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Effectiveness of a Short After-School Intervention on Physical Fitness in School-Aged Children

Extracurricular multilateral training improves physical fitness in children

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Abstract

Lo scopo di questo studio è stato di valutare gli effetti di un allenamento multilaterale extracurricolare di 8 settimane su alcune componenti del fitness fisico nei bambini. I partecipanti (8-10 anni) sono stati assegnati casualmente ad un gruppo sperimentale (EMT, n=14) che ha eseguito un allenamento multilaterale extracurricolare (60 min., 3 sessioni/settimana), o ad un gruppo di controllo (ST, n=14) che ha svolto solamente il programma di educazione fisica. Il fitness fisico dei partecipanti è stato valutato tramite la misurazione dei test sit and reach, stork balance stand, standing long jump, e Harre, prima e dopo l'intervento. Il gruppo EMT ha mostrato un miglioramento significativamente maggiore rispetto al gruppo ST in tutti i test ($p<0.05$), seguendo l'allenamento. I risultati indicano che attività multilaterali extracurricolari focalizzati su esercizi mirati allo sviluppo delle capacità motorie coordinative e condizionali, migliorano le componenti del fitness fisico correlati alla salute ed alle abilità.

The aim of this study was to assess the effects of an 8-week extracurricular multilateral training program on some components of physical fitness in children. Participants (8-10 years) were randomly assigned to an experimental group (EMT, n=14) that performed an extracurricular multilateral training (60 min., 3 sessions per week), or a control group (ST, n=14) that performed a standard school-based physical education program only. Participants physical fitness was assessed by measuring the sit and reach, stork balance stand, standing long jump, and Harre test at baseline and after 8-weeks. The EMT showed significantly ($p<0.05$) greater improvement than ST group in all fitness tests following training. Results indicate that extracurricular multilateral activities focused on exercises aimed to the development of the conditional and coordinative motor abilities, improve the health- and skill-related components of physical fitness.

Parole chiave: capacità motorie; allenamento multilaterale; scuola primaria; educazione fisica.

Keywords: motor abilities; multilateral training; primary school; physical education.

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1. Introduction

Physical activity (PA) has been suggested to be one of the most important modifiable lifestyle factors that can improve a variety of health-related aspects throughout life. There is increasing evidence that diseases in adulthood and old age could be associated with low levels of PA during growth (Telama et al., 2005). PA, which has been defined as "any bodily movement produced by skeletal muscles that result in caloric expenditure" (Caspersen, Powell, & Christenson, 1985), increases energy expenditure and can help prevent obesity (Haapanen, Miilunpalo, Pasanen, Oja, & Vuori, 1997), but PA declines throughout childhood (Kimm et al., 2002). Being continuously physically active may lead to high intrinsic motivation and a high level of motor skills that, in turn, increase the probability of being active in later life. Persistent PA has also been found to be important for health reasons, such as in lowering the level of cardiovascular risks among young people (Raitakari et al., 1994). The many benefits of PA for health and well-being are well documented, and much is known about factors influencing PA of children (Catuzzo et al., 2016; Lubans et al., 2010; Raitakari et al., 1994). In many countries, promoting life-long PA has long been an important goal of physical education curricula and sport policy (Mathisen, 2016; Sallis et al., 2012; Salmon, Booth, Phongsavan, Murphy, & Timperio, 2007). In turn, the goal of physical education is to provide students with the opportunity to engage in pleasurable PAs, to become physically fit and to learn generalizable motor and behavioural skills (McKenzie et al., 2003).

In physical education, the concept of "carry-over value" implies that activities in which people participate in adulthood should be learned at a young age. For this reason, young people should be encouraged to learn the types of PA that are common among adult people, such as individual, flexible, non-competitive, and fitness-oriented activities (Green, 2002; Haywood, 1991). A previous Finnish study demonstrated that children participation in relatively intensive endurance sports, such as cross-country skiing, running, and orienteering, was associated with participation in endurance sports in adulthood (Tammelin, Näyhä, Hills, & Järvelin, 2003). However, level of activity in adulthood did not depend on the type of PA at a young age. It seems that intensive participation in general in PA and sports, and continuous participation at school age, are more

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important than participation in specific sports (Telama et al., 2005).Thus, it seems plausible to argue that it is crucial to promote PA at a young age, since it is more effective to prevent childhood obesity (Lau et al., 2007) and develop motor abilities including perceptual and physical factors (Fleishman, Quaintance, & Broedling, 1984) in which many important abilities such as general motor coordination (i.e. multilimb and gross body coordination), spatial orientation, balance (i.e. gross body equilibrium), strength, and power are involved.

Ultimately, from previous studies we know that PA among children is believed to be insufficient (Andersen et al., 2006; Sleap & Warburton, 1996) and low levels of activity seem to persist into adulthood (Telama et al., 2005; Twisk, & Kemper, 2000). For these reasons, the World Health Organization (WHO, 2010) recommends that children and adolescents aged 5 to 17 years should accumulate at least 60 minutes per day of moderate-to-vigorous intensity PA for 5 days a week to avoid the risk of metabolic and cardiovascular diseases. In European countries, the majority of national PA recommendations for young people are in line with those reported by the WHO (Kahlmeier et al., 2015). Despite this, the experience of PA in Italian children is frequently confined to participation in a few training sessions of sport alone, which is not enough to ensure the daily requirement (Leoni et al., 2008; Sacchetti et al., 2013). The school is widely recognized as an important institution for the promotion of PA and fitness in youth. However, school-based interventions in promoting PA, fitness, and lifestyle in children and adolescents result in an inconclusive picture (Harris, Kuramoto, Schulzer, & Retallack, 2009; Russ, Webster, Beets, & Phillips, 2015) because of the heterogeneity of the interventions and for lacking a rigorous design (Dobbins, Husson, De Corby, & La Rocca, 2013). Conversely, there is some empirical evidence to support the potential for increasing PA levels in after-school programs, including cross-sectional studies and short-term interventions, although some interventions have some limitations (Kelder et al., 2005; Mears & Jago, 2016; Trost, Rosenkranz, & Dzewaltowski, 2008; Vandell et al., 2005).

Accordingly, the development and evaluation of interventions to promote PA in young people is therefore a priority, and non-curricular approaches can facilitate increases in PA among children. About that, we recommend an extracurricular multilateral training (EMT) program that already showed significant effects in improving fitness perfor-

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mance in youth (Fischetti & Greco, 2017). The multilateral approach, which focused on the development of the conditional and coordinative motor abilities, respects the physiologic age and psychological maturation of youth and is a means to improve fitness and conditioning (Bompa & Buzzichelli, 2018).
Therefore, with this background knowledge, we designed a controlled after-school intervention study aimed to investigate the effects of an EMT program on health- and skill-related components of physical fitness in children. We hypothesized that an 8-week after-school program, added to standard school-based physical education program, would promote great gains in flexibility of the lower body, static balance, explosive leg power, and general motor coordination.

2. Materials & Methods

2.1 Study design

To test our hypothesis, adaptations following EMT program in addition to standard school-based physical education program were assessed using a randomized controlled study design that included pre- and post-testing at weeks 1 and 8, respectively. This research was designed to obtain baseline data of some health-related (i.e., flexibility) and skill-related (i.e., balance, power, coordination) components of physical fitness (Caspersen, 1985) in children, in order to evaluate whether a supervised 8-week EMT program can produce improvements. This outcome was identified by statistically significant improvements in physical fitness (i.e., a sit and reach, stork balance stand, and standing long jump test) and general motor coordination tests (i.e., Harre test).

2.2 Participants

Twenty-eight healthy children (age range, 8-10 years) volunteered to participate in this study. An a priori power analysis (Faul, Erdfelder, Lang, & Buchner, 2007) with an assumed type I error of 0.05 and a type II error rate of 0.20 (80% statistical power) was calculated for measures of physical capacity and revealed that 8 participants per group would be sufficient to observe medium 'Time x Group' interaction effects. However, to

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avoid the experimental mortality, i.e. the loss of subjects, that could threaten the validity of the research design, more subjects were recruited. All participants were recruited from a primary school in Puglia (Italy) in April 2018 to develop the project conceived by the methods and didactics research group of sports activities of the University of Bari. The exclusion criteria were (a) children with a chronic pediatric disease, (b) children with an orthopaedic limitation, and (c) children older than 10 years and younger than 8 years of age (i.e., Turgor secundus growth phase). All volunteers were accepted for participation.

Upon completion of testing, the participants were randomly assigned to two groups: an experimental group (EMT), which performed an extracurricular multilateral training program added to standard physical education program, or a control group (ST), which performed a standard school-based physical education program only, as required by the ministerial program (i.e., 2 lessons of approximately 50 minutes a week, consisting of ball games, running, jumping, and climbing activities). All participants and their parents received a complete explanation in advance about the purpose of the experiment, its contents, and safety issues based on the Declaration of Helsinki, and provided their informed consent. The study was conducted from May to June 2018. The characteristics of the study population are described in Table 1.

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	ST (n = 14)		EMT (n = 14)	
	M	**SD**	**M**	**SD**
Age (years)	9.0	0.9	8.9	0.8
Body mass (kg)	33.7	8.9	32.9	7.8
Height (m)	1.39	0.1	1.37	0.1
BMI ($kg \cdot m^{-2}$)	17.4	3.2	17.5	3.2
Sex (m/f)	7/7		7/7	

Table 1. Participants characteristics for ST and EMT.
None of the group and gender differences were significant ($p > 0.05$). m = male; f = female; ST = Standard school-based Training (control) group; EMT = Extracurricular Multilateral Training (experimental) group; BMI = body mass index.

2.3 Study procedures

All study procedures were performed in the school gym. Fitness and general motor coordination tests were performed at weeks 1 (baseline) and 8 (end of the study). All subjects participated in an introductory training session before the testing procedures. Prior to pre- and post-testing, all participants underwent a standardized 10-minute warm-up that consisted of low-to-moderate intensity aerobic exercise and stretching. Initial and final test measurements were made at the same time of day and under the same experimental conditions. All measurements and the test procedures were performed and supervised by the physical education teacher. After intervention, the physical education teacher was also asked to give a judgment on the EMT program and on the behaviour shown by children.

All trials were performed using standardized test. On the first test day, subjects performed, in the following order, the sit and reach, stork balance stand, standing long jump, and Harre test, instead anthropometrical assessment were undertaken on day

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2. The reliability of the dependent measures was calculated using the intraclass correlation coefficient (ICC).

2.4 Fitness testing

Flexibility of the lower body was evaluated using the *Sit and reach test*. The sit and reach box (Cartwright Fitness, Chester, UK) was braced against a wall and subjects sat with their legs fully extended (medial sides of their feet 20 cm apart, no shoes) and bottoms of the feet against the box. While exhaling, subjects slowly bent forward toward the top of the box with 1 hand over the other. The technician ensured that the knees stayed in full extension and that movement was conducted slowly and smoothly. Subjects performed 4 trials, each held for 1–2 seconds, and the farthest reach was recorded in centimeters. The test-retest reliability reported a good reliability for this test (ICC = 0.83).
Postural static balance was evaluated using the *stork balance stand test* (Hatzitaki, Zlsi, Kollias, & Kioumourtzoglou, 2002). In this test, the subject stood on his dominant leg. The participants were instructed to lift and hold the contralateral leg against the medial side of the knee of the stance leg while keeping his hands on the iliac crests. The trial ended when the heel of the involved leg touched the floor, the hands came off the hips, or the opposite foot was removed from the stance leg. This test was conducted with eyes opened only. The subjects performed three attempts and the best time (sec.) was recorded for analysis. High test-retest reliability has been reported for this test with an intraclass correlation coefficient (ICC) of 0.94.
The *standing long jump test* has been considered a general index of muscular fitness in young and evaluates explosive leg power (Castro-Pinero et al., 2010). Before the test started, subjects were instructed to stand with both feet right behind a starting line and to jump as far as possible. Subjects were allowed to use arm swing during the test. Three trials were performed with a 2 min rest between trials. The best trial in terms of maximal distance from the starting line to the landing point at heel contact was used for statistical analysis. Measurements were taken to the nearest cm using a tape measure. The standing long jump test reported a good reliability with an intraclass correlation coefficient (ICC) of 0.85.

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2.5 General motor coordination testing

The *Harre circuit test* is a popular and widely used test in the scientific literature (Harre, 1982) to assess the ability of a subject to coordinate quickly complex movements and general motor tasks with high dimensionality in terms of number of joints involved and levels of force generated. After an initial somersault, participants were asked to perform three consecutive passages above and below three obstacles, turning around a central cone, at maximum speed as described in Figure 1. Three trials were performed and separated by 5 min of rest. Total time of each trial were recorded by using a photocells system (Microgate, Bolzano, Italia) and the average time was considered in the analysis. The time employed to run the whole circuit is recorded to the nearest 0.1 second. In case of mistakes (e.g. touching the obstacle), children were asked to repeat the trial after 2 minutes of rest. All trials were performed in an indoor karate gym, observing the same conditions. The Harre test reported a high reliability with an intraclass correlation coefficient (ICC) of 0.93.

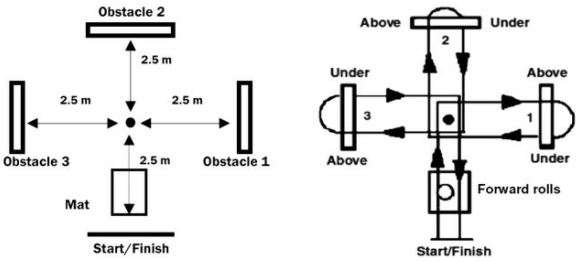

Figure 1 - Scheme of the Harre circuit.

2.6 Training procedures

EMT group was trained three times per week on non-consecutive days (Monday, Wednesday and Friday), after school time, for eight weeks under carefully monitored and controlled conditions by a specialist physical education teacher. To encourage the learning and development of the motor abilities and, therefore, to achieve the objective of the study, the teacher has created a fun and active learning environment, used appro-

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priate teaching styles and strategies, and developed each session using multiple intelligences (Ayers & Sariscsany, 2010).

Prior to each training session, all EMT subjects participated in a 10-minute dynamic warm-up period followed by dynamic and static stretches exercises (5 min.). The dynamic warm-up included arm swings, trunk twisting, high marching, stride jumping, high knees, side bending, side stretching, skipping leg swings, backward sprinting, and lateral shuffles. Stretching included achilles' tendon/calf stretches, skier's stretches, quadriceps stretches, hurdler's stretches, straddle stretches, groin stretches, back stretches and archers. Each training session ended with ~5 min. of cool-down activities. The daily training duration was 60 minutes.

Immediately after the 15-minute warm-up, the EMT group performed a multilateral training based on conditional and coordinative motor ability exercises for 40 minutes. The specific program was performed gradually from the first to the fourth level and focused on the development of the following motor abilities (both conditional and coordinative): flexibility, balance, explosive leg strength and general motor coordination. Each session was aimed at keeping the children effort at a medium-high level and to achieve a high volume, intensity and density of work. The rest period was very short in low intensity activities, whereas it was complete lasting 2 to 3 minutes in activities of medium to high intensity. The training program was summarized in detail in Table 2.

Level	**Goals**	**Training contents**
1	Basic motor and postural scheme Reinforcement of the spatial-temporal organization Opto-manual coordination	Exercises with small and big pieces of equipment, somersaults, ball control (balls of different size and weight), circuits and courses.
2	Reinforcement of the running scheme Reinforcement of the static-dynamic balance Reinforcement of the throwing-grasping scheme Introduction to the sense of direction	Exercises with small and big pieces of equipment, varied circuits, blindfolded courses.

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3	Reinforcement of the balance control in precarious situations Improvement of joint mobility Improvement of strength Integration between motor and postural schemes	Exercises with small pieces of equipment and with balance beams, different types of jumping, somersaults, pulling and pushing, varied circuits, relays.
4	Reinforcement of the sense of direction Integration between different motor schemes Reinforcement of the respiration control Development of the motor planning	Exercises with small pieces of equipment, somersaults, spins, rotations on the body axis, varied circuits, relaxation and respiratory control exercises.

Table 2 – Example of an 8-week after-school program composed of conditional and coordinative motor ability exercises performed by the EMT (experimental) group (3 weekly lessons of 60 minutes for 8 weeks for a total of 24 lessons in the study period).

2.7 Statistical Analysis

All analyses were performed using SAS Jmp Statistics (v. 14.1, Cary, NC, USA), and the data are presented as group mean values and standard deviations. Because we could not detect significant differences between males and females ($p > 0.05$), the data were pooled.

Normality of all dependent variables was tested using Shapiro-Wilk test procedure. Since the data were normally distributed, a multivariate analysis of variance (MANOVA) was used to detect differences between the study groups in all baseline physical characteristics and a mixed between-within subjects analysis of variance (ANOVA) was used to determine the interaction between the two independent variables of training (pre/post; within-subjects factor) and group (EMT and ST; between-subjects factors) on the dependent variables of physical fitness. When 'Time x Group' interactions reached the level of significance, group-specific post hoc tests (i.e., paired t-tests) were conducted to identify the significant comparisons.

Changes were calculated as [(posttraining value – pretraining value). The reliabilities of sit and reach test, stork balance stand test, standing long jump test, and Harre test measurements were assessed using intraclass correlation coefficients; scores from 0.8 to 0.9

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were considered as good, while values above > 0.9 were considered as high (Vincent & Weir, 2012).
We accepted $p < 0.05$ as our criterion of statistical significance, whether a positive or a negative difference was seen (i.e., a 2-tailed test was adopted). Partial eta squared (η^2_p) was used to estimate the magnitude (effect sizes) of the difference within each group and interpreted using the following criteria (Cohen, 1988): small ($\eta^2_p < 0.06$), medium ($0.06 \leq \eta^2_p < 0.14$), large ($\eta^2_p \geq 0.14$).

3. Results

3.1 Overwiew

All participants attended all training sessions (100% compliance) and there were no injuries resulting from either training program. Physical education teacher gave a positive opinion on feasibility, repeatability and utility of the EMT program. Furthermore, he observed enthusiasm in participation, an improvement in relational dynamics (e.g. increased socialization and less aggressive behaviour) and a growing interest in physical activity by the participants.

3.2 Fitness and motor coordination measures

The ST and EMT groups did not differ significantly at baseline in any physical characteristics ($p > 0.05$). Significant main effects for 'time' were observed on sit and reach, stork balance stand, standing long jump, and Harre test, $F_{(1,26)} = 133.2$, 23.5, 5.2 and 43.19, respectively, $p < 0.05$. Post hoc analysis revealed that EMT group made significant improvements on all the tests, whereas ST group showed significant improvements in sit and reach and Harre test. Significant 'Time x Group' interaction was found for sit and reach, stork balance stand, standing long jump, and Harre test, $F_{(1,26)} =$ 25.8, 6.8, 15.7 and 4.4, respectively, $p < 0.05$, with the EMT group making significantly greater improvements in performance than ST group. Pre- and post-intervention results for all outcome variables are presented in Table 3.

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	ST (n = 14)					EMT (n = 14)					*P*-value (effect size η^2_p)		
Variables	**Pre**		**Post**		**Δ**	**Pre**		**Post**		**Δ**	**Main effect: Time**	**Main effect: Group**	**Interaction: Time x Group**
	M	**SD**	**M**	**SD**		**M**	**SD**	**M**	**SD**				
Fitness test													
Sit and reach test (cm)	2.6	4.8	4.1*	4.4	1.5	1.2	5.2	5.1*†	5.7	3.9	<0.001 (0.84)	0.926 (0.00)	<0.001 (0.05)
Stork balance stand test (s)	37.1	15.3	38.9	12.5	1.8	30.2	20.1	36.1*†	16.8	5.9	<0.001 (0.47)	0.437 (0.02)	0.015 (0.21)
Standing long jump test (cm)	144.9	13.8	142.7	16.0	-2.2	128.5	12.9	136.7*†	16.4	8.2	0.031 (0.17)	0.0491 (0.14)	<0.001 (0.38)
Coordination test													
Harre test (s)	25.6	7.0	24.4*	6.2	-1.2	19.2	4.0	16.9*†	3.4	-2.3	<0.001 (0.63)	0.002 (0.03)	0.046 (0.14)

Table 3. Changes in fitness performance measures in the control (ST) and experimental (EMT) groups.
ST = Standard school-based Training group; EMT = Extracurricular Multilateral Training group; Δ = individual change. *Significantly different from baseline ($p < 0.05$). †Significant 'Time x Group' interaction = significant effect of the training program.

4. Discussion

This 8-week controlled after-school exercise intervention study showed improvements on the health- and skill-related components of physical fitness in 8 to 10-years-old children attending public primary schools in Apulia (Italy). Children who performed an extracurricular multilateral training program added to standard school-based physical

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education program (EMT group) showed a significant improvement in tasks requiring flexibility of the lower body (i.e., sit and reach), static balance (i.e., stork balance stand test), explosive leg power (i.e., standing long jump test) and general motor coordination (i.e., Harre test). Conversely, children who performed a standard school-based physical education program only (ST group), as required by the ministerial program (i.e., 2 lessons of approximately 50 minutes a week, consisting of ball games, running, jumping, and climbing activities) have not showed significant improvement in the static balance and leg power, whereas showed a small significant increase in performance in the flexibility of the lower body and general motor coordination.

The improvement in the EMT group in all the fitness performance tasks found in this study agrees with several previous studies (Fischetti & Greco, 2017; Kelder et al., 2005; Mears & Jago, 2016; Trost et al., 2008; Vandell et al., 2005) that have demonstrated the effectiveness of an after-school program in increasing PA levels as suggested by WHO (2010). In fact, our after-school intervention had the primary goal of increasing the levels of PA in children as recommended by WHO (2010), i.e. accumulating at least 60 minutes per day of moderate-to-vigorous intensity PA for 5 days a week, to improve one's physical fitness and avoid the risk of metabolic and cardiovascular diseases (Haapanen et al., 1997; Lau et al., 2007; Raitakari et al., 1994). Moreover, knowing that level of activity in adulthood did not depend on the type of PA at a young age but from intensive participation in general in PA and sports (Telama et al., 2005), we have specifically created a multilateral training program based on exercises that develop the conditional and coordinative motor abilities, respect the physiologic age and psychological maturation of youth, and improve physical fitness and conditioning (Bompa & Buzzichelli, 2018; Green, 2002; Haywood, 1991; McKenzie et al., 2003). However, improvement in ST group could be due to neuromuscular maturation which may also influence general motor coordination and fitness performance levels among 8 to 10-years-old children (Freitas et al., 2015).

Besides, with reference to the literature (Catuzzo et al., 2016; Lubans et al., 2010; Raitakari et al., 1994) and our own findings, the positive effects of the EMT on improving performance in physical fitness and general motor coordination can most likely be explained by the role of increased physical activity performed after school time. Conse-

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quently, all this could encourage engagement in lifelong physical activity (Cox, Schofield, & Kolt, 2010; Mathisen, 2016; Sallis et al., 2012; Salmon et al., 2007) seen that previous studies demonstrated that PA among children is believed to be insufficient (Andersen et al., 2006; Sleap & Warburton, 1996) and low levels of activity seem to persist into adulthood (Telama et al., 2005; Twisk, & Kemper, 2000). In effect, it must be said unfortunately that if a decade ago children preferred to be outdoors to play, today they prefer to stay in front of the TV or play video games, with the consequent gradual loss, over the years, of the development of fundamental movements and motor skills (Kimm et al., 2002) or reduction of the fitness performance in sports activities (Greco, Tambolini, Ambruosi & Fischetti, 2017). Despite all this, Italian children perform little physical activity both at school and after school (Italian Statistic Office, 2007; Leoni et al., 2008; Sacchetti et al., 2013) but our findings, supported by previous research (Kelder et al., 2005; Mears & Jago, 2016; Trost et al., 2008; Vandell et al., 2005), could be important in promoting PA, fitness, and lifestyle in children. Thus, it seems plausible to argue that it is crucial to promote PA at a young age and develop motor abilities including perceptual and physical factors (Fleishman et al., 1984; Green, 2002; Haywood, 1991; McKenzie et al., 2003; Notarnicola et al., 2012; Tammelin et al., 2003).

This investigation was subject to some limitations. First, the intervention was conducted in primary schools in Puglia (Italy), therefore, the results may not be generalizable to other areas of the country. Second, all participants accepted the intervention, thus the sample may be more motivated than the general school population, again limiting generalizability. Third, due to the reduced sample size, the results of the study should be interpreted with caution. Fourth, the short duration of the experimental intervention does not allow to adequately study what is caused by the manipulation of the independent variable. Finally, a further limitation of the present study is the lacking of a maturation status assessment of all participants before the start of the experimental research.

Despite these limitations, this study has many strengths. In fact, the present research provided novel findings in the field of the physical education. After-school intervention increased the levels of PA and improved the health- and skill-related components of physical fitness in children, giving them the opportunity to learn generalizable motor

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skills. Furthermore, an extracurricular multilateral training program could increase the probability of being active in later life and prevent the risks of metabolic and cardiovascular diseases, and obesity in school-aged children. Therefore, the study has reached the primary objective of the physical education which is to provide young with the opportunity to engage in pleasurable PAs and to become physically fit.

5. Conclusions

In summary, an 8-week after-school training program, added to standard school-based physical education program, caused great gains in flexibility of the lower body, static balance, explosive leg power, and general motor coordination in 8 to 10-years-old children. Findings highlighted the need to practice extracurricular sporting activities with a multilateral approach as at present the experience of PA in Italian children is frequently confined to voluntary participation in a few training sessions of out-of-school sport, which are insufficient to improve physical fitness. School is widely recognized as an important institution for the promotion of PA and fitness in youth, nevertheless, the Italian school-based interventions in promoting PA, fitness, and lifestyle in children and adolescents result poor. Therefore, we would need to plan social policies to develop extracurricular activities with a multilateral approach focused on exercises aimed to the development of the conditional and coordinative motor abilities, and multiple intelligences. In addition, all activities should be characterized by a predominantly playful approach to encourage enthusiasm, socialization and participation of youth in sports. Finally, through the qualified figure of the physical education teachers, this would be the best strategy to promote the lifelong physical activity and to help young people make informed lifestyle choices, develop proficiency in movement skills, and become physically fit.

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