

Assessment of Physical Fitness Levels, Gender and Age Differences of Rural and Urban Elementary School Children

Şehir ve Kırsal Kesimde Yaşayan İlkokul Çocuklarının Cinsiyete ve Yaşa Göre Fizik Kondüsyon Düzeylerinin Belirlenmesi

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ABSTRACT Objective: Both physical fitness and activity are important health and skill-related parameters. Reference data from a population is important for children after rehabilitation for injuries and for talent identification. The aim of this study was to reveal the physical fitness levels and gender differences of rural and urban children. The survey also aimed to obtain reference data on physical performance in Turkish Cypriot children. **Material and Methods:** To reveal the differences in the physical fitness of children living in urban and rural districts of Turkish Cypriot population, 7414, male and female elementary school children aged 9-11 years from 90 schools in the Turkish part of Cyprus were tested. Testing procedures were similar to the Eurofit tests. The Eurofit tests included 7 motor and cardiovascular (aerobic) tests. The subjects underwent motor (flexibility, balance, standing broad jump, hand grip, sits ups, and plate tapping, 10 x 5 m shuttle run), and cardiovascular health-related (aerobic) fitness assessments. In addition, height, body mass and skinfold thicknesses were assessed and body mass index (BMI) was calculated. **Results:** The results showed that BMI and sum of skinfold thicknesses were higher in the urban children ($p < 0.05$). Performance increased with age both for males and females and BMI increased with age with only small differences between genders. Differences in cardiopulmonary and motor fitness were also found between groups ($p < 0.05$). In addition, jumping abilities and muscle endurance were significantly higher in rural children ($p < 0.05$). **Conclusion:** The results of this study suggest that the children living in the urban have lower flexibility, muscle endurance and strength level than those who live in rural region.

Key Words: Physical fitness; motor activity; urbanization; rural health

ÖZET Amaç: Fizik kondüsyon ve aktivite hem sağlıkla ilgili hem de beceri ile ilgili önemli parametrelerdir. Bir toplumdaki elde edilen referans verileri çocukların sakatlık sonrası rehabilitasyonunda veya yetenek seçiminde önemlidir. Bu çalışmanın amacı şehirde ve kırsal kesimde yaşayan çocukların fiziksel uygunluk düzeylerinin belirlenmesi ve cinsiyetler arasındaki farklılıkların ortaya konmasıdır. Bu çalışma ayrıca Kıbrıslı Türk çocuklarının fiziksel performanslarına ait referans verileri oluşturmayı amaçlamaktadır. **Gereç ve Yöntemler:** Bu farklılıkları ortaya koyabilmek için Kuzey Kıbrıs Türk Cumhuriyeti'ndeki 90 okulda öğrenimlerini sürdüren, yaşları 9-11 arasında olan toplam 7414 kız ve erkek ilkököl öğrencisi çalışmaya katılmıştır. Uygulanan test prosedürü Eurofit testine benzemektedir. Eurofit testleri, 7 motor ve kardiyovasküler testten oluşmaktadır. Denekler motor (esneklik, denge, durarak uzun atlama, el kavrama, mekik ve disklere dokunma, 10x5 m mekik koşusu) ve kardiyovasküler sağlıkla ilgili (aerobik) uygunluk değerlendirme testlerine katılmışlardır. Boy, vücut ağırlığı ve deri kıvrımı kalınlıkları verilerinin yardımı ile çocuklara ait "beden kitle indeksleri (BKİ)'de" hesaplanmıştır. **Bulgular:** Sonuçlar incelendiği zaman BKİ ve deri kıvrımı kalınlığı toplamı, şehirde yaşayan çocuklarda daha yüksek bulunmuştur ($p < 0.05$). Hem kızlarda hem de erkeklerde yaşa bağlı olarak fiziksel performans artmakta, BKİ ise yaşa bağlı olarak cinsiyetler arasında küçük farklılıklar göstermektedir. Kardiyovasküler ve motor uygunluk özellikleri açısından cinsiyetler arasında farklılıklar bulunmaktadır ($p < 0.05$). Sıçrama ve kassal dayanıklılık yetenekleri, kırsal kesimde yaşayan çocuklarda daha yüksek bulunmuştur ($p < 0.05$). **Sonuç:** Bu çalışmanın sonuçlarına göre, şehirde yaşayan çocukların, kırsal kesimde yaşayanlara göre daha düşük esneklik, kassal dayanıklılık ve kuvvet özelliği gösterdiklerini söyleyebiliriz.

Anahtar Kelimeler: Fizik kondüsyon; motor aktivite; şehirleşme; kırsal sağlık

Physical fitness is generally considered “the ability to perform daily tasks without fatigue”. It includes several components such as cardiorespiratory fitness, muscular endurance, muscular strength, flexibility, coordination, and speed.^{1,2}

Differences in mean height, weight and physical fitness levels of children belonging to different socio-economic strata and/or towns or villages occur in almost all developed as well as in developing countries and in the Turkish Republic of North Cyprus (TRNC).

Living in areas distinguished by population size can be associated with differences in, inter alia, eating habits, access to sport facilities and opportunities for physical fitness activities. However, it is not entirely clear whether such factors can affect aspects of body composition and therefore, physical fitness.^{3,4} Contradictory reports have been published on physical fitness parameters of children living in urban and rural settings. In some cases, no difference has been identified in a range of fitness and motor skill measures between children from urban and rural areas.^{4,5} While some data indicate that urban children have more body fat than their rural equivalents, other data are in strong disagreement.⁴

Reports suggested that the distribution of children’s physical fitness across geographic boundaries, such as rural-urban districts, should be studied in different climate, economic and cultural contexts.⁶ To our knowledge, there is a need of such data, especially as reference values for Turkish Cypriot children. In addition, health complications such as over-weight or low levels of physical fitness in Turkish Cypriot children, have been delayed for many years. Therefore, comparisons are becoming more interesting. There is no reference data on the physical fitness of Turkish Cypriot children available as for regional or nationwide samples. Physicians, physical education teachers and sport coaches are groups that are potentially interested in such reference data.

Therefore, the aim of this study was to reveal physical fitness levels of Turkish Cypriot children, in relation to urban and rural districts, regarding gender and age groups.

MATERIAL AND METHODS

In 2006, a total of 4233 male and 5307 female 3rd, 4th and 5th grade children from all the elementary schools of the Ministry of Education and Culture in the Turkish Republic of Northern Cyprus (TRNC), were invited to participate in the study. As a result, 3939 boys and 3456 girls volunteered from 90 schools. Reasons for not participating were illness, no parental permission or other causes. This sample represented 77.7% of all 3rd (1296-32.9% male, 1121-32.4% female), 4th (1320-33.5% male, 1188- 34.4% female) and 5th (1323-33.6% male, 1147-33.2% female) grade male and female students living in the Turkish part of Cyprus. Sixty-three schools (n= 6046) were situated in urban areas and 27 schools were (n= 1349) in rural living areas.

The mean age of the male subjects were 9.02 ± 0.2 , 10.06 ± 0.1 and 11.04 ± 0.1 years and the mean age of the female subjects were 9.03 ± 0.2 , 10.05 ± 0.3 and 11.02 ± 0.2 for grades 3, 4 and 5, respectively. They will hereafter be referred to as 9, 10 and 11 years old, respectively. Those who contributed continued to receive their usual physical education during the study. Measurements were performed at two specially arranged test centers, with the same trained staff performing the tests. Before the data collection, parents of each participating child gave a written consent.

ANTHROPOMETRIC MEASUREMENTS

Height (HG) and body weight (BW) of subjects dressed in light clothes and without shoes were recorded, using a calibrated standard scale (Tanita TBF-350, Japan) and a stadiometer (Holtain, UK). Height was recorded in centimeters, while body mass was recorded in kilograms, with one decimal. BMI was calculated as body mass in kilograms divided by height in meters square ($\text{kg} \times \text{m}^{-2}$). Sum of skinfold thickness (SKF) was measured using Holtain calipers (UK) at four sites; biceps, triceps, suprailiac, and subscapula, on the dominant side of the body.

PHYSICAL FITNESS TESTS

Physical fitness was assessed using the European physical fitness test battery (EUROFIT) containing 8 tests that measure different components of fit-

ness: Flamingo balance (general balance), plate tapping (coordination and speed of limb movement), sit and reach (flexibility), standing-broad jump (explosive strength), handgrip strength (static strength), sit-ups (trunk strength and endurance), 10x5 m shuttle run (speed and agility), and 20 m endurance shuttle run (cardiorespiratory endurance). This test battery is a reliable and valid instrument to measure physical fitness in children and is commonly used in Europe.⁷

The order in which all the tests were conducted, is listed below;

- Flamingo Balance Test (FLB): Balancing for 60s on one leg as long as possible while standing on the preferred foot for 60 seconds. If the subject lost his/her balance, the timer was stopped and started again when the subject did the next attempt. The number of trials was recorded.

- Plate Tapping Test (PLT): Rapid tapping of two plates alternately with the preferred hand. The subject performed 25 cycles twice and the better result was recorded as the score.

- Sit and Reach (SAR): Reaching as far as possible from a sitting position. Research assistants recorded farthest reach the nearest one.

- Standing Broad Jump (SBJ): Jumping for a distance from a standing start. Three attempts were allowed. The longest distance jumped was recorded.

- Hand-Grip (HGR): Squeezing a calibrated hand dynamometer as forcefully as possible with the dominant hand. Grip size was adjusted to fit the subjects' hand size. Three attempts were given and results were recorded in kilograms (kg) with one decimal. The best trial was recorded.

- Sit-ups (SUP): Maximum number of sit ups achieved in 30 seconds.

- 10 x 5 m Shuttle Run (ST): Performing 10 shuttles over 5 meters in a 1 m wide lane. The subject performed the 10 x 5 m run test twice and the best result was recorded in seconds.

- 20 m Shuttle Run (SRT): To perform the 20 m shuttle run test subjects started running up and down a 20 m track at an initial speed of 8 km/h, which got progressively faster (0.5 km/h every mi-

nute), in accordance with a pace dictated by a sound signal from an audio tape.⁸ Subjects were instructed to keep pace with signals as long as possible. The score of the test was recorded when a lap or shuttle was completed.

Data analysis: Descriptive statistics were performed for all parameters. All data were not normally distributed ($Z: 6.35, p < 0.05$). Differences between rural and urban areas and gender were identified by Mann-Whitney U test. The SPSS 12.0 statistical package was used, and significance was set at $p < 0.05$.

RESULTS

Mean (X), standard deviation (SD) Z, Z' and Z'' values of anthropometric measurements and physical fitness of 3rd, 4th, and 5th grade male and female students were shown in Tables 1, 2 and 3, respectively for both genders.

Gender differences in physical performance were present in most tests and for most ages (see Tables 1, 2 and 3). In all ages, performance on the standing broad jump, sits-ups, 10 x 5 m sprint test, 20 m shuttle run test and hand grip tests were better in boys than in girls. Girls aged 9-11 years performed better on sit and reach test and flamingo balance test, compared to boys.

Although body fat (BMI and SKF) was found to be higher in urban children than in those living in rural regions, no statistical difference was found between urban and rural children for both genders ($p > 0.05$).

Z scores revealed that SBJ ($p < 0.05$) was significantly higher in 9-year-old boys living in urban settings compared to their rural equivalents, however there was no significant difference in females at the same ages (Table 1). The SBJ for both male and female 11 years-olds was significantly higher in rural settings compared to their urban equivalents (Table 3). There were significant differences of SBJ in both genders who lived in rural and urban districts (Table 1, 2 and 3). PLT was found to be significantly better in the urban children especially in 9-year-old boys ($p < 0.05$). ST was better in rural boys and girls and HGR was signifi-

TABLE 1: Mean and p values for anthropometric measurements and physical fitness in 3rd grade (9 years old) students according to life setting and gender differences.

	R (m) n= 258		U (m) n= 1038		p	R(f) n= 191		U(f) n= 930		p	p'	p''
	X (min-max)	SD	X (min-max)	SD		X (min-max)	SD	X (min-max)	SD			
HG (cm)	132 (115-151)	0.1	132 (114-153)	0.1	0.95	132 (117-157)	0.6	131 (115-158)	0.6	0.02*	0.02*	0.36
BW (kg)	30.6 (18.9-54.9)	6.5	30.9 (20.1-69.7)	6.7	0.65	31.2 (20.1-51)	6.7	31 (19-59)	6.9	0.73	0.48	0.37
BMI (kg/m ²)	17.4 (12.3-27.6)	2.7	17.6 (11-33.1)	3	0.72	17.6 (12.5-27.4)	2.9	17.8 (9.7-29.6)	3	0.41	0.06	0.63
SUP (r)	15 (1-25)	4.4	14.2 (1-30)	4.4	0.00*	13.7 (1-24)	4.8	12.5 (1-25)	4.9	0.00*	0.00*	0.00*
PLT (s)	18.7 (13-28.2)	2.8	18.2 (10.4-38)	3.4	0.00*	18.1 (13.4-28.9)	2.8	18 (10.1-35.4)	3.3	0.46	0.36	0.00*
SAR (cm)	21.9 (6.8-36.4)	5.5	21.7 (3.8-50)	5.4	0.37	22.7 (8-45.9)	5.8	23.1 (8.6-50.2)	5.5	0.27	0.00*	0.22
ST (s)	23.4 (19.5-31.8)	1.7	23.9 (18.6-32.2)	1.9	0.00*	24.7 (20.2-34.7)	1.9	25.1 (17.5-32.8)	2.1	0.00*	0.00*	0.00*
SKF (mm)	32 (13.1-103.6)	17.3	32.3 (8.7-138.6)	18	0.71	40.4 (14.8-119.8)	20.4	39.2 (5.4-126.7)	18.5	0.74	0.00*	0.00*
FIB (asc)	10.4 (1-15)	4.5	10.9 (1-15)	4.5	0.08	9.7 (1-15)	5	9.7 (1-15)	4.9	0.97	0.00*	0.18
SBJ (cm)	119.3 (58-168)	19.4	116 (17.195)	18.9	0.00*	105.4 (49-150)	18.1	103.7 (40-160)	18.2	0.12	0.00*	0.00*
SRT (n)	30.3 (2-82)	14.2	29.9 (1-97)	14.1	0.78	24.6 (8-96)	12.9	22 (3-59)	9.5	0.07	0.00*	0.00*
HGR (kg)	29.1 (14.9-45)	5.3	26.8 (14-48.7)	5.4	0.00*	25.7 (14.4-47.1)	5.1	24 (8.6-43.7)	5	0.00*	0.00*	0.00*

asc: Ascents, r: Number of repetition, n: Number of shuttle, SD: Standart deviation, m: Male, f: Female, P': Comparison of urban genders P'': Comparison of rural genders HG: Height, BW: Body weight, BMI: Body Mass Index, SUP: Sit ups, PLT: Plate tapping, SAR: Sit and reach, ST: Sprint test, SKF: Sum of skinfold thicknesses, FIB: Flamingo balance test, SBJ: Standing broad jump, SRT: Shuttle run test, HGR: Hand grip p= 0.05.

TABLE 2: Mean and p values for anthropometric measurements and physical fitness in 4th grade (10 years old) students according to life setting.

	R (m) n= 234		U (m) n= 1086		p	R (f) n= 199		U (f) n= 989		p	p'	p''
	X (min-max)	SD	X (min-max)	SD		X (min-max)	SD	X (min-max)	SD			
HG (cm)	137.8 (123-169)	0.1	137.4 (117-165)	0.1	0.39	138 (122-160)	0.6	137 (122-163)	0.6	0.15	0.62	0.72
BW (kg)	35.3 (21.6-66.1)	8	35.1 (20.9-75.4)	8.3	0.75	35.6(22.9-72.7)	9	35.2 (20.3-83.2)	8.4	0.89	0.77	0.88
BMI (kg/m ²)	18.4 (11-32.9)	3.5	18.4 (12.5-32.6)	3.2	0.98	18.4(13.8-31.8)	3.4	18.5 (11.5-49.2)	3.4	0.52	0.56	0.79
SUP (r)	16.2 (1-26)	4.4	15.7 (1-30)	4.5	0.01*	14.1 (1-25)	5.5	13.9 (1-28)	5.1	0.29	0.00*	0.00*
PLT (s)	17 (9.9-27.4)	2.8	16.7 (10.2-32.3)	2.7	0.11	16.8 (10.7-26.4)	2.6	16.7 (10.2-32.2)	3	0.34	0.27	0.34
SAR (cm)	21.2 (1.2-36.2)	5.7	21.3 (2.2-37.4)	5.8	0.99	22.6 (5.9-39.8)	6	22.6 (4.7-42.7)	5.9	0.98	0.00*	0.03*
ST (s)	23.2 (18.3-31.5)	1.8	23.2 (17.6-38)	1.8	0.43	24.1 (20.2-34.5)	2.1	24.5 (16.5-36.1)	2.1	0.00*	0.00*	0.00*
SKF (mm)	37.5 (13.2-114)	21.9	37 (8.4-126)	21.4	0.81	42.6 (16.7-135.6)	22.8	43.4 (14.2-162)	20.9	0.19	0.00*	0.00*
FIB (asc)	9.9 (1-15)	4.8	10.2 (1-15)	4.7	0.51	8.7 (1-15)	5	9.4 (1-15)	4.9	0.06	0.00*	0.01*
SBJ (cm)	124.3 (68-180)	21.9	123.3 (64-188)	19.5	0.38	111.5 (14-173)	21.5	110.1 (13-181)	19.3	0.41	0.00*	0.00*
SRT (n)	36.4 (7-93)	17.6	33.5 (5-116)	15.2	0.04*	26.7 (6-75)	11.5	24.2 (5-90)	11.4	0.00*	0.00*	0.00*
HGR (kg)	32.8 (17.6-49.3)	6	31.1 (13.9-59.4)	6.1	0.00*	29.7 (16.7-52.3)	6.5	28.1 (12-60.4)	6	0.00*	0.00*	0.00*

asc: Ascents, r: Number of repetition, n: Number of shuttle, SD: Standart deviation, m: Male, f: Female, P': Comparison of urban genders P'': Comparison of rural genders HG: Height, BW: Body weight, BMI: Body Mass Index, SUP: Sit ups, PLT: Plate tapping, SAR: Sit and reach, ST: Sprint test, SKF: Sum of skinfold thicknesses, FIB: Flamingo balance test, SBJ: Standing broad jump, SRT: Shuttle run test, HGR: Hand grip p= 0.05.

cantly higher in rural subjects than in the urban subjects, for both genders ($p < 0.05$).

Comparison of life settings with gender for SBJ, ST and HGT revealed significant differences. The only significant differences observed for 9 years old rural genders in PLT (Table 1).

Tukey tests revealed that SRT ($p < 0.05$) was significantly higher in boys and girls living in rural

settings compared to their urban equivalents (Table 2), and SUP and HGR were significantly better ($p < 0.05$) in the rural children at all ages for both genders (Table 1, 2, 3), whereas SRT, SUP and HGR were significantly higher ($p < 0.05$) in the (gender and setting comparison) rural subjects.

For 11-year-old boys, BMI was significantly higher for those living in urban settings ($p > 0.05$).

TABLE 3: Mean and p values for anthropometric measurements and physical fitness in 5th grade (11 years old) students according to life setting.

	R (m) n= 243		U (m) n= 1080		p	R (f) n= 224		U (f) n= 923		p	p'	p''
	X (min-max)	SD	X (min-max)	SD		X (min-max)	SD	X (min-max)	SD			
HG (cm)	142.5 (125-161)	0.1	142.3 (115-171)	0.1	0.90	143.9 (123-166)	0.7	143.9 (118-176)	0.7	0.93	0.00*	0.02*
BW (kg)	38.4 (22.8-78.4)	9.5	39.3 (23-83)	9.6	0.09	39.6 (21.3-73)	9.3	40.3 (21.3-81.4)	9.7	0.53	0.00*	0.06
BMI (kg/m ²)	18.7 (13.3-30.6)	3.3	19.2 (12.8-40.7)	3.6	0.03*	18.9 (13.3-32)	3.3	19.3 (11.6-33)	3.7	0.38	0.61	0.24
SUP (r)	17.9 (1-30)	3.9	16.6 (1-38)	4.6	0.00*	15.1 (1-28)	5.7	14.7 (1-27)	4.9	0.03*	0.00*	0.00*
PLT (s)	15.8 (11.2-26)	2.7	15.6 (10.1-41.3)	3.1	0.38	15.3 (10.2-28.1)	2.6	15.4 (9.9-37.3)	2.8	0.51	0.28	0.09
SAR (cm)	21.3 (7.7-33.4)	5.5	21.4 (4.8-47)	5.8	0.87	22.4 (6.8-37.7)	6	22.8 (4.3-47.2)	6.2	0.71	0.00*	0.03*
ST (s)	22.6 (18.7-40)	2.1	22.6 (13.5-30.7)	1.8	0.12	23.8 (20.1-34.6)	2	23.6 (17.5-34.9)	1.8	0.28	0.00*	0.00*
SKF (mm)	37.5 (14-121.2)	24.3	40.1 (8.8-139)	23.8	0.00*	44.2 (14.2-120)	22	46.3 (14.6-167)	22.9	0.19	0.00*	0.00*
FIB (asc)	8.8 (1-15)	4.8	9.7 (1-15)	4.9	0.01*	9.1 (1-15)	4.7	9.1 (1-15)	4.9	0.89	0.01*	0.56
SBJ (cm)	135.7 (12-192)	24.7	131.5 (70-200)	20.1	0.00*	122.8 (10-209)	22.7	119.6 (35-191)	19.7	0.01*	0.00*	0.00*
SRT (n)	41.1 (6-99)	17.2	38.1 (5-102)	17.6	0.00*	30.1 (7-80)	13.9	27.2 (6-81)	12.9	0.00*	0.00*	0.00*
HGR (kg)	37.3 (19.8-60.2)	6.7	35.2 (3.3-61.3)	7.2	0.00*	34.8 (16.9-59.2)	7.7	32.7 (3-59.8)	7.1	0.00*	0.00*	0.00*

asc: Ascents, r: Number of repetition, n: Number of shuttle, SD: Standart deviation, m: Male, f: Female P': Comparison of urban genders P'': Comparison of rural genders HG:Height, BW: Body weight, BMI: Body mass index, SUP: Sit ups, PLT: Plate tapping, SAR: Sit and reach, ST: Sprint test, SKF: Sum of skinfold thicknesses, FLB: Flamingo balance test, SBJ: Standing broad jump, SRT: Shuttle run test, HGR: Hand grip p= 0.05.

Z scores revealed that SKF and FLB ($p < 0.05$) were significantly higher in boys living in urban settings, compared to their rural equivalents, whereas SRT was significantly better ($p < 0.05$) and HGR and SUP were significantly higher ($p < 0.05$) in the rural subjects for both genders (Table 3).

DISCUSSION

The main aim of the study was to examine potential differences in the physical fitness of Turkish Cypriot children, living in urban and rural settings. This study gives reference values on body mass, BW, BMI and some physical performance tests of Turkish Cypriot children.⁹ Recent studies state that physical activity is correlated with a number of factors including demography, psychology, society and environment.^{10,11} In this study, only the environmental factor was analysed.¹²

To our knowledge, this is the first study which examined selected physical fitness components of 3rd-5th grade school boys and girls living in urban and rural settings, using a nationwide approach.

Anthropometric characteristics increase with age in both life settings and genders. A number of studies stated that there were major increases in most of the fitness parameters of 9-11 year- and 11-12 year-olds, respectively, during their maximum

spurt in height and weight.¹ Similar observations were made in this study. As FLB, PLT and ST performance improved with age, no difference was identified between settings, except for SKF. The SBJ, SUP, SRT and HGR performances improved with age in both groups and differences were noted between settings.

In all ages, girls had a better SAR performance than boys. This result is similar to recent Greek and French data.^{3,10} This may be due to differences in the growth rate of connective tissue, muscles and bones. In addition, the differences between genders in the hip joint and pelvic anatomy and low physical fitness and low levels of participation in physical activity can affect SAR test performances.^{11,13,14} The standing broad jump and sit-ups test performance increased with age, and boys performed better at all ages. In the 10x5 sprint test and 20 m shuttle run test, performance improved with age and boys showed better performance at all ages. The performance of 11-year-old girls is only as good as 9-year-old boys. In the hand grip strength test, performance increased with age and boys showed better performance at all ages.

Reference data from this study is in agreement with the evidence from a study conducted in Australia, as it claims that rural children are more fit than their urban equivalents.⁶ However, it is in dis-

agreement with the evidence from a study conducted in the US, which states that US urban children have superior fitness levels, compared to those living in rural areas.¹⁵ Methodological differences, such as the criterion used to define rural versus urban areas, variability in tests used to assess fitness levels, and statistical analysis may account for the discrepancies in literature.¹⁶⁻¹⁸ In another study conducted in Mexico, children living in urban parts were significantly taller and heavier than rural children.¹⁹ However in this study, there was no significant difference between rural and urban children for height and weight, but there were significant differences between genders. For example, girls were usually taller than boys. In a study conducted in Mexico, absolute grip strength did not consistently differ between rural and urban children, whereas in this study, HGR was found to be better in rural children for both genders.¹⁹ Explosive power (standing broad jump), abdominal strength and endurance of children living in urban areas were better than those living in rural areas in the study conducted in Mexico, while HGR, SBJ and SUP of rural children were better than urban children for both genders in our study.

For the shuttle run, performance improved with age and significant differences were found between life settings and genders except for 3rd grade children. Also BMI values of rural children were lower than those of urban children for both genders. The mean of BMI increased with age and was slightly higher for girls than for boys. This result is similar to the data of Rosner, Bundak, Turkkahraman and Constantinos.²⁰⁻²³ In another study which studied the growth patterns for school children, similar results showed that the mean values for height, weight and BMI increased with the age for both boys and girls, and this result was similar to that in our study.²⁴ The same result was obtained in the sit-ups test.¹⁹ For 20 m-SRT, recently studied on Tasmanian children, children in lower grades completed fewer shuttles than the children in higher grades, and boys completed more shuttles than girls within each grade.²⁵ This result was similar to that in this study.

According to the results on gender and age, out of eight performance tests and three anthropo-

metric data, boys had better performances in five motor tests, but girls had better performance than boys only in two motor tests. As a result, boys exceeded in some items, girls in others. This result is similar to Krombholz's findings.²⁶ But in all tests, the performance of both genders increased with age and this result is similar to French data.¹⁰ Kulinna et al and Faith et al reported that there was some evidence to suggest that differences in moderate to vigorous physical activity (MVPA) in physical education classes were related to the grade/age of the students, and boys were more active than girls.^{14,27} This may be correct, because these tests are vigorous specific strength and muscular endurance tests and because of genetic factors (hormones), boys can adapt more easily and show better results than girls do. In a recent study, which was conducted on 8-10 years old boys of Turkish children in Ankara, sit-ups test results were similar to the results of this study.²⁸

In both genders, balance and coordination performances improved with age, especially in girls. In the plate tapping test, performance increased with age in both genders, but 11-year-old girls had better performances than boys. For the sit-ups test, girls present the performance of a ten year old boy. Strength, endurance and sprint performances of boys were better than girls at all ages, but balance and coordination performances were better for girls at all ages. This may not only be due to differences in the growth rate of connective tissue, muscles and bones, but also to the differences of the hip the hip joint and pelvic anatomy between genders.²⁹⁻³¹

The main findings were that for only five out of 12 3rd grade children (9 years old), three out of 12 4th grade children (10 years old) and seven out of 12 5th grade children (11 years old), variables were significantly different between urban and rural settings and in some cases, these differences were not uniformly distributed among children living in either urban or rural environments. It is, therefore, reasonable to suggest that for Turkish Cypriot children change in age and the life setting has no clear impact on physical fitness as studied herein. The reason for this can be that, on the Turkish side of Cyprus, rural life living standards have reached urban standards. In other words, the emerging trend

of urbanisation of Turkish Cypriot rural life may be an additional explanation for the present findings. In the light of this result, the present data do not agree with published reports advocating that the life setting indeed affects children's fitness with gender.^{12,29}

A major positive aspect of the present study was the ability to assess all the male and female children who lived in rural and urban districts. Covering subjects from different locations, that is rural and urban, strengthens the validity of the study. Although the assessment of some measures of health was questionable (flamingo balance and plate tapping test), using a wide battery of tests enhances the reproducibility of the findings.

CONCLUSION

One major weakness may be the lack of other similar assessments in the Turkish part of Cyprus for comparing the results. However, with this study

we could reveal the norms of physical fitness levels of 9, 10 and 11-year-old males and females who live in rural and urban districts. Another limitation was the unequal number of subjects between districts. For all ages, the number of urban subjects was higher than the rural ones.

In conclusion, within the study's limitations, we concluded that life setting had no clear impact on physical fitness of 9-11 year-old Turkish Cypriot male and female school children and the significantly lower muscle endurance and strength of urban children might indicate their lower habitual physical activity level.

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