Comparative Study on Speed Running among Children Aged 11-12

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Abstract
The purpose of this study was to compare the results obtained in 50-sqm speed running by children aged 11-12 residing in urban or rural areas. Furthermore, the study compared the values obtained ten years prior in the same trial (by subjects of the same age). The sample comprised 155 children aged 11-12 ± 0.5 (from Iași, Romania): 74 children from a rural school and 81 from an urban school. The assessment of the 50-sqm speed running was performed by gender (boys and girls separately). The findings have proven the differences among the children: the rural boys obtained X+S=8.64±0.7 seconds compared to X+S=10.02±1.51 seconds scored by the urban boys. The results obtained by the rural girls were X+S=9.22±0.77 seconds, while the urban girls scored X+S=10.7±1.44 seconds. Upon comparing the values obtained in speed running in 2012 with those of 2022, we have concluded that, in 2012, the boys recorded better values by 0.04'' compared to the rural boys and 1.33'' compared to urban boys. Concerning the girls, in 2012, they scored better by 0.04'' compared to rural girls and by 1.52'' compared to urban girls. Consequently, it may be suggested that the results obtained by children aged 11-12 have had a descending trend, which means an insufficient development of the motor quality of "speed" over the past ten years.

K***eywords****: physical education, motor qualities, speed running.*

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1. Introduction

Physical education and sport represent a mandatory subject of the standard curriculum, targeting the development of motor skills and the integration into society of middle schoolers (European Commission/ EACEA/Eurydice, 2013).

The PES Curriculum has been widely used and is related to the positive psychological outcomes obtained by students, such as the development of skills and the increase in the motivation to practice exercising (Hastie et al., 2011; Wallhead & O'Sullivan, 2005). Exercising may lead to educational benefits regarding social development, aptitudes, trust, and behavioural consistency (Ntoumanis and Standage, 2009; Van den Berghe et al., 2014).

Physical education and sport discipline are based on an educational curriculum and the analysis of school documents. The syllabus for the Physical education and sport discipline contributes to developing the formation profile of middle school graduates. It is a competence-based flexible school document (MEN, 2017).

The philosophy of Physical education and sport provides students with opportunities to practise sporting activities, increasing the students' chances of practising performance sports (van der Mars and Tannehill, 2015).

Siedentop designed the student-centred curriculum in 1994 to increase students' motivation in Physical education and sport class by accomplishing the essential requirements and depending on their acquisitions (Wallhead et al., 2014).

The contents of instruction concern fields related to the organisation of motor activities, well-balanced physical development, motor capacity, the sports disciplines, individual hygiene and protection, behaviours and attitudes – through a specific approach, they contribute to the progressive acquisition of skills by enhancing the age-specific experience (MEN, 2017).

The Physical education and sports program generally promotes an optimal climate of self-control and student perception through autonomy, competence, and connecting (Chu & Zhang, 2018).

The literature has provided well-grounded evidence concerning the relationship between Physical education and sports class and motor skills (Figueroa & An, 2017).

In addition, various studies have reported that extracurricular activities and leisure physical activities carried out by children may develop their motor skills, which may constitute an alternative to the practice of Physical education and sport (Barnett et al., 2016; Bonvin et al., 2013).

The individual differences concerning motor competence are considered the outcome of motor experiences during childhood; subsequently, they reach high levels of specific competencies. Therefore, Physical Education classes are a significant factor in developing motor skills and qualities (Robinson et al., 2015).

The insight into the motor capabilities of children aged 11-12 is directly related to the effects of physical education practice and the development of various motor skills. For a teacher, it is highly relevant to grasp the motor capabilities of students, as it facilitates the planning process for the classes of Physical education and sports by choosing the manifestation methods and forms and selecting the physical exercises to develop those competencies (Batez, Krsmanovic, Dmitrić & Pantović, 2011).

Iivonen and Sääkslahti (2014) have reported that further research is necessary to understand the characteristics of physical activities that are relevant through their organisation level and structure (Berry, Abernethy, & Côté, 2008; Mota & Esculcas, 2002).

While the Physical education and sports classes take place in a systematic and organised setting under the direct supervision of teachers, the nonformal activities are free, and they contribute to both improving motor performance and enhancing the pleasure of exercising (Coutinho, Mesquita, Davids, Fonseca and Côté, 2016).

Many studies that have investigated the comparison between the motor capacity of urban and rural students have found that rural students tend to have better results than urban ones (Özdirenç, Özcan, Akin & Gelecek, 2005; Tinazci & Emiroglu, 2010; Badrić & Petračić, 2007; Cetinić, Petric & Vidakovic-SamarĎija, 2011; Karkera, Swaminathan, Pais, Vishal & Rai, 2014; Adamo et al., 2011; Tanovic, Kurtalić, Bojic, Mijatović și Azapagić,

2013; Albarwani et al., 2009). In addition, students' development and physical activity make the subject of other research studies (Simeonova & Pavlov, 2012; Yukako et a., 2010; Galov, 1996).

Motor capacity is determined by developing the motor qualities of speed, power, resistance, and flexibility (Slanchev, 1992).

To teach them to students ages 11-12, we use one of the athletics races, i.e., the 50 sqm speed running. The event comprises several phases: start, acceleration, peak speed, and deceleration, which involve, to a smaller or larger extent, the other motor qualities, too (Plisk, 2008). The decisive factor in short-distance running is represented by the level of motor aptitudes – power, speed, and acceleration (Dewanti & Lumintuarso, 2018).

Speed running is defined as a movement executed with maximum speed; it is genetically conditioned. The early detection of genetic resources may help to create an athlete with superior qualities. The maximum race speed is expressed by the structure of kinematic and dynamic parameters (Azuma & Matsui, 2021).

Maximum velocity (Vmax) is characterised by a gradual increase in speed, represented as a relatively flat section between speed and distance, almost 100% of the highest possible value (Healy et al., 2022).

Various methods and means of education speed and power are used to develop maximum acceleration, which helps maintain the acceleration level on the entire distance. Running is a part of most sports, but it has different representations depending on the objective to attain. Competence regarding running skills is significant and necessary in Physical education and sports, and it develops with age (Kato Miyamaru, 2006; Kato et al., 1985, 1987, 1992).

In athletics, an essential factor is to obtain maximum speed as quickly as possible. Short-distance running may be assessed concerning various aspects of speed quality through four phases (i.e., reaction time and reaction speed, acceleration, deceleration, and sprint speed and speed resistance). Speed is influenced by muscle power, anaerobic running, movement coordination, technical abilities, and the type of muscle fibres specific to the athlete (Nossek, 1995).

The comparative studies concerning the biomotor programs conducted around ten years apart aim to assess the health state, mean values of height evolution, youth weight, and the level of motor qualities determined by the biological and functional substrate (National Research Institute for Sport, 2012).

The interested parties involved in the field – mostly the Physical education and Sports teachers – were notified regarding data interpretation for each edition and the conclusions of each work. New findings have been outlined regularly regarding the evolution of biomotor potential, and the causes for justifying outcome decreases regarding some tests have been analysed (resulting in alterations to the syllabus).

After 1990, we noted the regression of the students' biomotor potential. In this respect, investigations have been carried out on other samples of students, thus recording a new battery of measurements and motor tests.

2. Material and method

2.1. The purpose of this study was to compare the results obtained in the 50 sqm speed running by rural and urban children aged 11-1, as well as the comparison of the results acquired decades ago in this test by subjects of the same age.

2.2. The subjects

The sample comprised 155 children aged 11-12 from Iași, Romania, 74 children from a rural area: 38 boys, 36 girls and 81 children from an urban area: 42 boys, 39 girls. We assessed the 50 sqm speed running on distinct groups and by gender.

2.3. Procedure

The test was applied in 2021 – 2022 to all students aged 11-12 during the Physical education and sports classes. The performance of the 50 sqm speed running was assessed according to the National Evaluation System for Physical education and sports benchmarks.

In this study, the statistical analysis compared the results of the 50 sqm speed running of rural students with the results of urban students, as well as the results of the assessment of the biomotor potentials from 2012 with the values obtained in 2022. To make the statistical calculations and graphical representations, the IBM SPSS Statistics 20 software was used, and the following indicators were calculated: Independent-Samples T Test and regression.

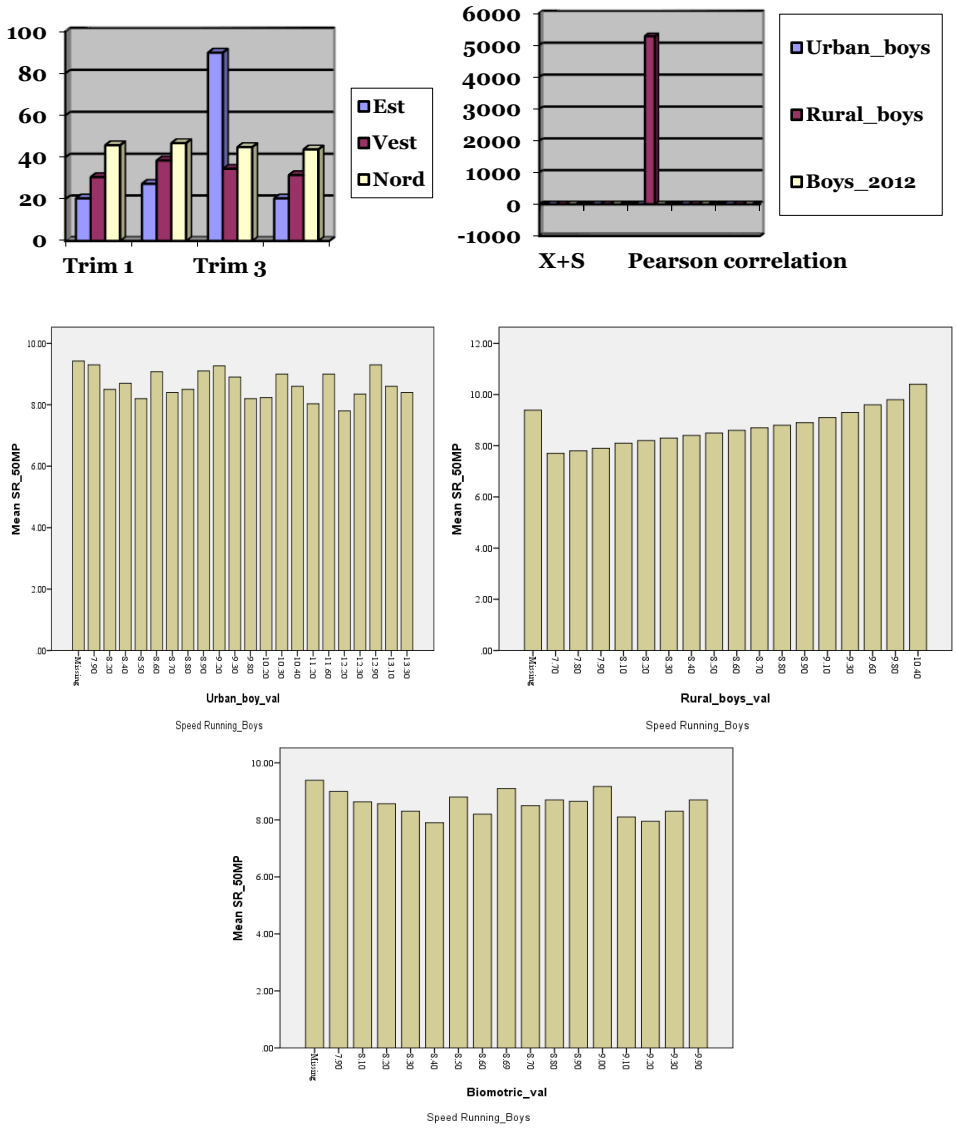
3. Results and Discussion

In this study, we assessed the potential differences between groups of urban and rural students, the differences between the results obtained by urban students in 2022 and the results obtained by students in the biomotor program of 2012, the results obtained by rural students in 2022 and those obtained by students in the biomotor program of 2012.

Table 1. Speed Running (SR) values among the research **Boys**

SR	Urban 2022 – Rural 2022	U. 2022 – Biomotor 2012	Rural 2022 – Biomotor 2012
X+S	10.02±1.51 – 8.64±0.70	10.02±1.51 – 8.69±0.43	8.64±0.70 – 8.69±0.43
D	1.38±0.81	1.33±1.08	0.04±-0.73
T Test	t = - 4.249;	t = 5.284;	t = -0.373
Sig	P<000	P<000	P = 0.711

Statistical calculations have shown that in the 50 sqm speed running, the difference between the mean of the results of urban students was higher by 1.38±0.81 compared to that of rural boys and by 1.33±1.08 compared to that of biomotor 2012. Among rural students, the results obtained in 2022 feature a lower difference by 0.04±-0.73 compared to the mean of the results obtained by boys in 2012. Hence, it may be concluded that between the results obtained by urban and rural boys, there is a perfect significance P<000. In addition, the results obtained by urban boys in 2022 and those obtained in 2012 were significant, P<000. Comparing the results of rural boys in 2022 and those obtained in 2012 indicates a significance threshold of P=0.711, showing that the difference between means is insignificant. (Table 1, Figure 1).



Graph 1. The results obtained by urban and rural boys and the values obtained in the biomotor program of 2012

Table 2. Regression of results – Boys

Regression	Sum of Squares	Sig.	MIN	MAX
Urban 2022 – Rural 2022	3.130	P = 0.155	8.99	10.10
Urban 2022 – Biomotor 2012	3.916	P = 0.110	9.12	10.62
Rural 2022 – Biomotor 2012	0.04	P = 0.933	8.62	8.66

Between the values obtained by the group of urban boys in 2022 and those obtained by rural boys in 2022, there is a positive regression of 3.130. The values obtained by urban boys in 2022 and those obtained by boys in 2012, there is a positive regression of 3.916. The results of rural boys in 2022 and those obtained by boys in 2012 indicate a positive regression of 0.04 (Table 2, Figure 2).

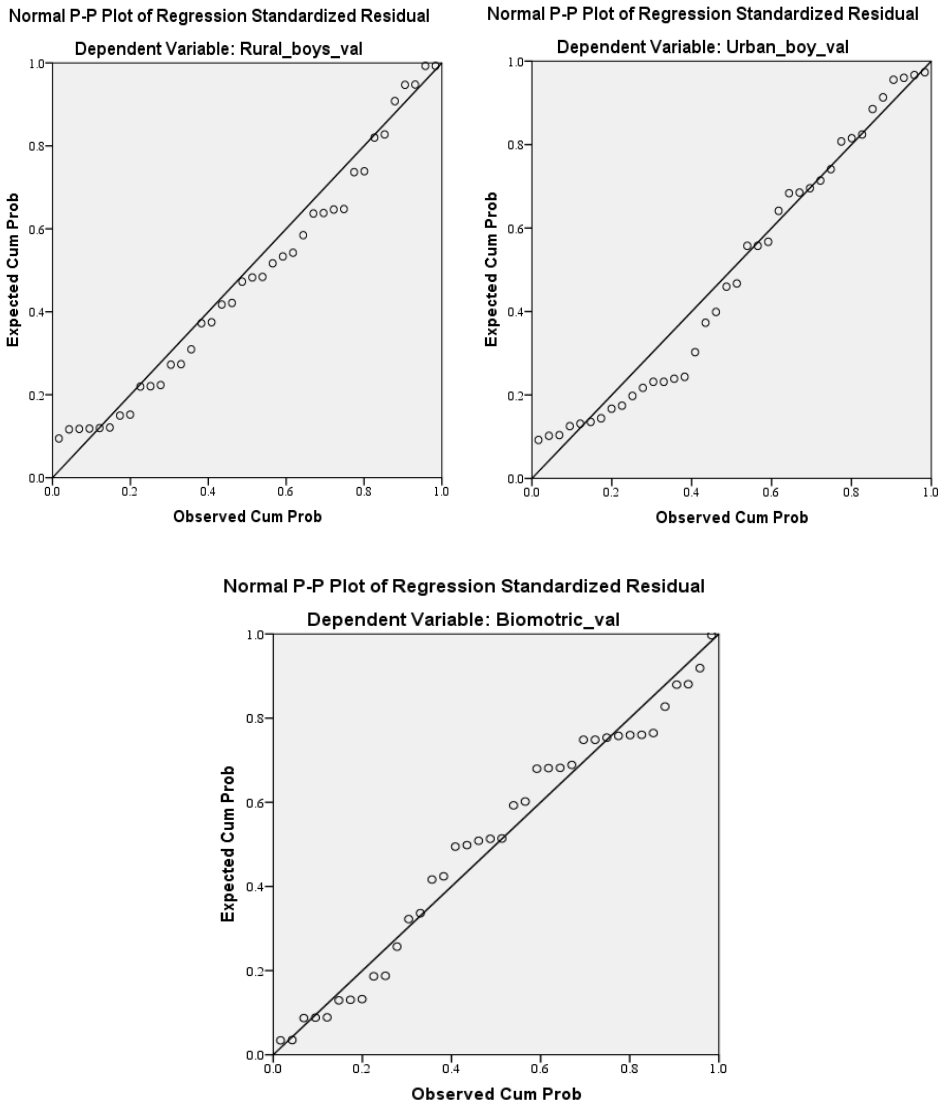


Figure 2. The regression between the three groups of subjects

Table 3. Speed Running (SR) values between the research studies – **Girls**

	Urban-Rural	**Urban -Girls 2012**	**Rural – Girls 2012**
X+S	10.78±1.44 – 9.22±0.77	10.78±1.44 – 9.18±0.66	9.22±0.77 – 9.18±0.66
D	1.56±0.67	1.6±0.78	0.04±-0.11
T Test	t = - 5.746	t = 0.277;	t = 6.086
Sig	P<000	P<000 P = 0.783	P = 0.783
Pearson correlation	-0.046	-0.140	0.036

The results obtained by the rural girls in the 50 sqm speed running in 2022 have shown a difference of 1.56±0.67 compared to the values obtained by the urban girls. The values obtained by girls in the biomotor program of 2012 recorded differences of 0.04±-0.11 compared to the results obtained by the rural girls in 2022 and 1.6±0.78 compared to the values obtained by the urban girls in 2022. The significance threshold is p<000 between the urban-rural groups and urban groups – the biomotor program of 2012, which proves that the differences between means are significant. The differences between the results obtained by the rural girls in 2022 and those obtained by girls in 2012 are insignificant, underlined by the value of P = 0.783. (Table 3, Figure 3).

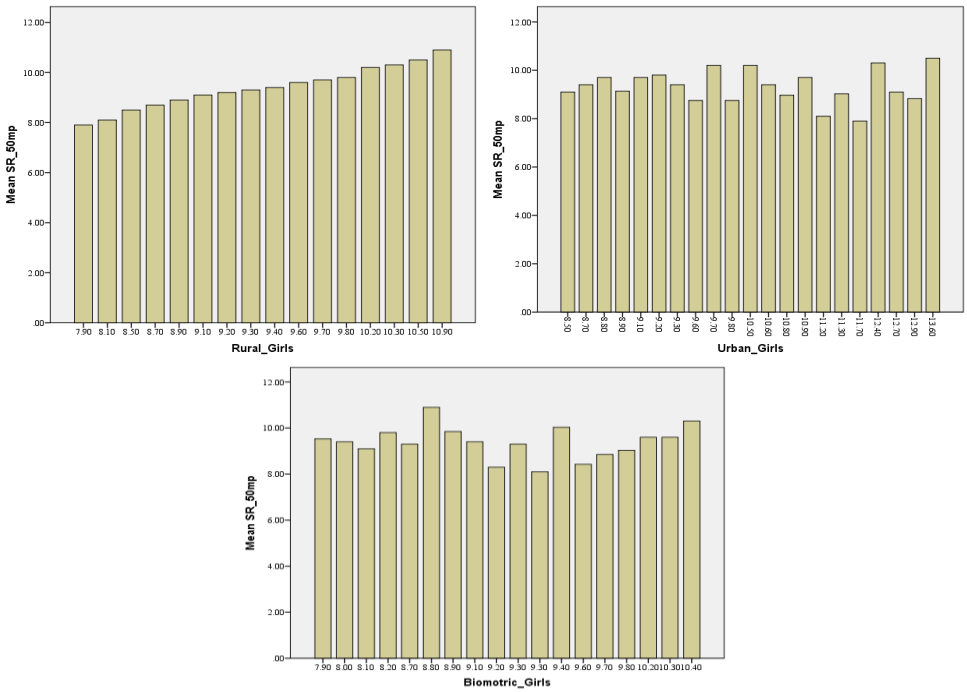


Figure 3. The results of girls in the 50 sqm speed running

Table 4. Regression results – Girls

Regression	Sum of Squares	Sig.	MIN	MAX
Urban- Rural	0.145	P = 0.788	10.80	11.05
Urban -Girls 2012	0.087	P = 0.836	10.84	11.03
Rural – Girls 2012	0.412	P = 0.415	9.02	9.43

Statistical calculations prove a positive regression of 0.145 between the results obtained by the urban girls in 2022 and the results obtained by the rural girls in 2022. The values obtained by the urban girls in 2022 and those obtained by girls in 2012 show a positive regression of 0.087. In addition, the values obtained by the rural girls in 2022 recorded a positive regression of 0.412 compared to those obtained by the rural girls in 2012 (Table 4, Figure 4).

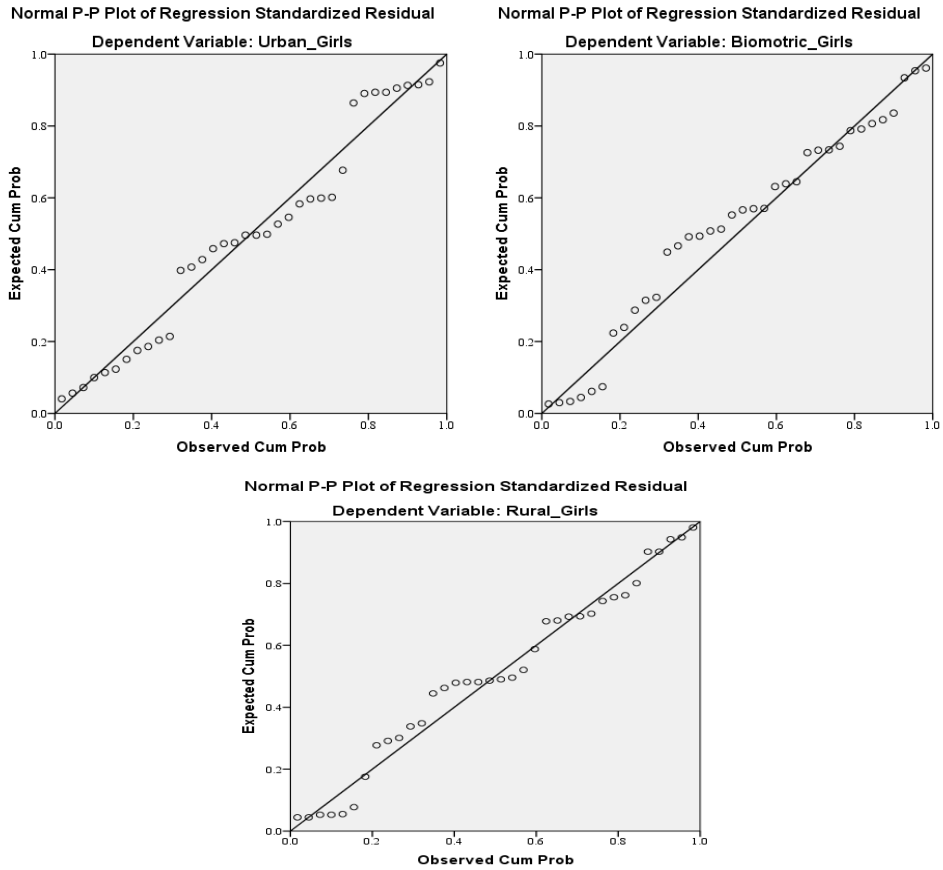


Figure 4. Regression between values in the 50 sqm speed running

A study carried out on 150 children within a primary school in Vidikorac, Croatia, has mentioned that the reaction time in the 50 sqm speed running is, on average, 15.3% higher for boys than for girls and that boys run 4.8% faster than girls (Blažević et al., 2011). Another study conducted in Croatia on a sample comprising 2431 students aged between 11.3 +/- 6.1 have shown that the differences between the exercise capacity of the rural and urban children have been calculated using a series of univariant analysis of variance, the results for speed running demonstrating that urban students have scored almost equal values compared to rural students (Ujević et al., 2013). Another study was conducted on students aged 10-12 and included 85 students, 61 from urban and 24 from rural areas (from various geographical zones). The urban students came from the school Kebangsaan Sungai Besi 2, Kuala Lumpur, and the rural students came from the school Sekolah Kebangsaan Sungai Rasau, Dalat. The results have proven that rural students scored higher by 33.3% compared to urban students, who obtained 19.7% (Hian et al., 2013).

4. Conclusions

This study aimed to compare the results of students aged 11-12 from rural and urban areas and the results obtained by students in 2022 with those within the biomotor program of 2012 in the 50 sqm speed running.

The study results have proven that rural boys scored higher than urban students and boys. In addition, the values obtained by rural boys in 2022 were better compared to the results obtained in the biomotor program of 2012.

The values obtained by girls in the biomotor program of 2012 were better compared to the results obtained by the rural girls in 2022 and the results obtained by the urban girls in 2022.

Consequently, the results prove that rural boys featured constant values concerning speed running, while urban boys scored lower on this test. Furthermore, the urban girls recorded lower scores compared to rural boys and the values obtained by girls in the biomotor program of 2012.

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