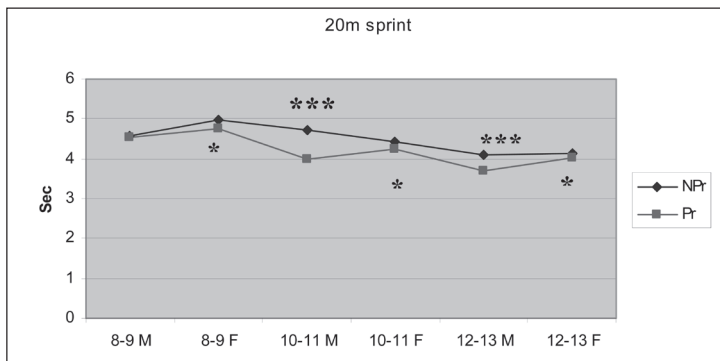
\* p = 0,03 (F 10-11); \* p = 0,04 (F 12-13);\*\*\* p = 0,007 (M 12-13).

**Fig. 1.**



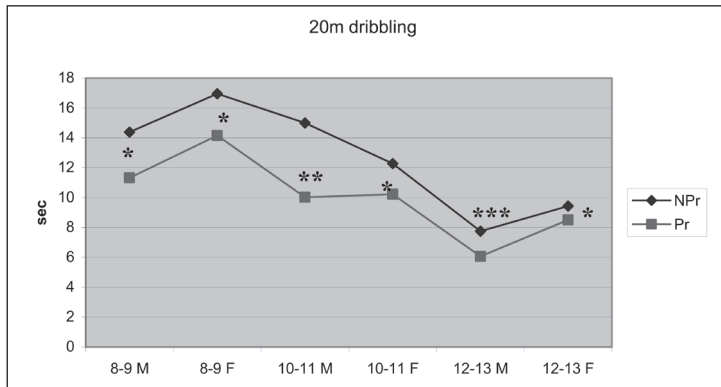
\* p = 0,04 (M 8-9); \*\*\* p = 0,000 (M 10-11); p = 0,01 (M 12-13); \* p = 0,04 (F 10-11).

**Fig. 2.**



\* p = 0,04 (F 8-9); p = 0,04 (F 10-11); p = 0,04 (F 12-13); \*\*\* p = 0,000 (M 10-11); p = 0,000 (M 12-13)

**Fig. 3.**



\*  $p = 0,03$  (M 8-9) ; \*\*  $p = 0,003$  (M 10-11) ;  $p = 0,000$  (M 12-13) ;  $p = 0,04$  (F 8-9) ;  $p = 0,03$  (F 10-11) ;  $p = 0,04$  (F 12-13)

**Fig. 4.**

## DISCUSSION AND CONCLUSIONS

Children acquire motor abilities through the process of motor development. It is a continuous process of modification that involves the interaction of several factors: 1) the neuromuscular maturation; 2) the physical growth and behavioural characteristics of the child; 3) the tempo of physical growth, biological maturation and behavioural development; 4) the residual effects of prior motor experiences; and 5) the new motor experiences (Malina, 2004). This work confirms the results of previous studies that an extra-curricular PE programme, during or outside of school hours, can maximize the participants' levels of physical activity and motor performance. Also, Dobbins et al. (2009) demonstrated that school programmes promoting physical activities have a preventive effect, as they increase the time in which children are physically active and reduce the time they spend watching TV. These programmes enhance physical fitness, but show scarce impact on the reduction of body weight. The differences that emerged in the different age groups, for males and for females, in the 20-m dribbling test (motor coordination) could be explained by the variety of activities, while the differences on other tests could be ascribed to higher levels of physical activity and time of motor activities. Sollerhed & Ejlertsson (2008) compared the motor performance of resistance and coordination of children (N: 132; M: 73; F: 59) attending two primary schools where PE classes had different number of lessons (two hours versus four hours a week). In this study significant differences between the two groups were detected. The results showed that PE classes with a greater number of weekly hours can favour the increase of children's motor performance. The processes of motor maturation, development and learning can hide the effects of motor activities programmes on the performance during the developmental age. Therefore,

systematic studies are necessary to: (a) compare the effects of different programmes (e.g. sport, games, expressivity and dramatization) on pupils' motor performances; (b) evaluate periodically the variations of the levels of strength, speed, resistance, motor coordination, according to gender, group (BMI), intensity, duration and frequency; (c) evaluate the trends of motor performance at different ages (longitudinal study); (d) evaluate the relationships among motor performance, levels of physical activities and psycho-emotional factors (motivation and physical self-efficacy) according to gender, activity and age.

## REFERENCES

1. Bailey, R. (2006). Physical education and sport in schools: a review of benefits and outcomes. *Journal of School Health*, 76, 397-401
2. Castelli, D, Hillman, CH., Buck, SM, Erwin, HE. (2007). Physical Fitness and Academic Achievement in Third- and Fifth-Grade Students, *JSEP*, 29(2), 239-252
3. Cole, TJ., Bellizzi, MB., Flegal, MK., & Dietz, WH. (2000). Establishing a standard definition for child overweight and obesity worldwide: international survey. *British Medical Journal*, 320, 1240-1243
4. de Meij, JSB., Chinapaw, MJM., Kremers, SPJ., Van der Wal, MF., Jurg, ME., & Van Mechelen, W. (2010). Promoting physical activity in children: the stepwise development of the primary school-based JUMP-in intervention applying the RE-AIM evaluation framework. *British Journal of Sports Medicine*, 44(12), 879-887
5. Dobbins, M., De Corby, K., Robeson, P., Husson, H., & Tirilis, D. (2009). School-based physical activity programmes for promoting physical activity and fitness in children and adolescents aged 6-18. *Cochrane Database of Systematic Reviews*, Issue 1. Art. No.: CD007651. DOI: 10.1002/14651858.CD007651.
6. Guthold, R., Cowan, MJ., Autenrieth, CS., Kann, L., & Riley, LM. (2010). Physical activity and sedentary behavior among schoolchildren: a 34-country comparison. *J Pediatr*, 157(1), 43-49 e41
7. Hardman, K. (2008) The situation of physical education in schools: a European perspective. *Human Movement*. 9, 5-18
8. Hellal, PC., Victoria, CG., Azevedo, MR., Wells, CK. J. (2006). Adolescent physical activity and health. A systematic review. *Sports Med*, 36, 1019-1030
9. Kopecký, M., Přidalová, M. (2008). The secular trend in the somatic development and motor performance of 7-15-year-old girls; *Med Sport*, 12, 3, 78-85.

10. Malina, R.M. (2004). Motor Development during Infancy and Early Childhood : Overview and Suggested Directions for Research. *International Journal of Sport and Health Science*, 2, 50-66
11. Morrow, JR, Jackson, AW, Disch, JG, Mood, DP. Measurement and Evaluation in Human Performance (2<sup>nd</sup> ed.). Champaign, IL: Human Kinetics, 2000
12. Sollerhed, AC, Ejlertsson, G. (2008). Physical benefits of expanded physical education in primary school: findings from a 3-year intervention study in Sweden. *Scandinavian Journal of Medicine & Science in Sports*, 18,102-107
13. Strong, W., Malina, R., Blimke, C., Daniels, S., Dielman, R., Gutin, B., Hergenroeder, A., Must, A., Nixon, P., Pivarnik, J., Rowland, T., Trost, S. and Trudeau, F. (2005). Evidence based physical activity for school-age youth, *J Pediatr*, 146, 6, 732-737
14. Tomkinson, G.R., & Olds, TS. (2007). Secular changes in pediatric aerobic fitness test performance: the global picture. In: Tomkinson G.R., Olds TS. (Eds.) *Pediatric Fitness: Secular Trends and Geographic Variability*. Basel, Switzerland: Karger.
15. World Health Organization (WHO) (2010). The „Global Recommendations on Physical Activity for Health” [www.who.int/dietphysicalactivity/factsheet\\_recommendations/en/index.html](http://www.who.int/dietphysicalactivity/factsheet_recommendations/en/index.html). Accessed [15 Feb 2011]

## ABSTRACT

This work is aimed at evaluating the motor performance for strength, speed, motor coordination and the development of motor skills during the developmental age. The sample is composed of 491 children and young adults (M 235, F 256) attending primary and secondary school, divided into three age groups: 8-9, 10-11, and 12-13 years. It was assumed that the pupils participating in a programme of physical activities outside of school hours show a higher level of motor skills and abilities with respect to the pupils involved in a curricular programme of physical education (PE). ANOVA 2 (group) x 3 (age, 8-9; 10-11; 12-13) highlighted significant differences in motor performance on all the tests, with regard to the practice of extra-curricular physical activities, not linked to gender differences. A supplementary syllabus of motor activities can determine an enhancement of motor performances and an increase of motor experiences.

**Key words:** *children, motor performance, physical education, school*