PHYSICAL FITNESS AND BODY WEIGHT IN PRE-ADOLESCENT SCHOOL CHILDREN: THE EUROFIT MOTOR FITNESS TEST EXPLORED ON 11-12-YEAR-OLD CHILDREN

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ABSTRACT

Nowadays, the early prevention of obesity in childhood is one of the most critical public health issues. More than half of children and adolescents worldwide do not meet the recommendation of 60 minutes of moderate to vigorous physical activity per day. This trend can reduce physical fitness and, consequently, cause a decrease in the quality of life throughout the lifespan. Physical fitness, defined as a set of abilities to perform physical activity and exercise (such as aerobic capacity, endurance, strength, flexibility), is considered one of the most important health markers in adulthood and childhood as well as adolescence. Methods: We conducted a cross-sectional study to investigate the physical fitness of pre-adolescent children of the Emilia-Romagna region. Children's anthropometric parameters (height and weight) and physical fitness levels - assessed via the EUROFIT test battery - were measured. In all of the applied EUROFIT tests, children's performance was below the sufficient age and gender values. Moreover, it was negatively associated with obesity.
Our research provided evidence that the general fitness of our sample was low and the performance of overweight/obese children was lower compared to the under/normal weight students.

Keywords: physical activity, body mass index, obesity, pre-adolescents, physical education

INTRODUCTION

The level of sedentariness is increasing around the world, especially in children and young people (Lobstein & Jackson-Leach, 2006; Jackson-Leach & Lobstein, 2006; Rijpstra, de Vries, Slinger, & L'Hoir, 2014). Indeed, children spend about 600 calories/day less than the children of 60 years ago (Boreham & Riddoch, 2001). In recent years, a great effort, of both local governments and the World Health Organisation (WHO), to sensitise people on the increment of physical activity across their lifespan has been made. For instance, WHO suggests that children and adolescents should perform at least 60 minutes of moderate- to vigorous-intensity physical activities every day to have a good state of health (Hallal, Andersen, Bull, Guthold, Haskell, Ekelund, 2012; Hubbard, Economos, Bakun, Boulos, Chui, Mueller, Smith, Sacheck, 2016; WHO, 2010). This reduction of physical activity is due to a constant change of lifestyles, such as increasing the time spent on low-active video games and watching television (Datar & Nicosia, 2012; Dixon, Scully, Wakefield, White, & Crawford, 2007; Giontella,

Bonafini, Tagetti, Bresadola, Minuz, Gaudino et al., 2019; Rey-Lopez, Vicente-Rodriguez, Biosca, & Moreno, 2008). This may reduce physical fitness and, consequently, reduce the quality of life throughout the lifespan (Bize, Johnson, & Plotnikoff, 2007; Shoup, Gattshall, Dandamudi, & Estabrooks, 2008). This is of particular concern as physical fitness, defined as a set of abilities to perform physical activity and exercise without fatigue (such as aerobic capacity, endurance, strength, flexibility), is considered one of the most important health markers not only in adulthood but also in childhood and adolescence (Ortega, Ruiz, Castillo, & Sjöström, 2008). Physical fitness represents a set of abilities that an individual has to achieve in order to perform PA efficiently. A high physical fitness level in childhood is considered essential for the maintenance of good health and general well-being. According to evidence, increased physical fitness level is related to favourable body composition, improved skeletal health, protection against cardio-metabolic risk factors (e.g., hypertension and dyslipidemia), as well as improved mood, psychological health, academic performance and the quality of life (Ortega et al., 2008). Physical fitness is, in part, genetically determined, but environmental factors can significantly influence it, and regular physical activity is one of the main determinants (Ortega et al., 2008).
For last issue, it is worth mentioning that obesity in infants, children and adolescents is rising in Europe (including Italy) and many children, who are not yet obese, are overweight and on the pathway to obesity. According to several investigations, it is very likely that people become obese or overweight in adulthood (Barba, Troiano, Russo, & Siani, 2006, Hruby et al., 2016; Guerra, Teixeira-Pinto, Ribeiro, Ascensão, Magalhães, Andersen et al., 2006).
Thus, nowadays, the early prevention of obesity in childhood is one of the most critical public health priorities. As previously said, WHO physical activity suggestions (Matínez-Vizcaí & Sánchez-López, 2008), may contribute to increase the physical fitness and reduce the incidence of the issues mentioned above. Considering the importance of reaching high levels of physical fitness in childhood, as well as the correlation between performance and well-being, the present study aimed to investigate physical fitness and body composition on a sample of first-grade middle-school children in the Emilia-Romagna region (Italy) to compare whether their physical fitness was in line with the EUROFIT test (Adam, Klissouras, Ravazzolo, Renson, Tuxworth, Kemper et al, 1987).

Besides, we explored the relation between the performance in various physical fitness tests and anthropometric parameters (e.g., BMI). This specifically chosen sample may allow developing some acceptable practices for both primary, middle and secondary school teachers.

MATERIALS AND METHODS

Study design, participants and setting

We conducted a cross-sectional study to investigate the physical fitness of pre-adolescent children of the Emilia-Romagna region. The study was carried out between November 2017 and January 2018. The study was conducted according to the Declaration of Helsinki, and it was approved by the local bioethics committee, the school board and the municipality of the two cities involved in the project. The parents were asked for permission to use the children's personal data and they signed an informed consent form in order to participate in the study.

EUROFIT battery test

The EUROFIT battery tests analysed several physical abilities such as strength, speed, endurance and flexibility. In particular, the tests included in the study were: the sit-up test, the standing broad jump test, the sit and reach test, the shuttle run test and the Cooper test.
1. In the "sit-up test", participants had to perform as many sit-ups as possible in 30 seconds. This test measures trunk strength;
2. In the "sit & reach", in a seated position with the knee completely extended and feet placed against a vertical support, the participants had to reach the toes and, if possible, to move past them. This test measures trunk flexibility and general flexibility;
3. In the "standing broad jump", the participants had to jump as far as they can from a standing position, and it measures the explosive leg power and lower limb muscle strength;
4. In the "shuttle run test", students had to perform a sprint of 10 meters for 5 times as fast as they can. This test measures running speed and agility;
5. In the "Cooper test", by contrast, they had to run for twelve minutes, trying to cover as much distance as possible. This test measures endurance abilities and cardio-respiratory fitness of the pre-adolescent.

Procedure

Physical fitness tests were performed during the physical education lessons, and they were supervised by the researchers involved in the project. All children received the same instructions before undertaking the EUROFIT physical fitness tests. For each test, except for the Cooper test, we collected the values from three trials, and only the best one was recorded for the analysis. Anthropometric characteristics (height and weight) were collected according to standardised procedures (Weiner, Lourie, 1998).

Height was measured to the nearest 0.1 cm using a portable stadiometer (SECA 217, SECA: Hamburg, Germany). We measured the body weight to the nearest 0.1 kg (light indoor clothing, without shoes)

using a calibrated electronic scale (SECA 877: Hamburg, Germany). BMI was calculated as weight (in kilograms) divided by the square of height (metres). This index was used to assess each participant's weight status according to Cole's cut-off values considering sex and age differences, dividing the sample into underweight/normal weight and overweight/obese children (Cole & Lobstein, 2012; Cole, Flegal, Nicholls & Jackson, 2007).

Data analyses

Descriptive analyses, through the RStudio software (1.2.5042 - www.rstudio.com), were performed to understand the participants' general level of physical fitness. In particular, according to the age and gender, one-sample t-tests for each of the tested physical abilities were performed to match the participants' performance with sufficient value of the EUROFIT guidelines. In order to analyse the differences between overweight/obese and normal-weight students, for each physical fitness test, a linear regression analysis was run with the single-factor IOTF category (under/normal weight and overweight/obese, 2 levels). Moreover, we controlled the effect of gender, analysing the interaction of IOTF category x gender (2 levels). For multiple comparisons, when necessary, post-hoc analyses with a Bonferroni correction were performed.

RESULTS

Five hundred and forty-nine (542) middle-school pre-adolescent children who attend the first grade were recruited (age range between 11 and 12 years old, mean age M = 11.46, SD = 0.34). In particular, 274 were female, and 268 were male. Children's descriptive characteristics, in total and by gender, are presented in Table 1. Stratifying the children by BMI categories, in the whole study sample, 69% of the children were under/normal weight, while the 31% were overweight/obese. The percentage of both normal-weight females and males was similar (70% VS 65%, respectively). In addition, Table 1 shows the number of participants for each physical fitness test.

Physical fitness tests

Sit-up test

One-sample t-test analysis revealed that 11-year-old female students were able to reach the sufficient EUROFIT value. In particular, students were able to perform M = 18.77 (SE = 0.35) sit-ups (19; t (145) = 0.65, p = .52). On the contrary, 12-year-old female students were not able to reach the discrete EUROFIT value (M = 17.73, SE = 0.34 sit-ups VS 20 sit-ups; t (121) = 6.57, p < 0.001). The results of 11-year-old males revealed that they were not able to reach their discrete EUROFIT value (M = 19.92, SE = 0.43 sit-ups VS 21 sit-ups; t (139) = 2.48, p = 0.014). On the contrary, twelve-year-old male students were able to reach the discrete value (M = 20.33, SE = 0.44 sit-ups VS 21 sit-ups; t (121) = 1.51, p < 0.001).

Data analysis on the differences between under/normal weight and overweight/obese students revealed better performance for under/normal weight students than overweight/obese students (M = 19.96, SE = 0.24 sit-ups VS M = 17.64, SE = 0.36 sit-ups, F (1, 523) = 45.18, η_p^2 = .08, p < 0.001).

Interaction of IOTF category x gender revealed a statistically significant difference (F (2, 520) = 13.54, η_p^2 = .05, p < .001). Post-hoc analysis revealed that both under/normal weight females and males performed better than their overweight/obese counterparts (Females: t (523) = 3.51, p = .003; M = 18.92, SE = 0.29 sit-ups VS M = 16.78, SE = 0.43 sit-ups; Males: t (523) = 4.83, p < 0.0001, M = 21.11, SE = 0.36 sit-ups VS M = 18.31, SE = 0.53 sit-ups,). Under/normal weight male students performed better than under/normal weight females (t (523) = 4.72, p < 0.0001, M = 21.11, SE = 0.36 sit-ups VS M = 18.92, SE = 0.29 sit-ups), while no differences emerged between overweight/obese females and males (t (523) = 4.72, p < 0.001, M = 16.78, SE = 0.43 sit-ups VS M = 18.32, SE = 0.53 sit-ups; see Table 2 for a summary of the results).

Standing broad jump test

The standing broad jump test revealed that both 11- and 12-year-old female children were not able to reach the sufficient value (t (144) = 3.72, p = 0.0003; M = 138.73, SE = 1.96 cm VS 146 cm; t (121) = 8.34, p < 0.0001; M = 134.96, SE = 2.05 cm VS 152 cm, respectively). Also, 11- and 12-year-old males were not able to reach the sufficient value (t (138) = 4.46, p < 0.0001, M = 144.29, SE = 2.40 cm VS 155 cm; t (125) = 7.67, p < 0.0001, M = 144.97, SE = 2.35 cm VS 163 cm, respectively).

Linear regression analysis on the single-factor IOTF category revealed better performance for under/normal weight students compared to overweight/obese ones (F (1, 520) = 43.39, η_p^2 = , p < 0.001; M = 149.69, SE = 1.34 cm VS M = 130.48, SE = 1.65 cm). Interaction of IOTF category x gender revealed a statistically significant difference (F (2, 520) = 7.82, η_p^2 = .03, p < 0.001). Post-hoc analysis revealed that both under/normal weight females and males performed better than their over-weighted counterparts (Females: t (520) = 4.75, p < 0.0001; M = 141.72 cm, SE = 1.53 cm VS M = 125.96 cm, SE = 2.47 cm; Males: t (520) = 5.13, p < 0.0001, M = 150.09 cm, SE = 2.20 cm VS M = 134.03 cm, SE = 2.18 cm). Under/normal weight male students performed better than under/

normal weight females (t (520) = 3.34, p = 0.0049, M = 150.09 cm, SE = 2.20 cm VS M = 141.72 cm, SE = 1.53 cm), while no differences emerged between overweight/obese females and males (t (520) = 2.12, p = 0.13, M = 125.96 cm, SE = 2.47 cm VS M = 134.03, SE = 2.18 cm).

Sit and reach test

In the sit and reach test, 11-year-old female students had sufficient flexibility (t (149) = 1.24, p = .22; M = 5.03, SE = 0.78 cm VS 6 cm). On the contrary, twelve-year-old females were not able to reach the sufficient value (t (122 = 4.76, p < 0.0001; M = 2.61, SE = 0.92 cm VS 7 cm). For both 11- and 12-year-old male students, the results highlighted that they were not able to reach the sufficient value (t (141) = 2.12, p = 0.04, M = -3.47, SE = 0.92 cm VS -2; t (124) = 2.28, p = .024; M = -3.62, SE = 0.71 cm VS -2 cm, respectively).

Analysis of the difference between under/normal weight and overweight/obese students revealed significant differences (F (1, 528) = 6.98, η_p^2 = .01, p = 0.008). Specifically, the sit and reach analysis revealed that under/normal weight students had better flexibility than their overweight/obese counterparts (M = 0.86, SE = 0.53 cm VS M = -1.38 cm, SE = 0.72 cm). Interaction of IOTF category x gender revealed a statistically significant difference (F (2, 528) = 46.31, η_p^2 = .15, p < 0.001). Post-hoc analysis revealed that under/normal weight females performed better than overweight/obese females (t (528) = 2.66, p = .04; M = 4.78, SE = 0.70 cm VS M = 1.50 cm, SE = 1.15 cm). No differences were observed between overweight/obese and under/normal weight male students (t (528) = 0.064, p = 0.99, M =-3.67 cm, SE = 0.63 cm VS M = 3.67 cm, SE = 0.80 cm). Both under/normal weight and overweight/obese female students performed better than normal and overweight/obese males (under/normal weight females VS under/normal weight males: t (528) = 8.90, p < 0.0001, M = 4.78 cm, SE = 0.70 cm VS M = -3.60 cm, SE = 0.63 cm; overweight/obese females VS overweight/obese males: t (528) = 3.66, p = 0.002, M = 4.77 cm, SE = 0.70 cm VS M = -3.67 cm, SE = 0.80 cm; see Table 2 for a summary of the results).

Shuttle run test

In the shuttle run test, both 11- and 12-year-old female students were slower than the sufficient value (t (141) = 9.63, p < 0.001; M = 22.96, SE = 0.19 sec VS 21.1; t (117) = 12.57, p < 0.001, M = 23.17, SE = 0.19 sec VS 21, respectively). Similar results for 11- and 12-year-old male students were found, in which both groups were not able to reach the sufficient value (t (137) = 7.03, p < 0.001, M = 21.95 sec, SE = 0.17 sec VS 20.6 sec; t (125) = 8.13, p < 0.001, M = 21.93, SE = 0.21 sec VS 20.2 sec). Linear regression analysis on the differences between under/normal weight and overweight/obese students showed that under/normal weight students were faster than overweight/obese students (F (1, 513) = 24.24, η_p^2 = .05, p < 0.001; M = 22.19 sec, SE = 0.12 sec VS M = 23.25 sec, SE = 0.18 sec). Interaction of IOTF category x gender revealed a statistically significant difference (F (2, 513) = 19.82, η_p^2 = .07, p < 0.001). Post-hoc analysis revealed that both under/normal weight females and males performed better than overweight/obese students (Females: t (513) = 3.71, p = 0.0013; M = 22.77 sec, SE = 0.15 sec VS M = 23.92 sec, SE = 0.27 sec; Males: t (513) = 4.23, p = 0.0002, M = 21.55 sec, SE = 0.17 sec VS M = 22.75 sec, SE = 0.24 sec). Under/normal weight male students performed better than under/normal weight females (t (513) = 5.37, p < 0.0001, M = 21.55 sec, SE = 0.24 sec VS M = 22.77 sec, SE = 0.15 sec), while overweight/obese males performed better than overweight/obese females (t (513) = 3.29, p = 0.006, M = 22.75 sec, SE = 0.24 sec VS M = 23.92 sec, SE = 0.27 sec; see Table 2 for a summary of the results).

Cooper test

One-sample t-test analysis on the Cooper test revealed that both 11- and 12-year-old females were not able to reach the sufficient value (t (145) = 10.23, p < 0.0001, M = 1481.53, SE = 25.36 m VS 1750 m; t (115) = 11.07, p < 0.001, M = 1514.05, SE = 38.78 m VS 1780 m, respectively), and that both 11- and 12-year-old males were not able to reach the sufficient value (t (138) = 8.12, p < 0.001, M = 1691.90, SE = 31.78 m VS 1950; t (121) = 6.29, p < 0.001, M = 1716.25, SE = 38.78 m VS 1960 m). Linear regression analysis on the Cooper test revealed that under/normal weight participants were able to perform the test better than overweight/obese students (F (1, 511) = 47.64, η_p^2 = .09 p < 0.001; M = 1666.83, SE = 16.62 m VS M = 1447.17 m, SE = 23.97 m).

Interaction of IOTF category x gender revealed a statistically significant difference (F (2, 511) = 32.55, η_p^2 = .10, p < 0.001). Post-hoc analysis revealed that both under/normal weight females and males had higher performance than their overweight/obese counterparts (Females: t (511) = 3.46, p = 0.003; M = 1539.76 m, SE = 21.48 m VS M = 1376.30 m, SE = 21.48 m; Males: t (513) = 7.053, p < .0001, M = 1810.50 m, SE = 30.47 m VS M = 1501.75, SE = 34.21 m). Under/normal weight male students performed better than under/normal weight females (t (513) = 7.73, p < 0.0001, M = 1820.50, SE = 30.46 m VS M = 1501.75 m, SE = 34.21 m), while no differences emerged between overweight/obese male and overweight/obese female students (t (513) = 2.34, p = .09, M = 1810.50 m, SE = 30.46 m VS M = 1501.75, SE = 34.21 m; see Table 2 for a summary of the results).

DISCUSSION

In the present study, on a sample of 11-12-year-old children in the Emilia-Romagna region, we measured physical fitness performance tests from the EURFOFIT battery and anthropometric measures (e.g., BMI) with the aim to evaluate the children's levels of physical fitness and the relation with body composition. We focused our attention on middle-school children who attend the first grade because this is the transition between primary school and middle school, and thus, it is crucial for two reasons: the first one allows understanding whether the children have been able to develop motor skills during the primary school and the second reason may allow understanding how the body composition affected the physical fitness. Our findings revealed that children have very low physical fitness compared to EUROFIT references. Moreover, our results suggested a negative relationship between physical fitness and body composition. Expressly, the results indicated that, except for the sit-up test where 12-year-old males and 11-year-old females were able to reach the sufficient value, in the other tests, students were not able to get the sufficient value. Concerning the difference between under/normal weight and overweight/obese students, our results highlighted a worse performance for overweight/obese students compared to under/normal weight students in all tests involved in the study. These differences were also found when the analysis has been categorised by gender.

Specifically, both under/normal weight females and males had better physical fitness than their overweight/obese counterparts. A single note is given by the sit and reach test where both overweight/obese and under/normal weight females had a higher performance than overweight/obese and under/normal weight males. Moreover, the performance of overweight/obese and under/normal weight males resulted in no significant differences. These results are in line with previous research: females, in general, are more flexible than males, and this is not related to the body composition (De Miguel-Etayo, Gracia-Marco, Ortega, 2014). Overall, our results suggest that physical fitness of this Emilia-Romagna sample is generally low, and this is regrettable in this age range because, in order to have adequate physical fitness, children should exceed the sufficient value of EUROFIT references.

This is a common problem around the world (Konstabel, Veidebaum, Moreno, Bammann, Tornarutusm et al., 2014; Wedderkopp, Froberg, Hanse, & Andersen, 2004). If we consider the Italian situation, only the 9.5% of children meet the WHO guidelines, and the number of overweight/obese children is increasing. Even if we did not control the physical activity level, it is feasible to conclude that low physical fitness is the result of children not spending enough time to practice physical activity. Moreover, it possible to assume that the little time spent on physical activities during school, leisure and sport time could be at low intensity. Indeed, according to Ortega and colleagues (2008), it is important to emphasise the intensity of physical activity because it is related to the enhancement of physical fitness (Martínez-Vizcaíno, V., & Sánchez-López, 2008).

Concerning the results on the differences between normal and overweight/obese students, it is important to notice that, in the conducted tests, the excess of weight is disadvantageous and it also correlates to numerous health diseases. Beauchamp, Rhodes and Nigg (2017) suggested a rethink of the physical education at all school levels should be made to avoid some health-related issues in adulthood. The time dedicated to physical education lessons should be increased and other activities, such as the active breaks and healthy homework, should be proposed (Brown et al., 2019; Masini, Marini, Leoni, Lorusso, Toselli, Tessari et al., 2020; Duncan et al., 2019). Furthermore, another point to be considered is the role of physical activity and physical fitness in cognitive functions and psychosocial features. In particular, several investigations have suggested that some cognitive functions could be developed through physical activity alongside an increment of academic achievement (Biddle & Asare, 2011; Donnelly & Lambuourne, 2011; Russo, Nigro, Raiola, & Ceciliani, 2019; Russo, Castagnoli, Babini, & Ceciliani, 2020; Sibley & Etnier, 2003). Thus, politics and local and central governments should rethink the school organisation and the role of physical activity and physical education during the school time. Moreover, to reassure parents and teachers, the increment of the physical activity time does not seem related to the detriment of academic performance (Trudeau & Shepard, 2008).

CONCLUSION

This cross-sectional evaluation on Emilia-Romagna middle-school children confirms that the physical fitness status is quite insufficient. According to teachers, it would be necessary to increase the physical activity and physical education with a new sustainable and feasible approach. We suggest developing political plans that should increase the level of physical activity and physical fitness.

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Table 1: Baseline characteristics of the sample

Characteristics	Total sample (n = 542)	Male (n = 268)	Female (n = 274)
	N or mean and SD	N or mean and SD	N or mean and SD
Age	11.46, 0.34	11.48, 0.35	11.43, 0.34
Under/normal weight	375	176	199
Overweight/obese	167	92	75
EUROFIT battery tests	**Number of participants**	**Male**	**Female**
Sit-up test	527	262	265
Under/normal weight	366	173	193
Overweight/obese	161	89	72
Standing long jump test	524	261	263
Under/normal weight	365	173	192
Overweight/obese	159	88	71
Sit and reach test	532	263	269
Under/normal weight	368	172	196
Overweight/obese	164	91	73
Shuttle run test	517	260	257
Under/normal weight	364	173	191
Overweight/obese	153	87	66
Cooper test	515	258	257
Under/normal weight	361	171	190
Overweight/obese	154	87	67

Table 2: Physical fitness test results comparing under/normal weight and overweight/obese participants, rotation = 90

Physical fitness tests	Under/normal weight (M, SE)	Overweight/ obese (M, SE)	p	Under/ normal Weight - females (M, SE)	Overweight/ obese females (M, SE)	p	Under/normal (M, SE) Weight - males (M, SE)	Overweight/ obese males (M, SE)	p
Sit-up	19.96, 0.24 sit-ups	17.64, 0.36 sit-ups	< 0.001	18.92, 0.29 sit-ups	16.78, 0.43 sit-ups	= .003	21.11, 0.36 sit-ups	18.31, 0.53 sit-ups	< .0001
Standing broad jump	149.69, 1.34 cm	130.48, 1.65 cm	< .001	141.72, 1.53 cm	130.48, 1.65 cm	< .0001	150.09, 2.20 cm	134.03, 2.18 cm	< .0001
Sit and reach	0.86, 0.53 cm	-1.38, 0.72 cm	= .008	4.78, 0.70 cm	1.50, 1.15 cm	= 0.04	3.67, 0.80 cm	-3.67, 0.63 cm	= .99
Shuttle run	22.19, 0.12 sec	23.25, 0.18 sec	< .001	22.77, 0.15 sec	23.92, 0.27 sec	= .0013	21.55, 0.17 sec	22.75, .24 sec	= .0002
Cooper	1666.83, 16.62 m	1447.17, 23.97 m	< .001	1539.76, 21.48 m	1376.30, 21.48 m	= .003	1810.50, 30.47 m	1501.75, 34.21 m	< .0001

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FIZIČKA SPREMNOST I TJELESNA TEŽINA KOD DJECE PREDADOLESCENTSKOG UZRASTA: EUROFIT TESTOVI MOTORIČKIH SPOSOBNOSTI POSMATRANI KOD DJECE U DOBI OD 11 DO 12 GODINA

Rana prevencija pretilosti tokom djetinjstva u današnje vrijeme predstavlja najvažnije pitanje javnog zdravlja. Više od polovine djece i adolescenata širom svijeta ne zadovoljavaju preporuku bavljenja umjerenom do intenzivnom fizičkom aktivnošću u trajanju od 60 minuta dnevno. Ovaj trend može smanjiti nivo fizičke spremnosti i time prouzrokovati smanjenje kvalitete života tokom životnog vijeka. Definisana kao niz sposobnosti za izvođenje fizičke aktivnosti i vježbe (poput aerobnog kapaciteta, izdržljivosti, snage, fleksibilnosti), fizička spremnost se smatra jednim od najvažnijih obilježja zdravlja tokom odrasle dobi, djetinjstva i adolescencije. Metode: Proveli smo transverzalnu studiju kako bi ispitali fizičku spremnost djece predadolescentskog uzrasta iz regije Emilia-Romagna. Antropometrijski parametri (visina i težina) te nivoi fizičke spremnosti djece su mjereni putem EUROFIT baterije testova. Kod svih primijenjenih EUROFIT testova, učinak djece je imao vrijednosti ispod dovoljnog nivoa kada je u pitanju dob i spol. Nadalje, bio je negativno povezan se pretilošću. Naše istraživanje je dalo dokaz da je opći nivo spremnosti našeg uzorka bio nizak te da je učinak pretile/gojazne djece bio niži u poređenju sa djecom koja su imala ispodprosječnu i normalnu težinu.

Ključne riječi: fizička aktivnost, indeks tjelesne mase, pretilost, predadolescenti, fizičko obrazovanje

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