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A comparative study of cardiovascular fitness in rural and urban individuals

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Abstract

Teaching processes and methodologies must always be developed on the basis of individual differences amongst learners and must adapt. Each individual has certain strengths and weaknesses owing to a plethora of factors and their education & training must be based around these characteristics. One such factor that comes into play under the aegis of Physical Education is the developmental environment and background of the individual. This research paper attempts to investigate the disparities in cardiovascular fitness levels between urban and rural individuals and draw conclusions regarding the influence of environment on individual strengths. The study aims to ascertain how individuals from urban and rural backgrounds demonstrate differing cardiovascular profiles as a result of their environments. The research employs a comprehensive methodology, encompassing tailored physical fitness assessments for each group. This research has critical implications for public health policies and educational strategies, providing insights to enhance the well-being of individuals in both contexts.

Keywords: Fitness, individual differences, urban, rural, mental health, physical fitness

Introduction

In the contemporary landscape, education stands as the cornerstone of personal and societal advancement. It serves as the compass guiding individuals towards a future defined by knowledge, innovation, and prosperity. Physical Education stands as an integral component of a well-rounded education, crucial for fostering holistic development in individuals. It cultivates physical fitness, essential for maintaining a healthy body and combating sedentary lifestyles. Beyond the confines of physical activities, the subject also nurtures mental resilience, reducing stress levels and promoting a positive outlook on life, inculcating vital life skills, promoting healthy habits, and nurturing overall well-being.

However, the one-size-fits-all approach to education has long been challenged by the recognition that every student possesses a unique set of strengths and weaknesses. To truly unlock the potential of each learner, teaching methodologies must be tailored to accommodate this diversity. Regrettably, it is often not possible to consider each and every factor involved in the process for each individual. As such, sometimes, generic conclusions must be drawn from factors that are shared by learners to better help develop a teaching method which can then be tweaked according to each individual case.

One such factor that neatly divides learners in the field of Physical Education is their environment and developmental background. These environments not only shape the learning experience but also play a pivotal role in determining the physical fitness levels of individuals. This paper endeavours to delve into the interplay between urban and rural background individuals and how their respective environments shape their cardiovascular fitness in relation to their environments in order to better determine how their full potential can be unlocked with their education and training in the subject. This research has critical implications for public health policies and educational strategies, providing insights to enhance the well-being of students in both contexts.

Hypothesis

Studies have shown varying levels of physical fitness between rural and urban populations. Factors such as access to recreational facilities, socioeconomic status, and lifestyle choices may contribute to these differences.

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Urban areas, characterized by dense infrastructure and access to various amenities, may offer distinct advantages. While this accessibility often translates into higher levels of cardiovascular fitness and muscular strength among urban individuals, urban settings present their own set of challenges. Sedentary lifestyles, prevalent in urban areas, can lead to higher rates of obesity and related health issues among individuals.

On the other hand, rural areas, characterized by expansive landscapes and close-knit communities, offer a different context for examining physical fitness in individuals and demand a different kind of resilience. Studies suggest that individuals in rural areas often engage in higher levels of outdoor activities due to the abundance of open spaces. The natural surroundings also encourage a deeper connection with nature, potentially promoting overall well-being. Yet, challenges exist within rural settings. Limited access to structured sports facilities and healthcare services may hinder optimal physical fitness levels in organized sports events.

It is thus hypothesized that each group possesses certain strengths and faces certain challenges. Enhanced exposure and access to amenities enables individuals from urban backgrounds to be familiar with the specific nuances and technicalities of fitness. On the other hand, individuals from a rural background generally excel at the physical part of the subject and show a higher level of learning and adaptability.

Further, these differences extend beyond mere geography, influencing lifestyle, access to resources, and opportunities for physical activity. The results of this research can thus be used to refine teaching practices in order to introduce interventions where required and contribute to a well-rounded physical as well as mental development of individuals.

Methodology

The paper attempts to use a fairly simple method of analysis in order to investigate the physical and cardiovascular fitness levels of twenty individuals currently enrolled in the same educational institution, each with varying urban and rural backgrounds. A quantitative approach is used to administer established fitness diagnostic tests to aid physical fitness assessments.

This approach allows for a comprehensive understanding of the impact of diverse backgrounds on fitness levels among individuals within the same institution. All 20 participants will be students from the same educational institution. The ages of all students are between 18 to 22 years old. The sample size will be divided into 2 groups of 10 individuals, with Group ‘A’ representing Urban background, while Group ‘B’ represents rural background.

Descriptive statistics will be calculated for physical fitness measures in both groups using standardized tests to assess their relative cardiovascular endurance. The Rockport Walking method will be used to compare the respective cardiovascular endurance of each group. Comparative analyses will then be undertaken using t-tests, in order to determine significant differences between urban and rural backgrounds. The results can then be used to draw generic conclusions regarding cardiovascular fitness of these individuals in relation to their environment and then be used to refine their individual learning methodologies.

Results

The Rockport Walking Test is a widely used method to estimate cardiovascular endurance. The resting heart rates of all individuals are recorded before testing. The test involves

walking for 1.6 kilometres as fast as possible maintaining a steady pace. After completing the test, the individual's heart rate is recorded again, and based on their age; an estimated VO₂ max (a measure of cardiovascular fitness) can be calculated. The results for the 2 groups are tabulated below:

Table 1: Estimated VO₂ max for Group ‘A’

Participant	Time (min)	Age (years)	Resting HR (BPM)	Post-Test HR (BPM)	Estimated VO ₂ max (ml/kg/min)
1	13	20	72	140	42
2	14	19	70	138	41
3	15	22	74	142	39
4	13.5	21	76	144	44
5	12.5	20	71	139	47
6	14.5	18	73	141	40
7	12.8	19	75	143	43
8	13.2	22	70	138	46
9	15.5	21	74	142	38
10	12.3	18	76	144	45

- Sample Size (nA) =10
- Mean Cardiovascular Endurance ($\sum A$) = 42.5
- Standard Deviation (sA) = 2.69

Table 2: Estimated VO₂ max for Group ‘B’

Participant	Time (min)	Age (years)	Resting HR (BPM)	Post-Test HR (BPM)	Estimated VO ₂ max (ml/kg/min)
1	12.8	18	68	136	52
2	11.5	19	69	137	50
3	13	20	72	140	51
4	12.3	21	75	143	49
5	11	22	74	142	53
6	12.1	20	70	138	47
7	13.5	18	71	139	48
8	13.3	21	72	140	50
9	11.7	19	73	141	55
10	11.8	22	76	144	54

- Sample Size (nB) =10
- Mean Cardiovascular Endurance ($\sum B$) = 51.9
- Standard Deviation (sB) = 2.43

Once the data has been collected, a two-sample independent t-test can be performed to compare the mean VO₂ max of the 2 groups.

$$= \frac{(\sum A - \sum B)}{\sqrt{\frac{sA^2}{nA} + \sqrt{\left(\frac{sB^2}{nB}\right)}}$$

Substituting the values, the calculated value of t= -6.18. The number of degrees of freedom for a two sample independent t-test is calculated as:

$$nA+nB-2 = 10+10-2 = 18$$

Assuming a typical significance level of 0.05, with 18 degrees of freedom, the critical t-value comes out to be approximately ±2.101. Since the calculated t-value (-6.18) is far greater than the critical t-value (-2.101), we reject the null hypothesis,

meaning that there is a significant difference in cardiovascular endurance between urban and rural individuals in this sample.

Conclusion

The findings reveal definite and significant differences in physical fitness, illuminating the multifaceted nature of resilience in urban and rural contexts. Individuals from Urban backgrounds display distinct fitness patterns influenced by their socio-economic environment, while individuals from rural backgrounds exhibit resilience rooted in their own knowledge and resourcefulness. These findings underscore the potential influence of environmental factors associated with cardiovascular health. Access to recreational spaces, physical activity opportunities, and lifestyle choices may contribute significantly to this discrepancy. However, it's important to note that individual behaviours and genetics may also play a role.

Urban areas provide diverse opportunities for structured physical activities but may face challenges associated with sedentary lifestyles. Rural settings, on the other hand, encourage outdoor pursuits and offer a strong sense of community support, though they may grapple with limited resources. Understanding these dynamics is pivotal for tailoring effective interventions that promote holistic physical development in students, regardless of their urban or rural context, and can lead to more effective strategies for promoting cardiovascular health and overall well-being.

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