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REGIONAL OBSERVATORY OF PHYSICAL FITNESS IN CHILDREN AND ADOLESCENTS IN SOUTHERN ITALY: A THIRTY-YEAR COMPARISON BETWEEN 1990-2020

REGIONALNI OBSERVATORIJ ZA TELESNO ZMOGLJIVOST OTROK IN MLADOSTNIKOV V JUŽNI ITALIJI: TRIDESETLETNA PRIMERJAVA V OBDOBJU 1990-2020

ABSTRACT

International literature showed that lower physical activity levels are associated with a progressive decline in physical fitness levels in children and adolescents over the past decades. The present cross-sectional study aims to assess trends in physical fitness levels among young adolescents in Lecce (Apulia region, Italy) comparing motor performances in 1990 and 2020. The sample consisted of 107 children attending the secondary school in Lecce in 1990, and 118 children attending secondary school in the same province in 2020, divided according to gender and BMI cut-off (normal weight and overweight/obese). Physical fitness assessment included standing long jump, medicine ball throw 2kg, 30-m dash and Cooper endurance running proposed both in 1990 and 2020. The analysis of variance (ANOVA) was performed to compare motor performances (1990 vs 2020) according to gender and BMI, and on total sample according to BMI; chi-square test was carried out to underline differences between Normal Weight, Overweight and Obese distribution in 1990 and 2020, and linear regression analysis was executed to investigate the variance in motor test explained by BMI, both in 1990 and 2020 groups. Results showed that: (a) sample in 1990 performed significantly better than those in 2020 in all of the above physical fitness test, independently for gender and BMI cut-off, (b) the percentage of overweight obese children has increased significantly from 1990 to 2020, and (c) BMI is a key factor influencing almost all motor performance in 2020.

Keywords: healthy lifestyles, obesity, physical fitness test, regional observatory

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IZVLEČEK

Mednarodna literatura je pokazala, da je nižja raven telesne dejavnosti povezana s postopnim upadanjem telesne zmogljivosti otrok in mladostnikov v zadnjih desetletjih. Namen pričujoče presečne študije je oceniti trende v ravneh telesne zmogljivosti med mladostniki v mestu Lecce (regija Apulija, Italija), s primerjavo gibalnih dosežkov v letih 1990 in 2020. Vzorec je bil sestavljen iz 107 otrok, ki so leta 1990 obiskovali srednjo šolo v mestu Lecce, ter 118 otrok, ki so leta 2020 obiskovali srednjo šolo v isti pokrajini, razdeljenih glede na spol in mejo indeksa telesne mase (normalna teža in prekomerna teža/debelost). Ocena telesne zmogljivosti je vključevala skok v daljino z mesta, met medicinke (2 kg), tek na 30 m in 12 minutni Cooperjev tek, predlagan tako leta 1990 kot leta 2020. Analiza variance (ANOVA) je bila izvedena za primerjavo gibalnih zmogljivosti (1990 proti 2020) glede na spol in indeks telesne mase ter na celotnem vzorcu glede na indeks telesne mase; test hi-kvadrat je bil izveden za poudarjanje razlik med porazdelitvijo normalne teže, prekomerne teže in debelosti v letih 1990 in 2020, linearna regresijska analiza pa je bila izvedena za preučevanje variance v gibalnem testu, ki jo pojasnjuje indeks telesne mase, tako v skupini 1990 kot 2020. Rezultati so pokazali, da: (a) vzorec iz leta 1990 se je pri vseh zgoraj navedenih testih telesne zmogljivosti, neodvisno od spola in mejne vrednosti indeksa telesne mase, odrezal bistveno bolje kot vzorec iz leta 2020, (b) delež otrok s prekomerno telesno težo in debelostjo se je od leta 1990 do leta 2020 bistveno povečal in (c) indeks telesne mase je ključni dejavnik, ki vpliva na skoraj vse motorične sposobnosti v letu 2020.

Ključne besede: zdrav življenjski slog, debelost, meritve telesne zmogljivosti, tegionalni observatorij

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INTRODUCTION

Overweight and obesity are both specific causes of premature death in adulthood (Bhaskaran et al., 2018). The progressive reduction in physical activity levels (PAL) in children and adolescents contributes to enhance sedentary lifestyles and the consequent development of non-communicable diseases (Zhang et al., 2019), increases the likelihood of cardiovascular events (Umer et al., 2017), contributes bone demineralization and osteoporosis (Pinheiro et al., 2020), increases sarcopenia (Rosique-Esteban et al., 2019), and it has negative effects on body composition management and muscle strength loss (Rosique-Esteban et al., 2019).

The World Health Organization (WHO) recommends at least 60 minutes per day of moderate to vigorous aerobic physical activity (MVPA) and activities that strengthen muscle and bones for children and adolescents between the ages of 5 and 17 years (Bull et al., 2020). However, most children and adolescents at those ages do not meet the international guidelines and recommendations (Guthold et al., 2020). A cross-sectional survey which included 298 schools from 146 countries highlighted that about 81% of the students aged 11-17 years were insufficiently physically active in 2016, with no significant differences between low-income countries (84.9%), lower-middle-income countries (79.3%), upper-middle-income countries (83.9%) and in high-income countries (79.4%; Guthold et al., 2020).

Sedentary habits in childhood and youth have determined a dangerous circular process, which generates low levels of physical activity, reduces the participation in sports or recreational activities, and it had consequent negative effects on motor skills, learning, and physical fitness levels (Faigenbaum, Rebullido & MacDonald, 2018). Findings highlighted that lower levels of physical activity and higher BMI values are associated with lower physical fitness levels, more significant in boys than in girls (Colley et al., 2019; Dong et al., 2019; Milanovic et al., 2019), and in 13-14 years old adolescents (Pate et al., 2019). Daily practice of physical activity and healthy lifestyles reduces the overweight and obesity levels (Al-Khudairy et al., 2017), improves muscle strength and functionality of the cardiovascular and lymphatic systems (Abrignani et al., 2019; Alves & Alves, 2019), contributes to the psycho-physical well-being of young people (Hosker et al., 2019), and it enhances cognitive and emotional development of children and adolescents (Singh et al., 2019; Rodriguez-Ayllon et al., 2019).

International literature showed that lower physical activity levels are associated with the progressive decline in physical fitness levels in children and adolescents over the past decades (Monacis & Colella, 2018). In a recent systematic review Fühner et al. (2021) analyzed secular

trend (1972-2015) in physical fitness in children and adolescents aged 6-18 years. Results highlighted the progressive decline in cardiorespiratory endurance and muscle power between 1986 and 2010-2012, with a small increase in muscle strength and speed. Studies revealed an increase in BMI values, a decline in the 20mSRT (20 meters shuttle run test) performance (Tomkinson et al., 2003), a reduction of cardiorespiratory fitness (Johansson et al., 2020), standing long jump, sit-and-reach, 50-m dash, endurance running (Bi et al., 2020), and, more generally, lower levels of muscle flexibility, strength and aerobic capacity (Venckunas et al., 2017).

Data from HBSC international report (Health Behaviour In School-Aged Children), which aimed to monitor and understand young children's health in around 50 countries in Europe and North-America, showed a progressive decline in MVPA levels in several countries since 2014, with only about 20% of adolescents achieving the international guidelines and recommendations on physical activity. Moreover, there was a high percentage of young people who still consume soft-drinks, physical activity participation decreased proportionally with age in both male and female, and one in five adolescents was overweight or obese (HBSC, 2020).

The results are even more worrying when referring to the Italian population, where findings revealed low levels of daily vegetables and fruits intake (about 27% of young people), the lowest levels of daily moderate to vigorous physical activity (together with Portugal and France), and the higher levels of electronic-media communication, especially in 15-year-old girls (about 63%).

These data have been confirmed by the latest ISTAT report (National Institute of Statistics) referred to 2017-2018, showing that more than 2 million children and adolescents in Italy were overweight (25.5% of the children aged 3-17 years), with a clear prevalence in boys, 27.8% compared to 22.4% of girls. Although from 2010-2011 to 2017-2018 there was a small reduction in the number of obese overweight children (28.5% in 2010-2011 compared to 25.2% in 2017-2018) and in the percentage of children and adolescents who do not engage in physical activity (25.7% in 2010-2011 and 22.7% in 2017-2018), the percentage of the youngest who do not participate in any sport or kind of physical activity during free time were about 1 million 925 thousand, equal to 22.7% of the Italian population aged 3-17 (ISTAT, 2019). Furthermore, Italy together with Cyprus, Spain, Greece and Malta are the countries with the highest percentage of overweight and obese children aged 7-8 years (ISTAT, 2019). In Italy the

prevalence of insufficient physical activity increased from 82.9% to 85.9% in boys and from 90.6% to 91.6% in girls from 2001 to 2016 (Guthold et al., 2020).

A further surveillance system on overweight and obesity and related risk factors in primary school children (6-10 years), named OKkio alla SALUTE (coordinated by the National Centre for Disease Prevention and Health Promotion) provided a more detailed characteristics and evolution on eating habits, levels of physical activity and weight status in relation to geographical variability in Italy (Nardone & Spinelli, 2020). The last report referred to 2019 showed that in Italy the percentage of overweight and obese children was 20.4% and 9.4% respectively: higher levels were found only in Spain, Greece and Cyprus.

Despite the progressive decline in the percentage of overweight (23.2% in 2008/2009, 23.0% in 2010, 22.2% in 2012, 20.9% in 2014, 21.3% in 2016 and 20.4% in 2019) and obese young people (12.0% in 2008/2009, 11.2% in 2010, 10.6% in 2012, 9.8% in 2014, 9.3% in 2016 and 9.4% in 2019), and the maintenance of stable physical activity levels, the situation remains critical (Nardone & Spinelli, 2020). Especially in Southern Italy (Campania, Apulia, Calabria, Sicily) it was found the highest prevalence of the percentage of overweight and obese children with 32.7%, against the 18.8% and the 22.5% of the North-West and the North-East of the country, respectively (ISTAT, 2019; Nardone & Spinelli, 2020).

Previous studies based on the monitoring of motor performances in Apulia showed lower physical fitness health-related components (strength, speed and aerobic capacity) in 9-10 years old overweight and obese children, associated with lower levels of perceived self-efficacy and enjoyment than normal weight (Colella, Monacis & d'Arando, 2020; Colella et al., 2020).

The Regional Observatory of motor performances in Apulia Region (Southern Italy) aimed at assessing the physical fitness levels monitoring the health status of children and young adolescents: data collected can be used in scientific research, in physical education and clinical facilities to develop guidelines, recommendations, national and international policy supporting the promotion of physical activity and healthy lifestyles. Moreover, it offers the opportunity to acquire periodically quanti-qualitative data on evolution of physical fitness and health-related components in different geographical areas, assessing the effectiveness of scholastic, institutional, and sport interventions aimed at promoting physical activity.

Therefore, this study aims to assess (a) trends in physical fitness levels, according to gender and BMI among young adolescents in Lecce (Apulia region, Italy), comparing motor

performances in 1990 and 2020, and (b) evaluate the BMI's influence on motor performances in 1990 and 2020.

METHODS

Sample

Data for the present cross-sectional study were collected from the Regional Observatory of Motor Performances in Apulia Region (Italy) and coordinated by the University of Foggia (Italy) - Laboratory of Motor Activities, aimed at monitoring physical efficiency levels related to the health status of adolescents in secondary school. The sample consisted of 107 children attending secondary school in Lecce (Apulia province) in 1990, and 118 children attending secondary school in the same province in 2020. Table 1 contains the anthropometric data (height, weight, BMI) of the participants, according to gender and BMI value (normal-weight or overweight/obese).

Table 1. Anthropometric characteristic of the sample (mean±SD). Nw= normal weight, Ow-Ob= overweight-obese.

				1990		
		N	**Age (years)**	**Weight (kg)**	**Height (meters)**	**BMI (kg/m^2)**
Male	**Nw**	54	11.17±0.50	40.38±7.32	1.50±0.07	17.69±2.17
	Ow-Ob	3	11.67±1.15	54.33±1.52	1.52±0.07	23.57±1.49
Female	**Nw**	45	11.02±.33	40.60±7.46	1.49±0.05	17.96±2.55
	Ow-Ob	5	11.20±0.45	60.20±9.98	1.51±.05	26.28±3.04
				2020		
Male	**Nw**	42	11.60±0.49	40.32±7.84	1.50±0.08	17.73±2.14
	Ow-Ob	21	11.62±0.49	58.54±10.47	1.52±0.06	24.98±3.29
Female	**Nw**	29	11.24±0.43	40.64±7.75	1.51±0.08	17.45±1.89
	Ow-Ob	26	11.62±0.50	59.38±8.19	1.53±0.05	25.04±2.90

Procedure

After extracting 1990 monitoring data, four classes were randomly selected in 2020 from the same school (Lecce, Apulia) where data were carried out in 1990. The study was conducted recruiting data from anthropometric and physical fitness assessment in children attended the first year of secondary school in 1990 (from the Regional Observatory of Motor Performances' archive) and providing the same assessment on children attending the first grade of secondary school in 2020 in the same school. The anthropometric assessment was conducted in 1990 and in 2020, as follows:

- Standing height and body weight were measured using a calibrated stadiometer and a balance scale (nearest 0.1 cm), respectively. BMI was obtained by dividing the body weight (kg) by the body height squared (m2). After measuring weight and height, and calculating BMI value, children were classified as normal weight (Nw) or overweight-obese (Ow-Ob) using the cutoff points for assessing the prevalence of overweight and obesity in children and adolescents (Cole et al., 2000).

Four items were measured to assess physical fitness including standing long jump, medicine ball throw 2kg (lower and upper limbs strength), 30-m dash (speed), and Cooper endurance running (aerobic capacity), proposed both in 1990 and 2020 as follow:

• Standing Long Jump (SLJ): the student stands behind the starting line, previously drawn on the platform for the long jump or in the gym. From here with the lower limbs slightly apart on the front plane, the student performs a long jump by performing a semi-bend on the legs, swinging the arms to the front, and landing on sand or mat. It is measured from the starting line to the nearest mark left by the feet or other part of the body, on the sand or mat. If the long jump does not leave a mark on the sand, it is important to pay attention to the landing of the heels on the floor or on the mat. The student performs three attempts, and the best one is used for the analyses (Council of Europe-Committee for the development of sport, 1988). In this study the long jump was performed on the mat both in 1990 and in 2020.

• Medicine Ball Throw 2kg (MBT 2kg): the student stands with his feet slightly apart behind a line drawn on the floor, with his arms high and holding a medicinal ball in his hands. From this position, after performing a semi-bending from the lower limbs, the student throws the medical ball as far as he can. Three attempts are carried out and the best result is used for the analyses (Morrow et al., 2015).

• 30-m dash (30-m): The student gets into the starting position with both feet behind a line. After a signal, the student runs as fast as possible to the other line and crosses with both feet. The time is measured in seconds (i.e. 7.56 s) from the start to the moment after which the student passes the end line. The student performs three tests and only the best result is used for analyses (Morrow et al., 2015).

• Cooper Test (Cooper): The student runs (or walks) for 12 minutes covering as much distance as possible. The student is notified with a signal at each stage (a stage is represented by a field tour of the school gym where the test took place), and 30 seconds before the end of the test. At the end of the test, the student must stop at the point where he is and stay there until the end of the measurement of the section covered. The test is performed once (Council of Europe-Committee for the development of sport, 1988).

Three Experts in physical education and motor sciences were recruited by the Laboratory of Didactic of Motor Activities and trained to standardize procedure and test protocol. Assessment was conducted during physical education lessons during January 2020.

Statistical Analysis

Kolmogorov–Smirnov test was used to verify the normal distribution of data, and descriptive statistic was carried out to present the results as Means ± SD. After verifying homoscedasticity condition (Levene's test), two-sample t-test was performed to compare motor performances (1990 vs 2020) according to gender and BMI, and on total sample according to BMI. The effect size (ES; ηp2) was reported for estimating the size of the differences detected, interpreting the values as follows: ηp2 ~ .20 = low ES, ηp2 ~ .50 = medium ES, and ηp2 ~ .80 = high ES (Cohen, 1988). Chi-square test was carried out to underline differences between Normal Weight, Overweight and Obese distribution in 1990 and 2020. Linear regression analysis was executed to investigate the variance in motor test explained by BMI, both in 1990 and 2020. Data analysis was conducted with SPSS ver.25. All significance levels were set at $p<.05$.

RESULTS

The data obtained from physical fitness test of children and adolescents in Lecce for 1990 and 2020 are presented in Table 2. Results showed that males in 1990 performed significantly better than those in 2020 in SLJ, both in normal weight ($p=.016$) and overweight-obese ($p=.049$, ηp2=

.162 that implies a small ES), MBT 2Kg only normal weight (p<.002) and Cooper Test (p=.000, ηp2= .176 in Nw group; p=.018, ηp2= .230 in Ow-Ob group).

Data analysis revealed better results of the sample of females in 1990 in SLJ (p=.000, ηp2= .256 in Nw; p=.051, ηp2= .134 in Ow-Ob group) and MBT 2Kg (p=.000, ηp2= .206 in Nw; p=.001, ηp2= .319 in Ow-Ob), which indicated a decline in lower and upper limbs strength. Females in 1990 also performed better in the Cooper test (p=.000, ηp2= .265 in Nw; p=.003, ηp2= .264 in Ow-Ob).

After analyzing the data on the total sample according to BMI Cutoff, it was shown that children in 1990 had better motor performance regardless of the BMI (Nw or Ow-Ob) except in the 30m sprint.

Table 2. Differences in Physical Fitness Tests in 1990 and 2020; *m* = meters, *s* = seconds.

			Measures							
			1990		**2020**					
			M	SD	M	SD	F	df	p	ηp^2
Male	**SLJ (m)**	**Nw**	1.57	.23	1.46	.24	6.015	1	*.016*	.060
		Ow-Ob	1.23	.22	1.20	.20	4.253	1	*.049*	.162
	MBT2kg (m)	**Nw**	4.88	.87	4.24	1.05	10.591	1	*.002*	.101
		Ow-Ob	4.70	1.15	4.10	.76	1.408	1	*.248*	.060
	30-m (s)	**Nw**	5.45	.48	5.43	.61	.018	1	*.893*	.000
		Ow-Ob	5.94	.56	6.05	.72	.064	1	*.803*	.003
	Cooper (m)	**Nw**	1793.35	316.58	1491.19	340.63	20.136	1	*.000*	.176
		Ow-Ob	1466.67	288.67	1206.95	145.90	6.575	1	*.018*	.230
Female	**SLJ (m)**	**Nw**	1.43	.18	1.21	.18	24.828	1	*.000*	.256
		Ow-Ob	1.38	.24	1.10	.22	4.171	1	*.051*	.134
	MBT2kg (m)	**Nw**	4.31	.72	3.64	.48	18.737	1	*.000*	.206
		Ow-Ob	5.01	.75	3.83	.63	13.560	1	*.001*	.319
	30-m (s)	**Nw**	5.82	.49	5.85	.62	.072	1	*.079*	.001
		Ow-Ob	6.69	.97	6.20	.65	1.953	1	*.173*	.063
	Cooper (m)	**Nw**	1594.23	231.67	1265.79	231.67	25.898	1	*.000*	.265
		Ow-Ob	1420.00	178.88	1116.08	194.87	10.426	1	*.003*	.264
Total	**SLJ (m)**	**Nw**	1.51	.21	1.36	.25	17.699	1	*.000*	.095
		Ow-Ob	1.42	.22	1.15	.21	8.599	1	*.005*	.144
	MBT2kg (m)	**Nw**	4.62	.85	4.00	.91	20.792	1	*.001*	.110
		Ow-Ob	4.89	.85	3.95	.70	11.439	1	*.001*	.178
	30-m (s)	**Nw**	5.61	.52	5.60	.64	.016	1	.898	.000
		Ow-Ob	6.41	.88	6.14	.68	.987	1	.325	.018
	Cooper (m)	**Nw**	1702.74	320.49	1399.13	319.20	37.232	1	*.000*	.181
		Ow-Ob	1437.50	206.60	1156.68	178.83	16.144	1	*.000*	.233

The sample's distribution according to the BMI Cutoff showed that (a) the percentage of Ow increased significantly from 5.3% in 1990 to 20.6% in 2020 for male (X2= 6.250, p=.012) and from 4.0% in 1990 to 34.5% for female (X2= 13.762, p=.000); (b) the percentage of the normal weight on total sample decreased significantly from 92.5% to 60.2% (X2= 4.612, p=.032),

while the percentage of overweight and obese children increased from 4.7% to 27.1% (X2= 19.703, p=.000) and 2.8% to 12.7% (X2= 8.000, p=.005) respectively.

Table 3. Sample's Distribution According to BMI Cutoff.

Prevalence of Normal Weight-Overweight and Obese Children								
		1990		**2020**		***X²***	***df***	***p***
		n	**%**	**n**	**%**			
Male	**Nw**	54	94.7	42	66.7	*1.500*	*1*	*.221*
	Ow	3	5.3	13	20.6	*6.250*	*1*	*.012*
	Ob			8	12.7	*/*	*/*	*/*
Female	**Nw**	45	90	29	52.7	*3.459*	*1*	*.063*
	Ow	2	4.0	19	34.5	*13.762*	*1*	*.000*
	Ob	3	6.0	7	12.7	*1.600*	*1*	*.206*
Total	**Nw**	99	92.5	71	60.2	*4.612*	*1*	*.032*
	Ow	5	4.7	32	27.1	19.703	1	.000
	Ob	3	2.8	15	12.7	8.000	1	.005

Regression analysis showed that in 1990, the BMI was significantly related to the MBT 2Kg (b= .213, p=.027), of the total variance, and 30m sprint (b= .421, p=.000), explaining 4.6% and 17.7% of the variance, respectively. In 2020 BMI negatively influenced the SLJ (b= -.329, p=.000; 10.8% of total variance explained), the 30-m sprint (b= .333, p=.000; 11.1% of total variance) and Cooper test (b= .366, p=.000; 13.4% of total variance).

Table 4. Incidence of BMI on Physical Fitness Test in 1990 and 2020.

Regression Analysis Between BMI and Motor Fitness Test										
	BMI in 1990					**BMI in 2020**				
	b	**R^2**	**F**	**df**	***p***	**b**	**R^2**	**F**	**df**	***p***
SLJ (m)	-.190	.036	3.971	1	.052	-.329	.108	14.092	1	.000
MBT 2Kg (m)	.213	.046	5.006	1	.027	.118	.014	1.141	1	.202
30m Sprint (s)	.421	.177	22.607	1	.000	.333	.111	14.498	1	.000
Cooper (m)	-.168	.028	3.061	1	.083	-.366	.134	17.952	1	.000

DISCUSSION

The present study compared results from physical fitness tests in children attending the first year of the secondary school in Lecce in 1990 and in 2020. It is important to underline the statistically significant difference in the distribution of the sample: the percentage of overweight-obese in boys went from 5.3% in 1990 to 33.3% in 2020, while in girls there was an increase from 10.0% to 47.2%. The significant increase in the proportion of overweight and obesity is reflected in lower children's motor performances in 2020 in contrast to 1990.

The results showed a progressive reduction and decline in motor performance from 1990 to 2020, both in boys and girls regardless of BMI. In addition, in this study, there were greater differences in girls than boys. The results of motor tests showed that children, whether with a normal weight or overweight-obese, were stronger (SLJ, MBT 2Kg and Cooper) and more resistant in 1990 than children in 2020; there were no significant differences in speed test.

In addition, the BMI explained part of the variance of the MBT 2kg and 30-m sprint in 1990, and it negatively influenced the SLJ, the 30-m sprint and the Cooper test in 2020. The role of BMI in influencing the expression of children's motor abilities in 2020 is highlighted.

The results of this study are partly confirmed by other previous studies. Eberhardt et al. (2020) analyzed secular trend in physical fitness on endurance, strength, speed, flexibility and coordination in children aged 4-18 years. Most studies revealed a decline in physical fitness level over time, especially for endurance, strength and flexibility, while no changes were reported for speed and coordination.

Shigaki et al. (2019) reported negative secular trend in cardiorespiratory fitness from 2002-2005-2010 both in girls and boys aged 7-10 years, and reduced flexibility in boys over years, while no differences were found in abdominal endurance.

A recent systematic review of the literature analyzed secular trends (from 1972 to 2015) on different components of physical fitness (cardiorespiratory endurance, relative muscle strength, muscle power and speed) in children and adolescents aged 6-18 years (Fühner et al., 2021). The 22 studies that met the inclusion criteria showed the following results: cardiorespiratory endurance increased until 1986 and decrease until 2010-2012, muscle strength declined initially from 1982 and increased until 2006, muscle power reduced over time, and speed small increased (especially in recent years).

On the contrary to the trends highlighted so far, Potočnik et al. (2020) showed a positive improvement of physical fitness in Slovenian children (7-10 years) from 1989 to 2019, with a higher increase in girls than in boys. Another Slovenian study (Đurić et al., 2021) showed an inverse trend between anthropometric measures (increase) and physical fitness test (declined): authors highlighted a progressive decrease in lower and upper limbs power. The higher negative changes were found in the decade from 1993/1994 to 2003/2004.

Recent findings focused on the importance of physical activity on aerobic capacity and muscle strength in children and adolescents having positive effects on different health markers, such as BMI, waist circumference, and body composition (Fühner et al., 2021).

In addition, in the light of epidemiological data related to increased overweight and obesity, the reduction of children's aerobic capacity and cardiorespiratory endurance was particularly significant and alarming: cardiorespiratory fitness was among the most important factors and indicators of health status in children and adolescents (Padilla-Moledo et al., 2020). Further evidence showed the positive and moderate relation between cardiorespiratory fitness and academic achievement, while there were no consistent evidence of strength and flexibility (Santana et al., 2017).

Trends in the reduction of motor performance levels, together with the increase in BMI, represent a global health problem, and, specifically, the entire school-educational, political, cultural and health system of Apulia. In a recent systematic review and meta-analysis García-Hermoso et al. (2020) examined the effects of quanti-qualitative physical education programs on physical fitness outcomes and fundamental movement skills in children and adolescents. Results highlighted that quality-based physical education intervention were associated with a small increase on cardiorespiratory fitness, muscle strength, and fundamental movements skills. The authors suggested that, despite the benefits of quality physical education in children and adolescents from 1980 to 2000, further opportunities would be needed to encourage physical activity, such as active breaks, active lessons, active transport, etc.

The quality of physical education and the opportunities for children to be physically active are a key element not only in reducing the rate of overweight and obesity, but also, and above all, in promoting children's health. According to Brian et al. (2020), the increase in overweight and obesity is closely related to reduced individual motor skills repertoire (i.e. run, jump, dribbling, kick a ball, throw and catch, etc.), and this contributes to further limit the quanti-qualitative opportunities for children to be physically active. The authors highlighted the importance of

unstructured play and structured motor experiences to encourage the learning of increasingly complex motor skills, moving from stability (i.e maintenance of upright posture) to mobility (i.e. walking, running, etc.), and acquiring an increasing motor competency and proficiency in different activities across the lifespan.

In this context, teacher training plays a key role in health promotion: when the teacher proposes a motor task (i.e. running, throwing and catching a ball, balancing, etc.), each motor skills develop a series of different motor abilities (strength, flexibility, speed, coordination and endurance; Van Hooren & De Ste Croix, 2020), capable of improving physical efficiency and participation in any type of physical activity, unstructured and structured play, sports, recreational, fitness, etc.

CONCLUSION

The Regional Observatory of motor performance focuses on monitoring and improving the health of children and adolescents through social, cultural, and institutional policies, concentrating on the real awareness of the risks, deriving from unhealthy behaviors and sedentary lifestyles.

This study – analyzing two independent sample in 1990 and 2020 - suggests continuity to the progressive decline in physical fitness levels, and the increase in the overweight/obese rate over the past 30 years with the following considerations:

(a) The systematic assessment of children's physical fitness plays a fundamental role allowing to acquire transversal and longitudinal data on the evolution of motor performances, necessary to customize the educational actions;

(b) It is important that physical education teacher's training includes organizational methods and teaching styles, and the physical (motor skills and motor abilities), psychological and social effects of physical activity;

(c) The implementation of good practice for evidence-based teaching of areas linked to motor activities, motor learning, and sport introduction is essential during childhood;

(d) The progressive reduction of children's opportunities to play and be physically active, together with the evolution of school physical education (PE) curricula, requires constant PE teachers' training to better promote quantitative-qualitative PE experience.

Future research perspectives may proceed in different but complementary directions: first the study of trends related to motor performance in different ages, then the proposal and implementation for evidence-based intervention protocol aimed at enhancing not only motor performance but also the underlying psychological and social factors.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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