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A comparative study of cognitive ability between urban slum and general area early teen male Athletes

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Abstract
Sports performance at any level not only requires physical strength and motor ability but some psychological aspects, e.g., cognitive abilities for quick decision making, paying attention, memorizing are the highly influencing factors. The influence of the environment is also a crucial aspect that helps to grow cognitive abilities in athletes. The purpose of the study was to observe the impact of the social environment and economic condition in the cognitive abilities of the slum area and general urban area athletes. A total of 47 athlete puberty boys (12yrs-15yrs) were selected as the subjects for the study. Their cognitive abilities were measured by Cognitive Ability Test (Sood *et al*.,2015) for collection of data, 38 questions were there in four domains of cognitive ability, namely - i) Verbal (VA), ii) Numerical (NA), iii) Abstract Reasoning (ARA) and iv) Verbal Reasoning (VRA). The statistics used were Mean, Standard Deviation and t-test for data interpretation. The level of significant difference was set at the 0.05 level. The study findings yielded the result that two groups had a significant difference in verbal ability and verbal reasoning ability, on the other hand, in numerical ability and abstract reasoning ability as well as total cognitive ability there was no significant difference present. Therefore, the study concluded that social environment and economical condition have an impact on cognitive abilities in the domain of verbal and verbal reasoning ability between the urban slum and urban general area early teen athletes.

Keywords: cognitive ability, slum area, general urban area, athlete, environment

Introduction
Cognitive ability is defined as a general mental capability involving reasoning, problem-solving, planning, abstract thinking, complex idea comprehension, and learning from experience (Gottfredson**,** 1997). These all represent some sort of cognitive abilities. But four major abilities i.e., verbal ability, numerical ability, verbal reasoning ability, and abstract reasoning ability can be measured as the basic cognitive abilities generally expected to be developed during childhood. Engaging in sports in late childhood positively influences cognitive and emotional functions (Bidzan-Bluma & Lipowska, 2018) [3]. Any person who has a target to participate in a pre-determined sports competition has been guided with systematic sports training that can be called an athlete. An athlete requires to develop the round-up qualities i.e., development of cardiovascular endurance, strength, flexibility, agility, skills related to the game and tactics for good sports performance. If the focus is being depicted to the team game, then the prior importance should be given to the mental task, because the tactical sense is one of the important factors to win a match. Tactical learning comes from tactical training. And the cognitive ability is the main component of understanding tactical training. The high-demand sport requires an extraordinary physiological capacity combined with outstanding abilities like motor control, perception, and cognitive functioning (Scharfen & Memmert, 2019).
Another important factor to enhance the cognitive ability in puberty boys is their environmental influence. Sportspersons from different socio-economic backgrounds do differ in cognitive abilities too. Children in poverty are more likely to experience worse health and more developmental delay, lower achievement, and more behavioral and emotional problems than their more advantaged peers. Relationship noticed between socio-economic status and brain development (Johnson *et al*., 2016) [9]. In this study, a comparison was made by the four main cognitive abilities between urban slum area and general area early teen male athletes.

Method
A total of forty-seven (47) boys, age group between 12yrs-15yrs (slum area n=23, general urban area n= 24) were the subjects of this study. The subjects for this study were selected (purposive samplings) from the urban slum area (USA) as well as specific urban general areas (UGA) of the metropolitan city, Kolkata.
The questionnaire, *viz*., Cognitive Ability Test (Sood *et al*.,2015) used for this study, which had the scope to measure four different domains i.e., i) Verbal Ability, ii) Numerical ability, iii) Abstract Reasoning Ability and iv) Verbal Reasoning Ability. The four domains of Cognitive Ability were the criterion measures of this study.

Results and Discussion

Table 1: contains the Descriptive Statistics in the form of mean± Standard Deviation (Mean±SD) of Cognitive Abilities of the two groups.

Table 1: Descriptive Statistics of Cognitive Abilities of two groups

Group	Cognitive Ability				
	Verbal (mean±SD)	Numerical (mean±SD)	Abstract Reasoning (mean±SD)	Verbal Reasoning (mean±SD)	Total cognitive (mean±SD)
USA	8.130±2.685	4.565±1.502	5.174±1.337	5.174±1.875	23.043±5.842
UGA	9.833±2.496	4.917±1.840	4.625±1.555	6.583±1.742	25.833±5.223

 # USA= Urban Slum Area, UGA= Urban General Area

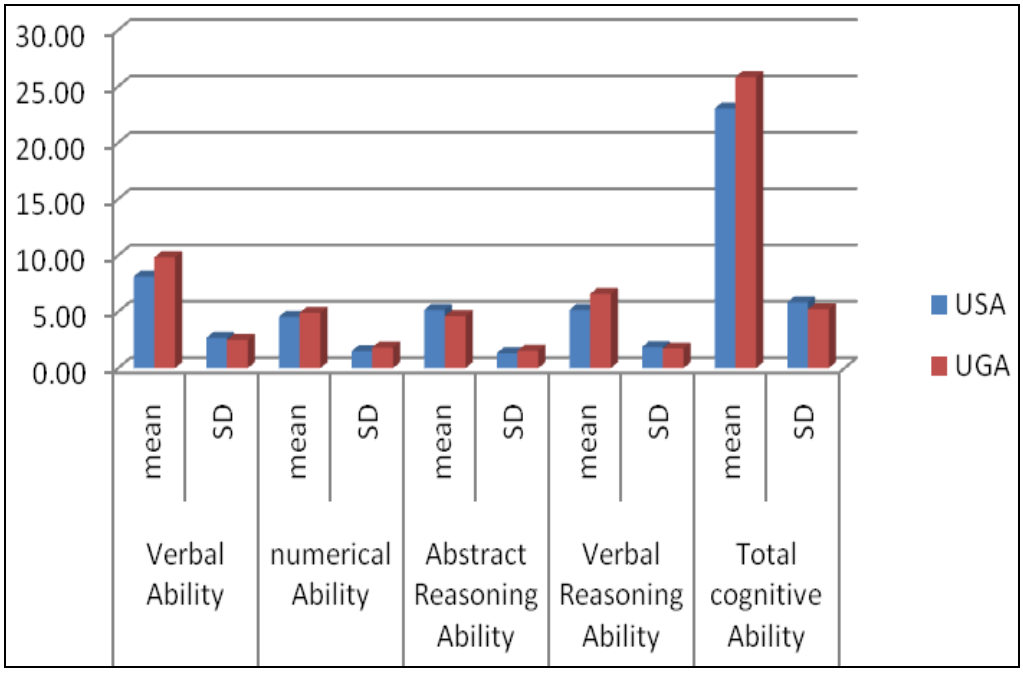

Fig 1: Descriptive Statistics of Cognitive Abilities of two groups

 # USA= Urban Slum Area, UGA= Urban General Area

It is observed that the USA group VA: 8.130±2.685, NA: 4.565±1.502, ARA: 5.174±1.337 and total CA: 23.043±5.842. On the other hand, the UGA had VA: 9.833±2.496, NA: 4.917±1.840, ARA: 4.625±1.555, VRA: 6.583±1.742 and total CA: 25.833±5.223.

Table 2: Comparative statistics between two groups

Variables	Mean Difference between USA& UGA	Standard Error	t-ratio	Sig. Level
Verbal Ability (VA)	1.7029	0.756	2.251*	0.029
Numerical Ability (NA)	0.3514	0.491	0.717^{ns}	0.477
Abstract Reasoning Ability (ARA)	0.5489	0.424	1.295^{ns}	0.202
Verbal Reasoning Ability (VRA)	1.4094	0.528	2.670*	0.011
Cognitive Ability (CA)	2.790	1.615	1.728^{ns}	0.091

*$t_{0.05}$ 45 = 2.000 and ns = not significant

The t-ratio for VA was 2.251* ($t_{0.05}$45= 2.000) and VRA was 2.670*, both were greater than the critical table value. Hence, the difference between the two groups in VA and VRA was statistically significant. However, the calculated t-ratios for NA- 0.717, ARA- 1.295 and CA- 1.728 were less than the critical t-ratio. Therefore, the difference between the two groups in NA, ARA, and CA was not statistically significant.

It is observed that children with poverty experienced a state of health and brain developmental delay (Johnson *et al*., 2016) [9] and socio-economic status effects on brain development **(**Raizada *et al*., 2010) [12]. However, it is observed that physical activity can enhance the cognitive functioning of children (Bluma *et al*., 2018) [3].

This study was conducted on the early teen male athletes of two different social and environmental conditions. Here, the common factor to both groups was their nature of sport participation (one among the social-environmental factors). The teens of two conditions had a difference in two of the four cognitive ability components- Verbal Ability and Verbal Reasoning Ability. And there had no difference in the rest two were-

Numerical Ability and Abstract Reasoning Ability. Overall cognitive ability found to have no difference between the particular two groups.

Conclusion

Considering all the limiting factors of the study, it was concluded that the difference in Verbal Ability and Verbal Reasoning Ability existed between the early teen male athletes of urban slum area and general area. However, both groups were at par in Numerical Ability and Abstract Reasoning Ability. Cognitive Ability, in general, had no difference between the groups.

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