

**Impact of regular physical activity and sport on the school performances of students between 6 and 10 years old****Bekhechi Kheira Amina <sup>1,\*</sup> , Khat Belkacem <sup>2</sup>****bekhechia@hotmail.fr****amina.bekhechi@univ-usto.dz****<sup>1,2</sup> Université des Sciences et de la Technologie d'Oran Mohamed Boudiaf (Algérie)****Receipt date: 20/11/2018; acceptance date: 13/02/2019; publishing Date: 30/06/2019**

**Résumé :** Cette étude longitudinale cherche à démontrer si l'activité physique et sportive régulière a un impact sur les résultats académiques et aussi sur le fonctionnement cognitif. Un groupe expérimental composé de 55 élèves pratiquants une activité physique et sportive extrascolaire et un groupe témoin de 55 élèves non-pratiquants, âgés de 6-10 ans des, des écoles primaires de la ville d'Oran ont été suivis durant 15 mois. Des données socio démographiques ont été recueillies grâce à un questionnaire destiné aux élèves et les résultats scolaires obtenus auprès de l'administration à la fin de chaque trimestre. Un test d'intelligence le CPM a été administré à la fin du cinquième trimestre pour évaluer les principales capacités cognitives des élèves. La pratique d'une activité physique et sportive régulière chez des enfants scolarisés semble avoir un impact très positif sur les performances académiques et aussi sur le fonctionnement cognitif comme constaté par de nombreuses études similaires.

**Mots clés:** Activité physique et sportive ; Enfants scolarisés ; Fonctionnement cognitif ; Performances académiques ; Raven's Coloured Progressive Matrices (CPM).

**Abstract:** This longitudinal study aimed at investigating the impact of regular physical activity and sport on the school performances. An experimental group of 55 students that practice out-of-school sports and a reference group of 55 students that does not practice out of school sports, their age is between 6 and 10 years old, from elementary schools of the town of Oran, they were followed during 15 month. The socio-demographic data were collected by a questionnaire intended for the students of the two groups, and administrative school results at the end of each quarter. An intelligence test of the CPM was administered at the end of the fifth trimester to assess the main cognitive abilities in both groups. As noted by many similar studies, the practice of a physical-activity and sport regular seem to have a very positive impact on the academic performance and also on cognitive functioning.

**Keywords:** academic performance, cognitive functioning, physical-activity and sport, provided education for children, raven's colored progressive matrices (CPM).

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## 1 - Introduction

The practice of physical exercise was classically associated with improvements of the metabolic functions such as cardiovascular, ventilator, hormonal (Donnelly and Lambourne, 2011), (Haapala et al., 2017). Recent evidence shows how the effects of the physical-activity on the brain can create positive results as the improvement of the attention, the memory and the executive functions (De Greeff et al., 2018), (Van der Niet et al. 2014). Recently, many studies reinvested the relation between the physical exercise and the marks obtained at primary, secondary and academic education levels (Álvarez-Bueno et al., 2016), (Maureira and Diaz, 2017).

Physical-activity seems to have a positive effect on other determinants of academic success like behavior in class, self-esteem, self-image, satisfaction towards the school, the feeling of belonging to the school and their social interactions. Research showed that regular physical-activity improves the school results and the productivity of the students, just as their capacity to be focused for long periods (De Greeff et al., 2018).

The daily physical-activity improves the output of the students and supports their academic success, stimulates their memory, their direction of observation and develops their capacity to solve problems and to make decisions; it also clearly controls the problems of behavior, by adopting a positive attitude and by having the direction of the creativity (Álvarez-Bueno et al., 2016), (Álvarez-Bueno et al., 2017), (Bangsbo et al., 2016).

It is suggested that the beneficial effects of the physical-activity on the school output are ascribable to the improvement of the cognitive functions, such as the attention, the concentration and the working memory (Esteban-Cornejo et al., 2014), (Rasberry, 2011), (Resaland et al., 2016).

This study seeks to demonstrate how regular sports activity has a positive impact on the school results.

## 2 - Method and Tools

### 2.1 - Population

On the whole, 110 students from both sexes 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. Students, who took part in this study after their written approval and that of their parents and the school administration, were divided into two groups: the experimental group (55 students) which profits from 3 weekly sessions of physical-activity and sport out-of-school and the reference group (55 students) which does not practice any out of school physical-activity and sport.

### 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 and non-sports students. A direct interview with each student was conducted in order to select the two groups, the same age, the same sex and the same socio-demographic level.

These two groups were 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 out of 10 (quarterly and both subjects: mathematics and Arabic language), non-doubling, no tutoring;

c. School and extracurricular sports (nature and time);

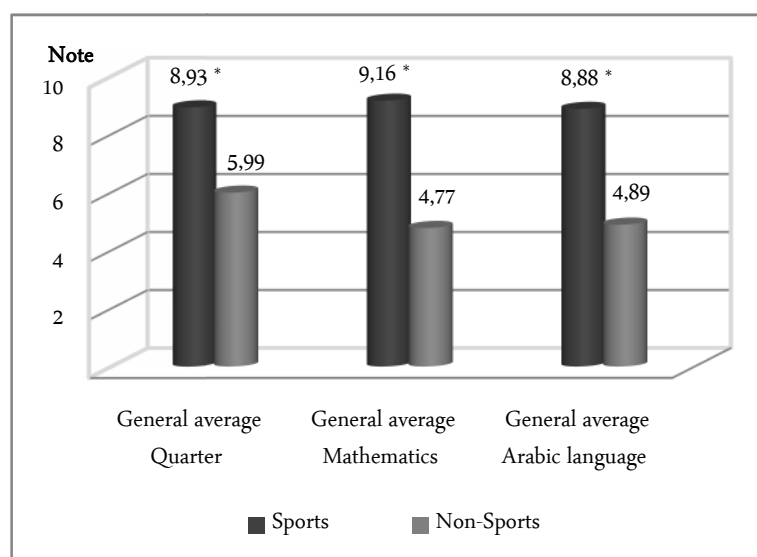
In addition, a test on cognitive functioning (the CPM: Raven's Coloured Progressive Matrices) (Raven (1998)) was carried out by the two groups of pupils after the last trimester (fifth quarter) and treated by a clinical psychologist.

### 2.3 - Statistical method

Statistical analyses were carried out on the SPSS software. Comparisons of means were made by statistical tests of the type Mann-Whitney U (2 samples) and ANOVA at one factor. The comparison between the two groups and the level of intelligence were measured by the Likert scale. For all the tests carried out the threshold of significance was set at  $p < 0.05$ .

### 3 - Results

Statistically and according to the Mann-Whitney U test, the difference is very significant ( $p < 0.05$ ) for all school averages between the two groups (Figure 1).



**Figure (1):** Comparison by the Mann-Whitney U Test of the general school averages of the 5 quarters (out of 10) of the two sports and non-sports groups \*  $P < 0.05$

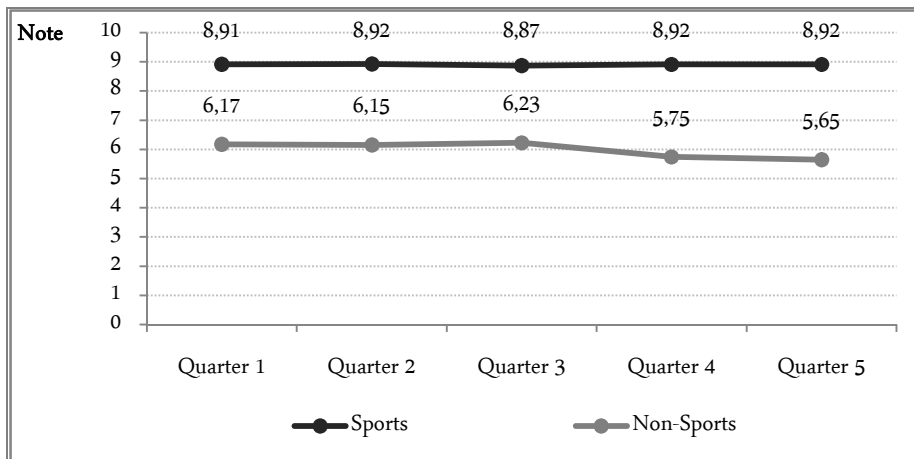
There is a large difference in the overall school averages between pupils practicing sports and non-practicing pupils. The general quarterly, mathematics and Arabic language averages of the five quarters of the sports group are significantly higher than those of the non-practicing group. (Figure 1)

In fact, pupils who practice sports have a general quarterly average of five quarters of 8.93 out of 10 against 5.99 out of 10 among pupils who don't practice sports. For the general averages of the five quarters of mathematics and the Arabic, the sports group has a general average of 9.16 out of 10 against 4.77 in mathematics and 8.88 against 4.89 out of 10 in Arabic.

Thus, the correlation between the overall average of the five quarters and the overall average of the five mathematics scores ( $r = 0.72$ ) is very strong. There is also a strong correlation ( $r = 0.81$ ) between the overall average of the five quarters and the overall average of the five scores of the Arabic. That is, the relationship between the overall quarterly average of the five

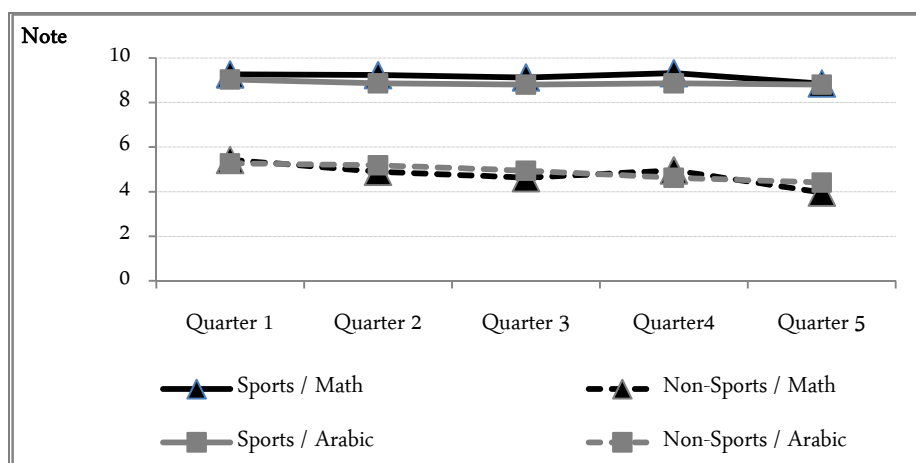
quarters and the overall average of the 5 scores of the Arabic is stronger than the relationship between the overall quarterly average of the 5 quarters and the overall average of the five marks of mathematics.

For sports group, the quarterly average is constant from the first to the fifth quarter. While among non-practicing group, the quarterly average is decreasing from the first to the fifth quarter particularly in the 4th and 5th quarter (Figure 2).



**Figure (2):** The evolution of the quarterly general averages of the 5 quarters (scores out of 10) of the two sports and non-sports groups

In the sports group, the general school averages of mathematics and the Arabic language are constant in the five quarters. While in the non-sports group there is a sharp decrease in the average in mathematics (from 5.43 to 3.96) and also for the Arabic language (from 5.28 to 4.4) in the five quarters. (Figure 3)



**Figure (3):** The evolution of the general school averages of mathematics and the Arabic language of 5 quarters (scores of 10) of the two sports and non-sports groups

Statistically and according to the Likert scale, the difference is very significant ( $p < 0.05$ ) between the two groups for the level of intelligence. The Contingency coefficient  $C_c = 60\%$ .

Sports group have an average intelligence "Above average" and non- sports group have a mean intelligence average (Table1).

**Table1: Comparison between the two groups and the level of intelligence by the Likert scale**

Level of intelligence	Sports group		Non-sports group	
	Numbers	Percentage	Numbers	Percentage
Superior	9	16.4 %	0	0 %
Above average	30	54.5 %	0	0 %
Medium	16	29.1 %	47	83.9 %
Below average	0	0 %	7	12.5 %
Subnormal	0	0 %	1	1.8 %
Total	55	100 %	55	100 %

There was a big difference in the level of intelligence between pupils practicing sports and non-practicing pupils (Table). It can be seen that 16.40% of pupils practicing sports have a "Superior" level of intelligence compared to 0% of non-practicing pupils. In addition, the level of intelligence "Above average" is 54.50% among pupils practicing sports against 0% among non-practicing pupils. In the non-sport group, the level of intelligence "Medium" dominates with 85.50% against 29.10% at the sports group. Finally, we note that 1.80% of non-sports students have a level of intelligence "Subnormal" (equals a student) against 0% in the sports group. (Table)

#### 4 - Discussion

Pupils, who practice regular physical activity and sports, though from different schools, have a general school average that is higher than that of non-practitioners. Thus, it appears that regular physical activity can improve concentration and academic performance, or even improve, reading and writing scores (Haapala et al., 2017). The students who do physical activity perform better in school than those who do not (Singh et al., 2012), (Van Dusen et al., 2011). In our study, this positive effect seems to be lasting since it is observed during the five school years of the study (Schmidt et al., 2017). On the other hand, the high level of intelligence level of sports students located "Above average" (54.50%) confirms to some extent the influence of regular physical and sports practice as well on the achieving better academic results than cognitive functioning. One of the elements which contribute to this durable influence seems to be the volume and the intensity of the meetings of sports (Marques et al., 2017), (Oliveira et al., 2017), (Tompkins et al., 2012), (Wittberg et al., 2012). 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 (Oliveira et al., 2017), (Tomprowski 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 guide lines 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 Ellemberg, 2013), (Van der Fels et al., 2015). However, the positive influence of this factor on the school behavior in general and results in particular is established for a long time (St-Louis-Deschênes and Ellemberg, 2013, Schmidt et al., 2017). 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).

## 5 - Conclusion

Regular physical activity and sports deserve to be largely encouraged for children, taking into account its benefits not only on health, but also on academic performance and cognitive functioning. It would be interesting in future research to determine the most influential component of physical activity and sport on school results to help educators (parents, teachers ...) to improve early learning.

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