

DEVELOPMENTAL DISORDERS AND MOTOR ACTIVITIES IN CHILDREN - ADHD AS A MODEL

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SUMMARY

The study aimed to identify the relationship between attention deficit hyperactivity disorder (attention deficit, hyperactivity, impulsivity) and Fundamental motor skills of children in primary school, and the problematic question was as follows: what kind of relationship that links between attention deficit hyperactivity disorder and Fundamental motor skills of primary school pupils?, and in order to reach the result, the study was conducted on a sample of 60 students of primary school children, using the descriptive correlational method.

It was concluded that there is an inverse correlation (negative) between the dimensions of the scale of attention deficit hyperactivity disorder (attention deficit, hyperactivity, impulsivity) and some Fundamental motor skills, by the increased acuity of this disorder the level of motor skills decreases and by the decreased acuity of this disorder the level of motor skills increases.

Keywords: attention deficit hyperactivity disorder; Fundamental motor skills; children; primary school.

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INTRODUCTION :

Attention-Deficit/Hyperactivity Disorder (ADHD) is a neurobehavioral condition characterized by excessive restlessness, inattention, distraction, and impulsivity. It is usually first identified when children are school-aged, although it also can be diagnosed in people of all age groups. In an average classroom of 30

children, research suggests that at least one will have ADHD. (American Academy, 2013)

Cases and diagnoses of ADHD have been increasing dramatically in the past several years. The American Psychiatric Association (APA) says that 5 percent of American children have ADHD. But the Centers for Disease Control and Prevention (CDC) puts the number at more than double that. The CDC says that 11 percent of American children, ages 4 to 17, had the attention disorder as of 2011. That's an increase of 42 percent between 2003 and 2011. (J. Legg, 2018)

Brain imaging studies have revealed that, in youth with ADHD, the brain matures in a normal pattern but is delayed, on average, by about 3 years. The delay is most pronounced in brain regions involved in thinking, paying attention, and planning. More recent studies have found that the outermost layer of the brain, the cortex, shows delayed maturation overall, and a brain structure important for proper communications between the two halves of the brain shows an abnormal growth pattern. These delays and abnormalities may underlie the hallmark symptoms of ADHD and help to explain how the disorder may develop. (National Institute of Mental Health)

There are many signs and symptoms of ADHD. Some are rather subtle, while others are quite obvious. For example, if your child has poor behavioral skills, academic difficulties, or problems with motor skills. (Timothy J., 2016)

In the same context an important conceptual development in the exploration of the phenomenon of Attention-Deficit/Hyperactivity Disorder can be attributed to the study of Nagui Hanna (2009). Nagui Hanna defined ADHD as a complex disorder of impairment of brain functions, which burdens our society with significant financial costs. Its salient features are inattention, hyperactivity, and impulsivity. In many cases, it is accompanied by one or more serious psychiatric comorbidities. Criteria for its diagnosis have emerged over the past four decades, resulting in better recognition and more widespread treatment. The current opinion estimates its prevalence in the USA to be 5 - 10% among school-aged children.

It has strong heritability and genetic links, as well as environmental predispositions and triggers. Although it mostly affects school-aged children, it is well known to affect preschoolers, youths, and even adults, with distinct manifestations and progression. Treatment predominantly relies on prescribing stimulant medications (amphetamines), of which methylphenidate is the most widely used. Psychosocial therapy has an important but less distinguished role in the management of the disorder.

In a previous study by Poeta et al stated that Children with ADHD also performed in the low classification ranges for spatial and temporal organization. (Poeta et al 2007)

Previous research also has investigated specific motor difficulties in ADHD (Pitcher et al 2003) As well as the relationship between the cardinal symptoms of ADHD and motor performance (Tseng et al 2004, Kroes et al 2002) Other studies have examined motor development in children with ADHD, namely an assessment of motor ability involving many facets of a child's performance, such as balance, fine and gross motor skills, and cognitive aspects related to the motor act. (Poeta et al 2007, Goulardins 2011)

Findings have revealed a wide range of motor problems in ADHD, including excessive overflow movements, poor timing, force control and greater variability in motor outcomes, poor balancing, difficulties in both learning and performing a variety of motor skills, and deficits in fine motor skills. (Pitcher et al 2003)

There are two components of children movement ability that needed to be developed including fundamental and fine motor skills aspects. Fundamental motor skills is a movement used big muscles such as walking, running, two legs jumping, and hopping the obstacles. On the other hand, fine motor skills is a movement used small muscles such as cutting, sticking, tearing, drawing, coloring, writing and arranging the blocks. Each child has different motor ability. (A Komaini, R Mardela, 2018)

Motor skills include locomotion (running, walking, jumping, hopping), manipulation (throwing, kicking, catching, bouncing), and stability (bending, twisting, rolling, dodging), Mastery of a range of motor skills, combined with good overall physical fitness, is critical to the healthy development of a child and forms the basis of their athletic competence, To perform a task or movement, our brain sends signals to our motor units (individual nerves and collections of muscle fibers) at precise intervals to orchestrate the contraction of muscles throughout our body, Learning a motor skill is like writing a computer program to a disk – the program, imprinted on the brain, plays back as a motor reflex. The method of imprinting a motor skill "program" on the brain is repetition (i.e., "practice, practice, practice"). (great play, 2015, <https://www.greatplay.com/articles/how-children-learn-motor-skills>)

"Motor skills" describe your child's ability to perform movements with their body. Gross motor skills are large movements, such as running. Fine motor skills are small movements, such as writing. Researchers in the journal *Research in Developmental Disabilities* report that more than half of children with ADHD have problems with gross and fine motor skills.

Study in the journal *CNS & Neurological Disorders* examined the effects of medication and motor skills training on children with ADHD. Children who received motor skills training alone, or in combination with medication, showed improvements in their gross and fine motor skills. In contrast, those who received medication alone showed no improvements. (Timothy J., 2016). At the same time, Dr. James McGuire, a developmental and behavioral pediatrician at Elliot Health

System in Manchester, New Hampshire, makes clear that while there may be associations between motor skill delays or coordination difficulties and ADHD, it's not a matter of "cause and effect."

Motor skill delays are not a part of an ADHD diagnosis, he explains, urging people not to jump to hasty conclusions. Plus, he adds that "there are some ADHD kids with superior motor skills who are really good at sports, and there are those with motor skill delays and coordination difficulties," reinforcing that there isn't a one-size-fits-all standard in this situation. "You have to look at each child individually," he says. "You can't assume ADHD and motor skills challenges go together. It can also be the other way around: That it's not motor skill delays that intensify ADHD symptoms, but instead ADHD symptoms that can interfere with motor skills and coordination efforts. For example, because ADHD children may have trouble paying attention, McGuire says, there might be more coordination challenges that develop indirectly. (Jennifer Lea Reynolds, 2017).

Studies on fundamental motor skills and its association with attention deficit hyperactivity disorder can be highlighted research of Pan CY, Tsai CL, Chu CH (2009). Authors of the study compared the movement skills of children with autism spectrum disorders (ASD), attention deficit hyperactivity disorder (ADHD), and those without disabilities. After controlling for age, both ASD and ADHD groups scored significantly lower than controls ($p's < .05$) on overall gross motor development as well as locomotor and object control subtests, and the ASD group performed more poorly than the ADHD group ($p's < .01$) on both subtests. Of the children with ASD and ADHD, only 16% had clinical levels of impairment. Potential underlying factors are discussed, with suggestions for future research.

The information above defines the problem of our research --What type of relationship is there between attention deficit hyperactivity disorder and Fundamental motor skills of children in primary school? And What type of relationship is there between attention deficit and Fundamental motor skills of children in primary school?. What type of relationship is there between hyperactivity and Fundamental motor skills of children in primary school?. What type of relationship is there between impulsivity and Fundamental motor skills of children in primary school?

The hypothesis of the study is that the attention deficit- hyperactivity disorder has an inverse relationship with Fundamental motor skills of children in primary school.

Partial Hypotheses:

- There is an inverse relationship between attention deficit and Fundamental motor skills of children in primary school.

- There is an inverse relationship between hyperactivity and Fundamental motor skills of children in primary school.
- There is an inverse relationship between impulsivity and Fundamental motor skills in children in primary school.

Based on the above the need to conduct this study arose to identify the relationship between attention deficit hyperactivity disorder and Fundamental motor skills of children in primary school

The study aimed to identify the type of relationship between attention deficit hyperactivity disorder and physical kinetic aspect which is represented in our study on Fundamental motor skills, where it is no secret that this disorder has many repercussions on the child who is characterized by hyperactivity and lack of attention and impulsivity and this may affect his motor skills both in terms of lack of focus in the performance or randomness, it would be fair to say that the basic reasons of this disorder is linked to a Brain dysfunction which causes lack of attention and concentration and hyperactivity which affects the movement of the child, particularly in his motor skills, Hence our study gained importance to determine the link between this disorder (attention deficit with hyperactivity) and basic motor skills and its reflection on them.

MATERIAL AND METHODS

A research approach is a set of general rules and regulations that are put in order to reach acceptable facts about the phenomena of interest to researchers in various fields of human knowledge (Mouhamed abidat, And all,1999, p35)

The study was targeted to identify the relationship between attention deficit hyperactivity disorder (ADHD) and Fundamental motor skills of children in primary school. Thus, the descriptive correlational method was used.

Our study community consists of primary school students in Bouira province- Algeria, it was conducted on a purposive sample of 60 students that show symptoms of Attention Deficit Disorder and hyperactivity according to teachers' statement and observation.

Study variables:

Based on the title of the study and in light of the hypotheses we can determine the study variables as follows:

the independent variable: it is the factor that the researcher take it with the change to check out its relationship with the dependent variable (Hassan Ahmed

Shafi'i, Susan Ahmed: 1999, p. 74) and in our study the independent variable is *attention deficit hyperactivity disorder*.

dependent variable: it is the phenomenon that exists or changes when the researcher applies or changes the variable (Hassan Ahmed Shafi'i, Susan Ahmed: 1999, p. 74) and in our study the dependent variable is *Fundamental motor skills*.

Assessment instruments.

Data for this study were collected using 2 instruments: ADHD diagnosis test , basic motor skills tests.

ADHD diagnosis test.

attention deficit hyperactivity disorder test (hearing disability and ordinary), designed by Mohamed El Noubi Mohamed Ali, it includes three forms, each form containing three dimensions, a family form with 24 questions and a school form with 24 questions, while the child form contains 36 drawings and pictures.

Psychometric test properties.

Validity

Construct-related validity (face validity). By asking a panel of 7 experts to assess how well the test questions correlate with the particular ability or characteristic that the test sets out to measure and after the attention deficit hyperactivity disorder test has been previewed by the experts the test was validated for the purpose of study.

internal consistency: The correlation coefficients were calculated between the score of each statement and the total score of the dimension to which it belongs, the correlation coefficients of the family form ranged from 0.42 to 0.84, the school form was 0.52-0.75 and the child form was 0.49-0.89. The correlation coefficients between each dimension and the total score of the scale were calculated in all forms, and its values ranged from 0.6 to 0.91.

divergent validity: Scale degrees for the exploratory research were arranged in descending order and thirty percent were selected from the top category and thirty percent from the lower, then the differences between the two groups was calculated by (t) test the T value was (-12.476) hence we notice that there are differences between the top and lower groups at the Statistical significance (0.05), for the significance level Sig (0.00) is less than (0.05).

reliability:

Cronbach's alpha: Alpha values ranged between 0.72-0.93, which proves the reliability of the test.

Split-Half reliability: reliability was calculated by means of a half-split method by applying the test only once, and then dividing the test components into two (even paragraphs together and odd paragraphs together) and then calculating the test reliability for the half of the test, whose values ranged from 0.66 to 0.85, but this value represents the reliability value of half of the test in order to get the value of the total test We made correction by Spearman-Brown equation and the overall test result was 0.72 to 0.9, which is a high reliability for the test.

Test-retest reliability: We applied the test and reapplied it at a time interval of 12 days, and then Pearson correlation coefficient was calculated between the results of the first test and the second test, the results of the test and the retest showed that Pearson correlation coefficient ranged between 0.69 to 0.87. and the statistical significance of the correlation coefficients values was statistically significant at 0.01 and 0.05, indicating a high degree of reliability.

basic motor skills tests:

The researchers selected a range of basic motor skills tests and was displayed on a panel of experts, (7 experts) Where the percentage of agreement on the selected tests is 75% and more, and the technical skills Tests of the basic motor skills selected by the experts are:

- 30 meter sprint test.
- standing vertical jump test .
- standing on one leg test.
- Seated Forward Bend.
- Medicine ball throw test.
- Kick the ball test.

est validity and reliability: in order to determine the reliability of the test, the retest method for basic motor skills was selected on the same sample from the research community outside the study sample The data were statistically treated by calculating the simple correlation coefficient between the first and second applications. The correlation degree was from 0.72 to 0.89, and the Intrinsic Validity was from 0.85 to 0.94.

test Objectivity. The results of the tests were recorded from two judges of the working group and the correlation coefficient between the first judgment estimate and the second judgment estimate is an objectivity coefficient.

Data analysis

Data were processed according to the following statistical methods:

- Pearson correlation coefficient.
- Cronbach's alpha.
- Spearman-Brown Formula.
- (T) Test.

RESULTS

Analysis of the first hypothesis results

Table 1 - correlation coefficients between attention deficit and Fundamental motor skills

		30 m Sprint Test	Standing Vertical jump test	Standing on one leg test	Seated Forwar d Bend	Medicin e ball throw test	Kick the ball Test
attenti on deficit	Family form	0.37	0.44	0.66	0.33	0.41	0.37
	School form	0.39	0.43	0.61	0.4	0.43	0.35
	Child's form	-0.45	-0.57	-0.76	-0.28	-0.38	-0.44

It is clear from Table (01) that The correlation coefficients between attention deficit and basic motor skills were estimated in the following order: 0.37, 0.44, 0.66, 0.33, 0.41, 0.37 for the family form, which is a statistically significant at the significance level 0.05, Which confirms the existence of a statistically significant relationship between attention deficit and basic motor skills, and this direct positive relationship is statistically explained that the greater the attention deficit increases the basic motor skills increase, but actually the tests of basic motor skills used in the study the more its numerical values increase the basic motor skills performance will be weak,hence we deduce from the family form test that by an increase of attention deficit, the accuracy of the performance of basic motor skills decreases, And the same result was obtained from the school form of the teachers Where the values of Pearson correlation coefficient were statistically significant at 0.05, and it is respectively 0.39, 0.43, 0.61, 0.4 , 0.43, 0.35. As for the child's

form, the values of Pearson correlation coefficient were Negative and it is respectively -0.45, -0.57, -0.76, -0.28, -0.38, -0.44. These values are not statistically significant at the significance level 0.05, but by reference to the type of relationship between The two variables we find it a negative relationship and unlike the family form and the school form this result is explained in the attention deficit dimension as: the numerical value indicates that the smaller the numerical value or the total summation of this dimension, the greater the disorder in the attention deficit will be and the more the numerical value is, it indicates that the child does not suffer from attention deficit.

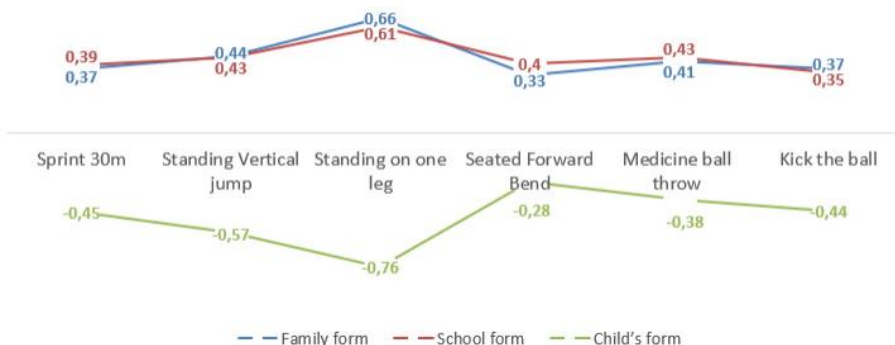


Figure 1- correlation coefficients between attention deficit and Fundamental motor skills

Analysis of the second hypothesis results

Table 2 - correlation coefficients between hyperactivity and Fundamental motor skills

		30 m Sprint Test	Standin g Vertical jump test	Standin g on one leg test	Seated Forwa rd Bend	Medicin e ball throw test	Kick the ball Test
Hyperactiv ity	Family form	0.31	0.33	0.49	0.35	0.6	0.40
	School form	0.34	0.29	0.44	0.37	0.54	0.47
	Child's form	0.28	0.35	0.44	0.29	0.51	0.38

It is clear from Table (02) that the values of correlation coefficients between Hyperactivity dimension and the basic motor skills ranged between 0.28 and 0.6,

which are statistically significant at the significance level of 0.05 indicating a statistically significant relationship between Hyperactivity and basic motor skills, and as we mentioned in the previous hypothesis, the more the numerical values of motor skills increase, the accuracy performance decreases, and by an increase of the numerical values of the Hyperactivity disorder and in all the forms including the child's form (unlike the first hypothesis) hence we confirm that there is an inverse relationship between Hyperactivity and motor skills, by an increase of the first one the second will decrease.

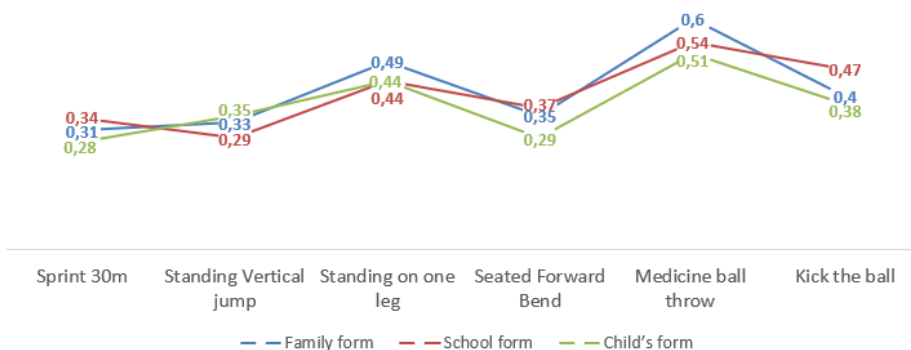


Figure 2. correlation coefficients between hyperactivity and Fundamental motor skills

Analysis of the third hypothesis results

Table 3 - correlation coefficients between the impulsivity and Fundamental motor skills

		30 m Sprint Test	Standing Vertical jump test	Standing on one leg test	Seated Forward Bend	Medicine ball throw test	Kick the ball Test
impulsivity	Family form	0.41	0.50	0.47	0.7	0.51	0.31
	School form	0.45	0.52	0.5	0.57	0.41	0.29
	Child's form	-0.35	-0.47	-0.53	-0.60	-0.44	-0.28

It is clear from Table (03) that the values of correlation coefficients between impulsivity and basic motor skills ranged from 0.31 to 0.7 for the family form and from 0.29 to 0.57 for the school form of the teachers, which are statistically significant values at significance level 0.05. As for the child's form, the values of Pearson correlation

coefficient were Negative and it is ranged between -0.28 and -0.6 in the same way as the first hypothesis, we found that there is an inverse relationship between impulsivity and basic motor skills.

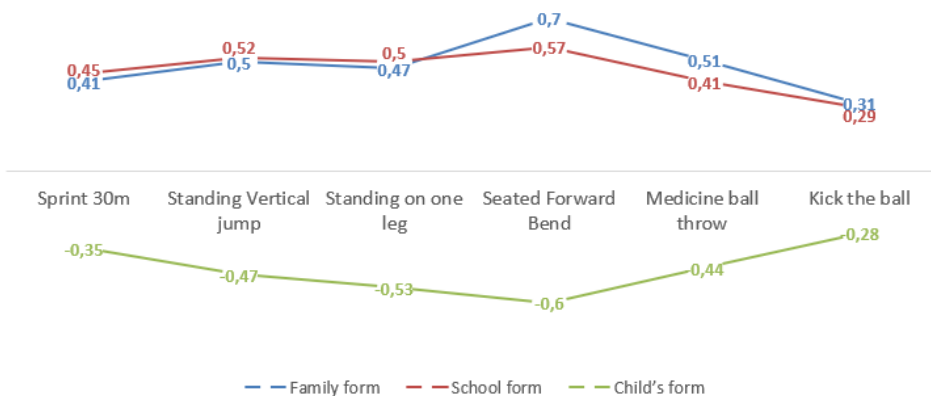


Figure 3. correlation coefficients between the impulsivity and Fundamental motor skills

DISCUSSION

The purpose of this study was to identify the relationship between attention deficit hyperactivity disorder (attention deficit, hyperactivity, impulsivity) and Fundamental motor skills of children in primary school. Findings revealed that there is an inverse correlation (negative) between the dimensions of the scale of attention deficit hyperactivity disorder (attention deficit, hyperactivity, impulsivity) and some Fundamental motor skills, by the increased acuity of this disorder the level of motor skills decreases and by the decreased acuity of this disorder the level of motor skills increases. These results confirm our hypothesis and they are in line with previous studies that also demonstrated the relationship between attention deficit hyperactivity disorder and Fundamental motor skills (Lidiane Fernandes et al, 2021 Neto, Goulardins, Rigoli, Piek, & Oliveira, 2015; Toniolo, Santos, Lourenceti, Padula, & Capellini, 2009).

A similar trend between Attention-Deficit/Hyperactivity Disorder (ADHD) and Fundamental motor skills has been observed in other studies (William J. Harvey et al., 2007) where repeated measures analyses revealed significant skill differences between children with and without ADHD ($p \leq 0.001$). Results from the stimulant medication trials indicated no significant effect of medication on the

movement skill patterns of children with ADHD. It is concluded that children with ADHD may be at risk for developmental delays in movement skill performance.

In the same context, Tseng et al investigated the relationship between motor performance, attention, impulse control and hyperactivity in children with ADHD, and found that attention and impulse control were important predictors of both fine and gross motor skills in children with ADHD. (Tseng et al 2004)

Similar results were found in the study of William J. Harvey, Greg Reid (1997) who *described the fundamental gross motor skills and fitness conditions of children with attention-deficit hyperactivity disorder (ADHD). The results revealed that fundamental gross motor performance and physical fitness of children with ADHD are substantially below average.

Data provided from this study can provide useful information in the development of fundamental motor skills in ADHD children, as an aspect that may indirectly help in deal with the daily effects of the disorder. For example, ADHD children that practice physical activities have improved executive functions in a significant way (Pontifex, Saliba, Raine, Picchietti, & Hillman, 2014).

CONCLUSION:

The results of the study indicate that there is a relationship between ADHD and basic motor skills, where the high level of this disorder decreases the performance accuracy of basic motor skills, and this result achieved the goal of the study which was to identify the type of relationship between ADHD And basic motor skills. in addition the hypotheses were accepted That there was an inverse relationship between the attention deficit, hyperactivity and impulsivity, and some of the basic motor skills that the study targeted.

the most important recommendations of this study is the design of behavioral programs aimed at reducing the attention deficit disorder hyperactivity, and the design of educational sports programs to develop these basic motor skills of children in primary school.

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