PHYSICAL FITNESS PROFILE OF RURAL VERSUS URBAN PRIMARY SCHOOL CHILDREN IN ETHEKWINI DISTRICT, KWAZULU-NATAL, SOUTH AFRICA

OLADAPO MICHAEL OLAGBEGI [ID], THAYANANTHEE NADASAN [ID], YOLISWA MAZIBUKO [ID], ESETHU MFENGA [ID], KHANYANI RANGANA [ID], RISUNA THEMBA [ID]

Discipline of Physiotherapy, School of Health Sciences, University of KwaZulu-Natal, Durban, South Africa

ABSTRACT

Purpose. Assessment of physical fitness (PF) in children as a health indicator is crucial for identifying areas requiring attention regarding the prevention of non-communicable diseases. This study aimed to evaluate and compare the PF profiles of rural and urban primary school children in KwaZulu-Natal, South Africa.

Methods. In a cross-sectional survey, 520 consecutive primary school children (urban: 260, rural: 260, age: 6–13 years) recruited from 2 randomly selected schools were assessed with the Eurofit test battery. Four components of the test were assessed: standing long jump (SLJ), sit-ups (SU), 5-m shuttle run test (5m-SRT), and cricket ball throw (CBT). Composite z-scores for the tests were ranked by age and sex, and categorized into low, moderate, and high PF.

Results. Urban and rural children were statistically comparable ($p > 0.05$) regarding their age, weight, and height but rural children had a significantly higher body mass index ($p < 0.05$) than their urban-based counterparts. Rural children obtained significantly higher SLJ ($p < 0.001$) and SU scores ($p < 0.001$) and lower 5m-SRT scores ($p < 0.001$) than those from the urban school but their CBT scores were statistically comparable ($p = 0.994$). The prevalence of low PF status was significantly higher ($p < 0.001$) among urban children (54.6%) compared with their rural counterparts (26.5%).

Conclusions. Prevalence of low PF was higher among urban primary school learners compared with their rural counterparts. Place of residence should be considered when implementing effective interventions to promote physical activity and health.

Key words: physical fitness, rural, urban, children, Eurofit

Introduction

Evidence from observational studies has shown that physical inactivity and poor cardiorespiratory fitness are strongly associated with higher morbidity and mortality from any cause, including cardiovascular disease and cancer [1]. Even though the full clinical manifestations of the diseases typically appear in adulthood, their aetiologic source seems to occur during childhood [2, 3]. In this context, a higher physical fitness (PF) level in children has been associated with more positive health-related outcomes in terms of present and future risk for obesity, cardiovascular disease, skeletal health, and mental illness, such as depression, anxiety, and mood status and self-esteem disorders [2, 4–6]. Furthermore, regular exercise and moderate-to-vigorous physical activity have been shown to both increase PF and prevent overweight/obesity [6]. Therefore, PF is regarded as a modern-day vital indicator of health and quality of life in childhood [4, 5].

Within the recent few decades, children's physical activity levels have dramatically changed [7, 8]. Outdoor physical play is being increasingly replaced by less physical indoor activities [8]. Children are mostly driven to school by automobiles instead of cycling or walking, and participation in organized sports is declining [8]. Over the last decade, the possible consequences of these changes for children's overall development and health have been a source of concern to the stakeholders (media, scientific researchers, and policy makers) [8].

PF refers to the ability of the body to function effectively, enjoy leisure, be healthy, resist diseases, and cope with emergencies [9]. As physical activity is one of the main determinants of PF, different environments can be associated with different lifestyles, dietary habits, access to sports facilities, and physical activity opportunities [10]. In the past, PF was more about winning badges for competitions aimed at testing maximum fitness; the paradigm shift employs the concept of health-related fitness, which focuses on promoting the health of the individual. Valid and reliable measures of children's PF are vital for assessing the relationship of their PF and health [8].

The prevalence of certain risk factors in urban children and adolescents compared with their rural peers suggests that unhealthy lifestyles may be expected to increase with further urbanization [11]. The obesogenic environment is reportedly directed to the adolescent's market, thereby making healthy choices difficult [11]. The obesogenic environment encourages unhealthy dietary habits and sedentary lifestyle through indoor activities such as television watching and using the computer [11]. Behavioural (smoking, alcohol abuse, physical inactivity, and poor dietary habits) and physiological (obesity) non-communicable disease risk factors are known to be prevalent among the South African youth; however, little is known about the pattern of these risk factors when children reach adolescence and how this relates to urban or rural setting in South Africa [11].

PF is known to be genetically determined and influenced by environmental factors [2, 4]. Peer et al. [11] found significantly higher prevalence of physical inactivity among urban South African adolescents compared with their rural counterparts (males: 40.7% vs. 27.1%; females: 53.4% vs. 44.9%). The authors also revealed higher prevalence of obesity among adolescents residing in urban areas (males: 9.6% vs. 10.6%; females: 25.7% vs. 33.9%). These observations suggest that with further urbanization, the prevalence of non-communicable diseases may increase if appropriate intervention programs are not implemented. However, studies on comparative prevalence of low PF levels in urban and rural primary school children in South Africa still appear scarce. Therefore, the primary aim of the study was to evaluate and compare the baseline PF scores among rural and urban primary school children aged 6–13 years in eThekwini district, KwaZulu-Natal province, South Africa. The secondary aim of the study was to describe the prevalence of low PF among primary school children in rural and urban schools.

Material and methods

Study setting and design

This study was conducted in the eThekwini district, KwaZulu-Natal province, South Africa. The participants were recruited from 2 primary schools from 2 different environments: urban and rural; both schools were public schools. A quantitative cross-sectional research design was applied in the study.

Sampling technique and sample size calculation

A non-probability purposive sampling technique was used to recruit consenting participants. The sample size was calculated with the formula for cross-sectional studies described by Charan and Biswas [12]. To determine the sample size, unknown prevalence for the outcome (50%), tolerable error of 5%, and confidence level of 95% were assumed, adding 10% for possible losses and refusals. Thus, it was necessary to evaluate 422 school children.

Inclusion and exclusion criteria

The inclusion criteria for the study required that the participants were enrolled/registered in either of the 2 selected schools for the 2019 academic session.

Children with history or record of cardiopulmonary or respiratory illnesses, physical impairments, or injuries that might affect their mobility and flexibility were excluded from the study. Also, those who did not provide assent or signed informed consent from their parents or legal guardians were excluded.

Ethical considerations

Ethical approval for the study was granted by the Biomedical Research Ethics Committee of the University of KwaZulu-Natal (Ref. No.: BE563/18). Gatekeeper permission was also obtained from the KwaZulu-Natal Department of Education, as well as the selected schools. When ethical approval and gatekeeper permission were obtained, information letters and informed consent forms were sent to the principals of the selected schools. The researchers arranged information sessions with learners in the schools after the principals had granted permission to conduct the study. During the sessions, the researchers provided learners with detailed information regarding the objectives and procedures of the study and informed

them that participation was voluntary. This was done in the English and isiZulu languages.

In agreement with the school principal, the potential study participants were given parents' information letters and informed consent forms to take home for their parents' consideration. Learners who returned the informed consent letters duly signed by their parents were considered as potential participants. Only eligible learners who volunteered to participate by giving their verbal assent were finally enrolled as study participants.

Data collection process

Demographic information such as age, sex, and ethnic group was elicited and recorded. A standardized measuring tape (Millor, South Africa) was fixed vertically on a wall for the measurement of the participants' height. Their body weight was assessed with digital weighing scales (Micro T7E electronic platform scale; Optima Electronics, George, South Africa); standardized measuring procedures were followed. Body mass index (BMI) was calculated by using the formula:

$$BMI = body\ weight/height^2$$

Measurements of physical fitness scores

Four Eurofit tests (standing long jump [SLJ], sit-ups [SU], 5-m shuttle run test [5m-SRT], and cricket ball throw [CBT]) were selected for the assessment of the participants' PF. Eurofit is a battery of fitness tests used to evaluate strength, speed, flexibility, and balance [10]. The tests are inexpensive, simple to administer, and good for large field testing since they require minimal equipment and personnel [10]. Eurofit has demonstrated very good test-retest reliability and good criterion validity for tests where appropriate criterion measures have been identified [10].

The procedures for the 4 tests used in this study were adopted from a paper by Armstrong et al. [13] and are described below.

Standing long jump

Standing barefooted with knees bent, having feet together and arms back, the child was instructed to swing their arms, jump as much forward as possible, and land with the feet together. Only 2 attempts were allowed but a child that lost balance during the test would be permitted 1 extra attempt. The better of at least 2 attempts was documented as the test score. The score for this test is the shortest distance between the heels of the feet in the starting position and the point at which the closest heel touched the ground after jumping. The distance was measured with a standardized measuring tape (Millor, South Africa).

Sit-ups

In supine lying position on an exercise mat, the child was asked to position their knees bent at 90°, both feet flat on the floor, hands behind the head, and both shoulder blades in contact with the floor. A research assistant helped stabilize the feet on the ground. The child was then instructed to sit up, touch both knees with the elbows, and return to the starting position. The child was to repeat this as many times as possible within 30 s. The aforementioned position had to be maintained for the repetition to be valid. The test score is the number of sit-ups made in 30 s. Time was monitored with a chronograph digital stopwatch (Pro-Fit Sportmate, South Africa).

5-m shuttle run test

The start and finish lines of a 5-m distance were marked out with cones, and 2 pieces of a Dejuca CR240 ski rope (10 × 10 m) were positioned on the ground at the start and finishing lines. The child was asked to stand behind the rope on one side of the shuttle, run as fast as possible between the cones (22.86-cm tall Champro plastic marker), cross the line with both feet, and then run back to the starting point. The child was to continue the running until they completed 10 shuttles (totalling 50 m) in as short a time as possible. The score for the test was measured with a chronograph digital stopwatch (Pro-Fit Sportmate, South Africa) as the time taken to complete 10 shuttles; this was recorded to the nearest 0.1 s. A child who did not cross the line with both feet was penalized 0.1 s and if that happened more than once, the participant had to repeat the test after a short rest.

Cricket ball throw

The child was asked to stand in front of a marked restraining line and behind a second line drawn 2 m away, and throw a 135-g cricket ball (Dunlop League, 4.75 oz) as far as possible. The participants were allowed 2 trials and the better throw was recorded (in meters).

Statistical analysis

The data were analysed with the use of the SPSS version 26.0 software (SPSS Inc., Chicago, IL, USA). The descriptive statistics of frequencies, percentages, and median and quartiles were used to summarize the data. The normality Shapiro-Wilk test showed that the data were largely skewed; hence, non-parametric tests were chosen to compare continuous variables. Median scores of the fitness tests were descriptively compared with the median normative values from 2 international studies [2, 14].

Each of the fitness test variables (SLJ, SU, 5m-SRT, and CBT) was converted to z-scores. Since lower 5m-SRT scores represent high performance in the test, the z-scores for each test were separately ranked by age and sex into 3 groups by using the Rank Cases function, Ntiles option in SPSS [15]; the groups were marked from low to high scores (1–3) of the PF variable. The group scores were summed up to calculate the combined scores of PF. The combined scores were ranked again and categorized into low, moderate, and high PF.

The chi-square test of independence was used to compare the participants' sex categories, as well as to compare levels of fitness categories by school location for the entire sample and each age group. The Mann-Whitney U-test served to compare the median scores of demographic characteristics (age, weight, height, BMI) and fitness tests (SLJ, SU, 5m-SRT, and CBT) of participants from urban- and rural-based schools. Comparison of demographic characteristics and fitness test scores by sex was also computed by using the Mann-Whitney U-test. The level of significance was set at α = 0.05.

Ethical approval

The research related to human use has complied with all the relevant national regulations and institutional policies, has followed the tenets of the Declaration of Helsinki, and has been approved by the Biomedical Research Ethics Committee of the University of KwaZulu-Natal (Ref. No.: BE563/18).

Informed consent

Informed consent has been obtained from all individuals included in this study.

Results

A total of 520 primary school learners (urban: 260, rural: 260) aged 6–13 years participated in the study. Their median age, weight, height, and BMI were 10.00 years, 31.55 kg, 1.32 m, and 17.93 kg/m^2, respectively. The median SLJ, 5m-SRT, SU, and CBT scores equalled 1.45 m, 26.06 s, 13.00, and 14.14 m, respectively.

The groups demographic characteristics are compared and presented in Table 1. The results showed that participants from the urban-based school were not significantly different ($p > 0.05$) from those from the rural-based school regarding their age, weight, or height. The children from the rural school had a significantly higher BMI than those from the urban school. The 2 groups were also significantly different ($p = 0.017$) in the distribution of sex categories (males: 39.2%, females: 60.8% for the urban school; males: 49.6%, females: 50.4% for the rural school).

Table 2 shows a descriptive comparison of the participants' Eurofit test scores by age and sex with some available international data from Poland and Greece. Median SLJ scores for boys aged 7, 8, 9, 10, and 11 years in the present study are higher than the median scores among children from Poland.

Table 1. Participants' demographic characteristics

Variable	Urban (n = 260) Median (LQ; UQ)	Rural (n = 260) Median (LQ; UQ)	z	p
Age (years)	9.00 (9.00; 11.00)	10.00 (8.00; 12.00)	–0.714	0.475
Weight (kg)	31.20 (26.10; 40.20)	31.85 (25.85; 41.45)	–0.647	0.517
Height (m)	1.32 (1.25; 1.44)	1.32 (1.22; 1.43)	–1.084	0.278
BMI (kg/m^2)	17.38 (15.83; 20.22)	18.23 (16.87; 21.20)	–3.334	0.001*
Sex	Frequency (%)	Frequency (%)	χ^2	p
Male	102 (39.2)	129 (49.6)	5.678	0.017*
Female	158 (60.8)	131 (50.4)		

LQ – lower quartile, UQ – upper quartile, BMI – body mass index

* significant difference at α = 0.05

Table 2. Comparison of participants' Eurofit test median scores by age and sex with international data

BOYS

Age (years)	South Africa (present study) (n = 260)			Poland (Dobosz et al.) [2] (n = 25,687)			Greece (Tambalis et al.) [14] (n = 216,407)		
	SLJ	SRT	SU	SLJ	SRT	SU	SLJ	SRT	SU
6	1.23	30.06	11.00				1.02	24.4	13.0
7	1.36	28.51	10.00	1.11	25.8	15.6	1.13	23.0	15.0
8	1.48	26.57	12.50	1.22	24.5	17.6	1.23	22.1	17.0
9	1.43	25.10	15.00	1.32	23.4	19.4	1.31	21.5	18.0
10	1.65	25.27	16.00	1.42	22.6	21.3	1.40	21.0	20.0
11	1.66	24.56	16.00	1.52	21.9	22.6	1.47	20.4	21.0
12	1.62	23.52	14.50	1.63	21.2	23.7	1.54	20.1	21.0
13	1.77	22.40	16.00	1.78	20.6	25.0	1.64	19.8	22.0

GIRLS

Age (years)	South Africa (present study) (n = 260)			Poland (Dobosz et al.) [2] (n = 23,594)			Greece (Tambalis et al.) [14] (n = 207,921)		
	SLJ	SRT	SU	SLJ	SRT	SU	SLJ	SRT	SU
6	1.13	29.81	11.00				0.93	24.4	12.0
7	1.33	29.09	11.00	1.04	26.6	14.8	1.10	24.0	14.0
8	1.33	27.30	12.00	1.11	25.4	16.4	1.10	23.0	16.0
9	1.38	26.71	13.00	1.21	24.6	18.0	1.20	22.3	17.0
10	1.46	25.41	12.00	1.32	23.8	19.8	1.27	21.8	18.0
11	1.50	25.86	13.00	1.40	23.0	20.9	1.34	21.2	19.0
12	1.53	25.72	14.00	1.47	22.4	21.5	1.36	21.2	19.0
13	1.49	25.07	13.00	1.54	22.1	22.1	1.37	21.3	19.0

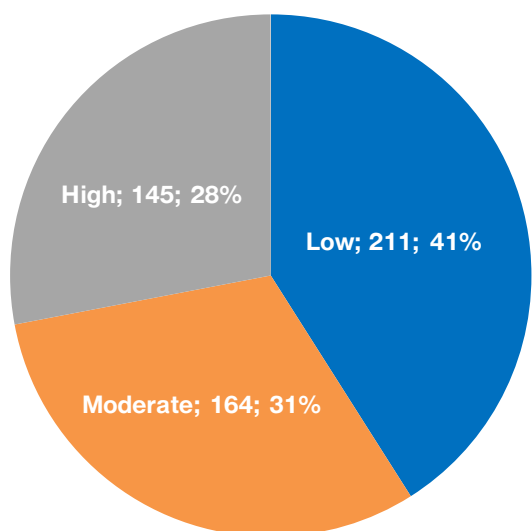SLJ – standing long jump (m), SRT – shuttle run test (s), SU – number of sit-ups in 30 s

Figure 1. Distribution of physical fitness levels in the entire sample (n = 520)

Figure 1 displays the distribution of overall levels of PF among all participants, while the levels of PF of urban- and rural-based learners are compared in Table 3. Overall 211 (40.6%) of the entire 520 partici-

pants presented low fitness status. Low fitness prevalence of 54.6% and 26.5% was observed among urban and rural children, respectively, and the distribution of PF level categories was significantly different ($p < 0.001$) between the 2 groups of learners.

As seen in Table 4, the analysis of the distribution of fitness levels in the age categories represented in the study sample showed that the highest prevalence of low PF was found among urban-based learners aged 12 years (63.9%), followed by urban-based learners aged 6 years (63.2%) and 11 years (60%). In turn, the prevalence of low fitness among rural-based learners aged 12, 6, and 11 years equalled 18.9%, 39.3%, and 20%, respectively. Statistically significant differences were observed in the distributions of PF level categories between the 2 groups of learners aged 7 years ($p = 0.0340$), 11 years ($p < 0.001$), and 12 years ($p < 0.001$).

The comparison of Eurofit test scores and overall fitness levels of participants from urban- and rural-based schools are displayed in Table 5. Children from the rural school had significantly higher SLJ ($p < 0.001$)

Table 3. Comparison of fitness levels of urban- and rural-based children

Fitness status	Urban school (*n* = 260) *n* (% within location)	Rural school (*n* = 260) *n* (% within location)	χ^2	*p*
Low	142 (54.6)	69 (26.5)		
Moderate	68 (26.2)	96 (36.9)	44.788	< 0.001
High	50 (19.2)	95 (36.5)		

Table 4. Comparison of physical fitness levels in primary school children by age

Age (years)	Fitness status	Urban school (*n* = 260) *n* (% within location)	Rural school (*n* = 260) *n* (% within location)	χ^2	*p*
6	Low	12 (63.2)	11 (39.3)		
	Moderate	4 (21.1%)	10 (35.7)	2.586	0.274
	High	3 (15.8)	7 (25.0)		
7	Low	17 (50.0)	3 (15.0)		
	Moderate	9 (26.5)	10 (50.0)	6.743	0.034*
	High	8 (23.5)	7 (35.0)		
8	Low	20 (45.5)	11 (26.8)		
	Moderate	12 (27.3)	19 (46.3)	4.136	0.126
	High	12 (27.3)	11 (26.8)		
9	Low	21 (55.3)	10 (31.3)		
	Moderate	8 (21.1)	10 (31.3)	4.070	0.131
	High	9 (23.7)	12 (37.5)		
10	Low	15 (51.7)	12 (31.6)		
	Moderate	10 (34.5)	12 (31.6)	4.951	0.084
	High	4 (13.8)	14 (36.8)		
11	Low	21 (60.0)	7 (20.0)		
	Moderate	11 (31.4)	9 (25.7)	18.836	< 0.001*
	High	3 (8.6)	19 (54.3)		
12	Low	23 (63.9)	7 (18.9)		
	Moderate	7 (19.4)	16 (43.2)	15.244	< 0.001*
	High	6 (16.7)	14 (37.8)		
13	Low	13 (52.0)	8 (27.6)		
	Moderate	7 (28.0)	10 (34.5)	3.694	0.158
	High	5 (20.0)	11 (37.9)		

* significant difference at α = 0.05

Table 5. Comparison of urban and rural school children's physical fitness test scores

Variable	Urban (*n* = 260) Median (LQ; UQ)	Rural (*n* = 260) Median (LQ; UQ)	*z*	*p*
SLJ (m)	1.41 (1.24; 1.57)	1.51 (1.29; 1.70)	–3.858	< 0.001*
5m-SRT (s)	27.92 (25.03; 30.69)	24.95 (23.10; 27.27)	–7.646	< 0.001*
SU (/30 s)	11.00 (8.00; 14.00)	15.00 (12.00; 17.00)	–9.408	< 0.001*
CBT (m)	14.01 (10.36; 18.00)	14.27 (10.15; 18.67)	–0.007	0.994

LQ – lower quartile, UQ – upper quartile, SLJ – standing long jump, SRT – shuttle run test, SU – sit-ups,
CBT – cricket ball throw
* significant difference at α = 0.05

Table 6. Comparison of participants' demographic characteristics and physical fitness test scores by gender

Variable	Boys (n = 231) Median (LQ; UQ)	Girls (n = 289) Median (LQ; UQ)	z	p
Age (years)	9.00 (8.00; 12.00)	10.00 (8.00; 11.00)	–0.194	0.846
Weight (kg)	31.30 (24.60; 39.10)	32.30 (26.10; 42.60)	–1.577	0.115
Height (m)	1.32 (1.21; 1.42)	1.33 (1.25; 1.44)	–1.239	0.215
BMI (kg/m^2)	17.78 (16.45; 19.64)	18.11 (16.23; 21.37)	–1.215	0.224
SLJ (m)	1.51 (1.30; 1.71)	1.42 (1.25; 1.57)	–3.925	0.000*
5m-SRT (s)	25.38 (22.91; 29.11)	26.71 (24.30; 29.25)	–3.179	0.001*
SU (/30 s)	15.00 (11.00; 18.00)	12.00 (9.50; 16.00)	–4.121	0.000*
CBT (m)	16.32 (12.28; 20.08)	12.80 (9.38; 16.63)	–6.584	0.000*

LQ – lower quartile, UQ – upper quartile, BMI – body mass index, SLJ – standing long jump, SRT – shuttle run test, SU – sit-ups, CBT – cricket ball throw
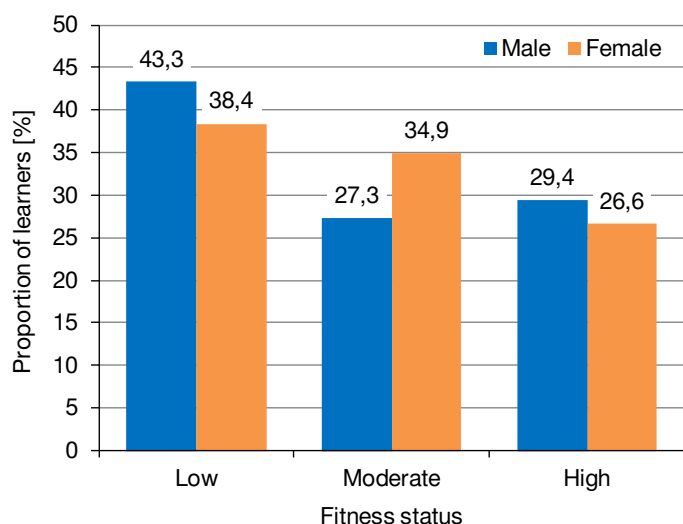* significant difference at $p < 0.05$

Figure 2. Distribution of physical fitness levels by sex

and SU ($p < 0.001$) scores, and lower 5m-SRT scores ($p < 0.001$) than those from the urban school. However, participants from the 2 types of schools were not statistically different in their CBT scores ($p = 0.994$).

As presented in Table 6, male and female participants' demographic characteristics and Eurofit test scores were compared. Male learners had significantly higher SLJ ($p < 0.001$), SU ($p < 0.001$), and CBT scores ($p < 0.001$), but significantly lower 5m-SRT scores ($p < 0.001$) than their female counterparts. However, male and female subjects were comparable ($p > 0.05$) regarding their demographic characteristics. Figure 2 illustrates the distribution of PF levels by sex. Higher prevalence of low PF status was observed among the boys (43.3%) as compared with girls (38.4%). However, the results of chi-square test showed that the distribution of PF levels was not significantly different between the sexes (χ^2 = 3.511; $p = 0.173$).

Discussion

The primary objective of this study was to compare the PF profile of primary school children studying in rural and urban schools in eThekwini district, KwaZulu-Natal, South Africa. The participants from the rural school demonstrated statistically significantly better performance than their urban-based counterparts in 3 (SLJ, SU, and 5m-SRT) of the 4 battery tests used in this study. Further analysis also showed that the prevalence of low fitness status was significantly higher among urban-based school children compared with their rural-based counterparts (56.4% vs. 26.5%).

These findings suggest that rural primary school children were more physically active and had a healthier overall profile than their peers from the urban school. It was also implied that a higher proportion of children from the urban school exhibited a high metabolic risk [16]. A probable explanation for rural school children's better PF performance indicators could be that children residing in rural areas may have more opportunities in terms of active play and active transportation, as well as reduced access to social media and other modern technologies. These factors could have enhanced rural children's potential for increased physical activity and reduced their sedentary time. Rural areas are associated with less sedentary lifestyle and more walking for transport [17]. Ramos-Sepúlveda et al. [18] further highlighted that urban children had more barriers that could restrict their freedom to play and practise physical activities. Peer et al. [11] identified environmental factors, such as lack of safety, high crime rates, lack of green areas and recreation facilities, as hindrances to South Africans' participation in optimal physical activity.

Furthermore, urban centres are known to have better infrastructure, with easier access to public trans-

port, and a lower likelihood to walk long distances to access schools [11]. In addition, urbanization seems to provide easier access to sedentary activities, such as television, which could contribute to tendencies for a high prevalence of physical inactivity in urban compared with rural children and adolescents [19, 20]. In turn, children residing in rural areas normally help their parents in household chores and other related activities, which may reduce the time available for sedentary leisure activities [21]. PF in children is reported to be strongly influenced by the school or exercise opportunities available in the community [22].

The results of this study regarding SLJ (lower limb power) and 5m-SRT (cardiorespiratory fitness) performance agree with a recent Macedonian study by Sylejmani et al. [9], who found that rural children and adolescents exhibited better performance in SLJ, handgrip strength, and bent arm hang ($p < 0.001$; Cohen's d: 0.1–0.5) compared with their urban peers. In Spain, Chillón et al. [23] also observed that rural children and adolescents had higher cardiorespiratory fitness, but lower speed agility and flexibility than urban young people ($p < 0.001$; Cohen's d: 0.1–0.3). The detailed analysis further revealed that rural children and adolescents had better performance in handgrip strength (mean difference: 0.8 kg), and bent arm hang (mean difference: 2.3 s) than their urban peers. It was concluded from both studies [9, 23] that besides other environmental factors, the place of residence should be considered when designing interventional strategies to promote physical activity and health. The findings of the present study regarding SU performance are at variance with the results obtained by Sylejmani et al. [9] and Chillón et al. [23], as both studies indicated a significantly better SU performance among urban children and adolescents. This may be attributed to the genetically induced racial differences between white Macedonian or Spanish and black South African children. Armstrong et al. [13] implied that white South African children presented significantly higher SU performance scores than their black African counterparts. All the 520 children that participated in this study were black Africans.

High prevalence of low fitness was observed among children from the urban school aged 12 years (63.9%), 6 years (63.2%), and 11 years (60%). Differences in the maturational status of children for any given chronological age, accompanied with assumptions concerning body size, are hypothesized to affect performance scores in tests of motor skills [13]. However, the finding suggests that sedentary lifestyle may cluster around the period that a child approaches the adolescent stage

of life as adolescents are more likely to spend much time with social media devices than those within the younger age categories. In contrast, the prevalence of low fitness among rural based learners aged 12, 6, and 11 years equalled 18.9%, 39.3%, and 20% respectively.

Boys had significantly better performance scores in all 4 fitness tests utilized in this study. Anatomical and physiological differences in the physical activity level, body composition (especially greater muscle mass), cardiac size and function, and mechanical efficiency may explain the gender differences in PF among school boys and girls [16, 24]. Boys' superiority in terms of cardiorespiratory fitness has been a consistent finding in literature [16, 25, 26]. This further confirms the reason why the boys performed better in all fitness tests.

The descriptive comparison of the present study with available international data from Poland and Greece showed that median SLJ scores for boys and girls aged 7–11 years in the present study were higher than the values reported for Polish and Greek children. Children from Poland and Greece had higher median scores in SU and SRT for both genders. It is important to take into consideration the environmental variables of the 3 countries (Poland, Greece, and South Africa), which may have an impact on the physical activity of pupils. Unfavourable weather has been identified by Harrison et al. [27] as an environmental barrier to being physically active: levels of activity in cold weather may be lower than those in a warmer climate.

Limitations of the study

Normative reference values for classification of South African children into low, moderate, and high PF categories are not available. Therefore, a statistical ranking of z-scores for the battery test scores was performed as observed in previous South African research [15]. We could not use reference values from Europe because children's PF levels have been shown to depend on several biological and environmental factors, which vary across countries [2]. Further, using a purposive sampling method to select participants is an additional limitation; the findings of the study may not be a true representative of primary school children in eThekwini district and KwaZulu-Natal province. Consequently, any generalization of the results of this study to all children in eThekwini district and KwaZulu-Natal must be conducted with caution. Finally, not accounting for the tempo and timing of growth and maturation, particularly in older

girls, is a major limitation that could have introduced cofounders into the result of the study [28].

Conclusions

Rural school children in eThekwini district had better performance in all 4 Eurofit tests used in the study as compared with their urban peers. They also exhibited a healthier overall PF profile. Stakeholders in the departments of education and health should carefully consider the setting of the child's residence when implementing effective interventions to promote physical activity and health in this vulnerable population.

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Conflict of interest

The authors state no conflict of interest.

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