

Cognitive Functioning According to the Sport Practiced in Children

PhD.BEKHECHI Amina Kheira, PhD.GHRICI Houari

University of Sciences and Technology of Oran Mohamed Boudiaf (Algeria)

Abstract: *The aim of our research is to find out whether there is an influence of extracurricular sports activity on children's cognitive abilities. Even if there is a significant difference between the disciplines in the level of intelligence in school children. A sample of 55 athletic students, aged between 6 and 10, from primary schools in the city of Oran (Algeria). The students were followed for five school terms. Socio-demographic data was collected through a questionnaire intended for students of both groups and academic results obtained from the administration at the end of each term. A "CPM" intelligence test was administered at the end of the fifth trimester to assess the main cognitive abilities of athletic students.*

Keywords: School children; Sport; CPM intelligence test

I. Introduction

It is widely recognized that physical activity is essential for the growth and development of children and youth. Regular physical activity can have a positive impact on their physical, mental and social well-being. In particular, it can play a role in school success and readiness (Activité physique quotidienne dans le écoles, 2005a, 2005b, 2006). Physical activity seems to have a positive effect on certain determinants of academic success such as behavior in class, self-esteem, self-image, satisfaction with school, feeling of belonging to school and their social interactions (Ekeland et al., 2004). Introducing children to physical activity early and ensuring that it is a positive experience helps them lay the foundations for healthy and productive lives. (Daily physical activity in schools, 2005a, 2005b, 2006).

The effects of physical or sports activity on cognitive functions and academic performance are well documented. According to an already "old" hypothesis (Piaget 1956), psychomotor learning has a positive influence on intellectual functions.

Tomporowski and Elis in 1986, analyzed several studies (n = 27) dealing with the effects of specific exercises on cognitive functioning. These studies were classified into groups according to the length and intensity of the exercise protocol. The authors conclude that studies that had a short-duration, moderate-intensity exercise protocol were the ones that best predicted good cognitive functioning.

Academic performance, which is linked to cognitive functions, corresponds to a system that measures the achievements and construction of knowledge in students. In many education systems, this concept is often associated with a rating scale. In this sense, sedentary lifestyle seems to be a risk factor for cognitive functions, which represent fundamental elements for good academic performance. Studies conducted in recent years provide increasing evidence of the beneficial effects of physical exercise on brain function, which have an impact on improving school performance (Donnelly et al., 2016; Haapala et al., 2017; Lambourne et al., 2013).

A study, carried out (Davis et al., 2007), indicates that the practice of sport can improve cognitive skills, mentions Geneviève Piché. Several explanations are possible. Some authors suggest a neurobiological effect,

that is to say that physical activity has an influence on the brain by stimulating the development of new cells or by promoting its plasticity.

II. Method and Tools

2.1 - Population

An experimental group (55 students) which profits from 3 weekly sessions of physical-activity and sport out-of-school .Aged between 6 to 10 years old of 16 elementary schools, in class of second and third year with return to school 2015/2016 were selected.

2.2 - Experimental protocol

A survey previously distributed to all teachers confirmed and validated the choice of the classes concerned: each class had to include experienced sports students, members of sports clubs. A direct interview with each student was conducted in order to select the group, with same socio-demographic level.

This group was followed from the first to the fifth trimester during two school years (2015-2016 and 2016-2017), by means of a survey submitted after each quarter: the document contains socio-demographic, school and sports data for each student which is as follows:

- a. The social level (working and non-separated parents, number of siblings, no health problems, average number of sleeping hours per night)
- b. School averages
- c. School and extracurricular sports (nature and time);

In addition, a test on cognitive functioning (CPM: Raven's Colored Progressive Matrices, 1998) was carried out by the group of pupils after the last trimester and treated by a clinical psychologist.

2.3 - Statistical method

Statistical analyses were carried out on the SPSS software. The comparison between the levels of intelligence were measured by the Likert scale and independence Test χ^2 .

III. Results

Table: Level of intelligence according to the sport practiced

Sport		Level of intelligence			Total
		Superior	Aboveaverage	Medium	
Aikido	Percentage	0,00%	10,00%	0,00%	5,50%
Athletics	Percentage	22,20%	0,00%	0,00%	3,60%
Cycling	Percentage	0,00%	0,00%	6,30%	1,80%
Horse riding	Percentage	0,00%	3,30%	6,30%	3,60%
Soccer (football)	Percentage	0,00%	3,30%	37,50%	12,70%
Gymnastic	Percentage	11,10%	3,30%	12,50%	7,30%
Judo	Percentage	22,20%	33,30%	12,50%	25,50%
King boxing	Percentage	0,00%	3,30%	0,00%	1,80%
Karate	Percentage	11,10%	13,30%	12,50%	12,70%
Kung Fu	Percentage	0,00%	0,00%	6,30%	1,80%
Fight	Percentage	0,00%	3,30%	0,00%	1,80%

Swimming	Percentage	33,30%	20,00%	0,00%	16,40%
Taekwondo	Percentagege	0,00%	3,30%	6,30%	3,60%
Tennis	Percentage	0,00%	3,30%	0,00%	1,80%
Total	Numbers	9	30	16	55

Test χ^2

According to the Independence Test χ^2 , there is a significant difference ($P = 0.039$) between disciplines

As shown in Table, students who practice Judo and Swimming have a majority of "Above average" intelligence levels in addition to the "Superior" level of intelligence. Unlike students practicing soccer (football) who have a level "Medium" of intelligence.

IV. Discussion

Physical activity may help improve intellectual capacities (Laure & Binsinger, 2009; Cotman & Berchtold, 2002). It also improves cognitive functions, in particular concentration and memorization (Sibley and Etnier, 2003; Garnier, Gasnier and Mejean, 2000; Tomporowski, 2003), whose importance in learning processes is known. However, the positive influence of this factor on behavior in general and educational performance in particular has long been established (Hansford and Hatti, 1982; Rubin, Dorle, & Sandidge, 1977). Children who are in good physical condition may do up to twice as better on academic tests than those who are not in good physical condition (Woodward-Lopez, 2010).

Sedentary lifestyle seems to be a risk factor for cognitive functions which represent the fundamental elements for good academic performance. These data reflect physical exercise as a new tool for cognitive improvement and empower the physical activity professional, not only to be aware of the improvement in physical qualities and motor skills, but also to take an active role. Moreover, concomitant in the academic improvement of students and to remedy school dropout. The very positive and stable school results in the time of the pupils practicing sports represent an additional argument to encourage the children who practice sports out of school (Sævarsson et al., 2017). This ascertainment is more pronounced in mathematics compared to the Arabic language (Álvarez-Bueno et al., 2017). Actually, the benefits of physical activity and sports on the health of the young people are undeniable, like its effect on the mental one and the social relations (Oliveira et al., 2017), (Tomporowski et al., 2015). To this must be added the sedentariness of the majority of school children in elementary schools who do not benefit from physical activities (or very little) either inside or outside school.

In this sense, the current guidelines for the physical-activity recommend that children need to take part in moderate regular physical-activities with vigorous during 60 minutes or more each day (Rasberry et al., 2011). The results of a psychological test (WISC: Wechsler Intelligence Scale for Children) on intelligence show that students who receive 5 hours of physical education per week scored higher than students who received the minimum of 40 minutes of physical education per week (Janssen et al., 2011). This represents an additional argument for encouraging out-of-school sports activities for children. Not only the children do not reach the level of physical-activity recommended, but the schools also contribute to this culture of physical during last years, many school systems eliminated the recreations and/or physical education from their program of studies because of the increasing pressure to improve the school grades (Watson et al., 2017). A regular physical-activity could contribute to enhance the intellectual abilities (Marques et al., 2017), (Van der Niet et al., 2014). It also improves the cognitive functions, in particular concentration and memorization because of its importance in the processes of training (Donnelly et al., 2016), (Janssen et al., 2014), (Maureira and Diaz, 2017), (St-Louis-Deschênes and Elleberg, 2013), (Van der Fels et al., 2015).

The children who are in a good physical condition could succeed better in academic tests than those who are not in good physical condition (Sævarsson et al., 2017). Recent research shows the need to increase

the physical activity for children and teenagers which can be critical for the reversal of the current trends of the disease and also for the improvement of academic success (Telford et al., 2012), (Tompkins et al., 2012).

While for the level of intelligence, there is a difference between the disciplines: the students who practice Judo and Swimming are majority of a level of intelligence "Above average", while the students practicing the Football have a "medium" level of intelligence.

V. Conclusion

At the end of our research study on the influence of regular sports activity on cognitive functioning in schoolchildren, it is appropriate to affirm that the practice of extracurricular sports has a positive impact on the development of cognitive capacities and also a significant difference between the disciplines in favor of swimming and judo.

The practice of an extracurricular sports activity in children deserves to be widely encouraged given its beneficial effects not only on health, but also on cognitive functioning. Parents, teachers and health professionals should be made aware of it.

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