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# The impact of physical activity on mental health in children

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**Abstract.** Over the past decade, children have become more and more sedentary, which predisposes them to mental health problems such as depression and anxiety. The present investigation aims to find a possible impact of physical activity on children's mental health. The data from a sample of 60 children with age between 9 to 11 years old has been examined. The sample was equally divided into two parts, one consists of physically active children who practice different sports or physical activities, and on the other part, the sample was composed of children who are not practicing any physical activity. The children's parents completed the PRS-C BASC-2 Questionnaire, providing data about the child's behaviors. Physically active children showed lower levels of depressive behavior than physically inactive children (sig. 0,002,  $p < 0.01$ ). The data showed that children involved in physical activity have less anxiety behaviors than the control group (sig. 0,000,  $p < 0.01$ ). Moreover, we find that the level of adaptability is significantly higher in physically active children (sig. 0,023,  $p < 0.01$ ). These findings suggest that physical activity has a beneficial effect on children's mental health. More research is needed to understand better the relationship between physical activity and mental health in children.

**Keywords:** Impact, physical, mental, health, children

## 1. Introduction

### 1.1. Children period

Children's period, between the ages of 6 and 11, marks two important events in the evolution of the individual, namely the beginning of school and the end of elementary school, these being assimilated on the one hand with the end of childhood, and on the other hand with the premature onset of puberty (Verza & Verza, 2000).

Although by the age of 6, the child's physical development is achieved at a fast pace, with the passage of this age, it begins to decrease in intensity and will grow again only during preadolescence. Within the muscular system, there are also changes in the ability to regulate movements, being much more developed, and in the fine muscles of the upper limbs, outlining a better relationship with graphic skills (Sălceanu, 2015, p. 222).

However, the most significant changes occur at the level of the central nervous system, these being "the preponderant development of the frontal lobes, especially the verbally motor areas, the increase in the speed of formation of connections between neurons, the reduction of gray matter density in certain areas of the cerebral cortex" and "the increase of white matter (Papalia et al., 2010, p.285 apud Sălceanu, 2015, p. 222)".



As far as the intellectual development of the child is concerned, it is strongly demanded, trained, and exercised during the early school period, given that he has also been assigned the status of the student, which is strongly impregnated by aspects such as study and learning.

Perception is one of the most important processes that developed during this period, its occurrence being favored by the efficiency gained by the perceptual interpretative and sensory capacities, through the performances reached by the visual and auditory senses. All these have as a triggering fact, the environment shaped by the education system and the curriculum proposed by it (Briceag, 2017, p. 185).

And thinking is worth mentioning at this level because great progress is also being made on this side, directly involving the "consolidation of logical constructions." Therefore, "the child thus enters the stage of concrete operations, thinking becomes concrete-operational, children begin to solve problems by testing hypotheses, learn to make logical inferences, transferences, the ability to extract general principles is perfected that they will then apply in various situations, thinking becomes causal, focused on the use of symbols, decent and reversible (Golu, 2011, p. 96)".

As well as in the case of physical development, mental development does not undergo large, rapid, or extraordinary changes, yet its essential role cannot be denied. Even though the main concern of children during this period is no longer play, there are also transformations at this level, targeting the importance of the rules it implies, thus creating a way to develop team spirit and identify the meaning of the terms of honesty and obligation (Verza & Verza, 2000, p. 135).

## **1.2 Children and adaptability**

The increasingly changing nature of modern life requires individuals to constantly improve their ability to adapt. To adapt to changing circumstances, individuals must demonstrate adaptability in both cognition and behavior (Ployhart & Bliese, 2006).

Adaptability is a psychological construct that captures individual differences in how people respond to change (VandenBos, 2007). When faced with new, uncertain, or changing circumstances, adaptive individuals can constructively regulate cognition, emotion, and behavior (Martin, 2012; Martin et al, 2012).

In other words, adaptability is the individual's ability, skill, willpower, and/or motivation to change or fit into different tasks, and social or environmental characteristics. As described in the same paper, adaptability is also considered a key source of mental resources. People with high levels of adaptability can integrate more psychological resources than people with low levels of adaptability (Ployart & Bliese, 2006, apud Zhou & Lin, 2016).

Looking from a developmental perspective, adaptability is that temperamental trait that describes the degree to which the children interpret changes in the social environment as stressful or not (Thomas & Chess, 1977, apud Brock & Curby, 2016). Accordingly, children with high adaptability tend to thrive socially and academically compared to children with low adaptability (Martin et al., 1983, apud Brock & Curby, 2016).

However, the extent to which each child makes friends, engages with classroom materials, or thrives academically also relies heavily on factors outside the child, including teacher-child interactions characterized by warmth and sensitivity (Curby et al., 2011, apud Brock & Curby, 2016).

## **1.3. Mental health problems in children**

### **a) Depression**



Depressive disorders (especially "major depressive disorder") are one of the leading causes of disability worldwide (Friedrich, 2017, Charlson et. al., 2019). The worldwide prevalence of anxiety and depression in children is estimated at 2.6% and the rate is increasing (Lindberg et al., 2020).

Clinically, depressive disorders are characterized by the prolonged presence of specific somatic and cognitive abnormalities in combination with a sad, empty, or irritable mood or anhedonia (American Psychiatric Association, 2013 apud Kaltenboeck & Harmer, 2018).

Depressive disorders are complex neurobiological conditions, and it is now clear that they are associated with a wide range of physiological and cognitive abnormalities. Depression is a psychological condition that refers to enduring and relatively stable negative emotional experiences such as unhappiness, sadness, and pain in life every day (Zhang et al., 2022, apud Liu, 1997).

Depression, from a nosological point of view, is diagnosed when a specific combination of symptoms occurs within a determined period and with a certain intensity. The DSM-V (Diagnostic and Statistical Manual of Mental Disorders) defines major depression as having five or more symptoms over two weeks. Symptoms include depressed or irritable mood, decreased interest or pleasure, insomnia or hypersomnia, psychomotor agitation or delay, fatigue or loss of energy, feelings of worthlessness or inadequate guilt, decreased ability to concentrate, recurring thoughts of death, suicidal ideation with or without a specific plan, or a suicide attempt (APA, 2013, apud Wegner et al., 2020).

Depressive disorders in childhood, adolescence, and adulthood share the same basic characteristics: changes in mood, thinking, and activity, which are enough to cause impaired personal and social functioning. In children, however, there are differences depending on the stage of development. Children with depression find it difficult to say positive things about themselves and blame themselves for difficulties in their lives. They are also less likely to talk about subjective feelings and are more likely to exhibit somatic symptoms such as headache, abdominal pain, musculoskeletal pain, or fatigue (Charles & Fazeli, 2017).

In turn, patients with depression have been observed to exhibit some abnormalities in the hypothalamic-pituitary-adrenal (HPA) axis, particularly subtle signs of cortisol hypersecretion. For example, depression has been associated with increased 24-hour blood cortisol levels, decreased cortisol secretion after dexamethasone administration, increased waking salivary cortisol, increased adrenal gland volume, and decreased glucocorticoid receptor numbers both in the brain, as well as in the periphery (Cowen, 2015 apud, Kaltenboeck & Harmer, 2018).

Therefore we can summarize that the basic features of depression that also affect children are symptoms such as low mood, decreased interest or pleasure in most or all of the day's activities, decreased motivation, increased or decreased appetite and weight, insomnia or hypersomnia, restlessness or psychomotor retardation, fatigue, cognitive disturbances such as memory deficits and suicidal thoughts with or without plans or suicide attempts (Horowitz & Garder, 2006).

### **b) Anxiety**

Another emotional problem that children face is anxiety. Anxiety is a normal emotional state, characterized by apprehension, nervousness, insecurity, and overwhelm, which every person experiences at least once in their life. The favorable environment for anxiety is the appearance of problems or threats (Anxiety UK, 2012).



The state of anxiety can be equated with an exaggerated response of the body characterized by fear, which was triggered by erroneous and negative anticipation of possible consequences, and not as a result of what an event presents. Anxiety in children can often be triggered in situations related to the school environment, such as tests and their possible consequences. For example, a negative result can provoke their perception of punishment from their parents or rejection from friends. Fear and anxiety, accompanied by the feeling of devaluation towards these events are so strongly felt that the child tries as much as possible to avoid experiencing them (Sălceanu, 2015, p. 396).

Waiting for a negative event to happen keeps the little ones in a continuous state impregnated by fear, which causes manifestations such as doubts about past actions, doubts whether they did something wrong at some point, fears about the future, self-criticism, constant feeling of the need to have an adult around to offer them support, decreased self-esteem, blame as well as states of irritability, opposition, and nervousness (Marcelli, 2003).

Bringing into discussion the concepts of fear and anxiety, it is also worthy to make a distinction between them, so that fear portrays an emotional reaction to a danger, whether true or assumed, and anxiety signals an anticipation of possible danger. Moreover, the body has a different way of responding to each of them, in the case of fear is stimulated autonomously alertly, through fight or flight, the sensation of danger being close, and in the case of anxiety is characterized by muscle tension, which keeps the individual in a state of alertness, caution and avoidance (APA, 2016).

Experiencing anxiety leaves the individual with a persistent state of tension, which leads him to consider himself powerless in the face of a threat that he cannot see, prevent, or control, but which he can only feel overwhelmed him, never knowing when the moment of impact will occur (Rachman, 2013).

The defense and alert mechanisms are often triggered by the presence of anxiety, so common in everyone's life, causing the body to act. In the face of the danger caused by the situations proposed by the environment, in which anxiety is triggered, the predominant reactions are constituted by fear and the burning desire to flee, to escape from that circumstance, which categorizes them as defense mechanisms. Although anxiety, accompanied by fear, can also have an adaptive role, the balance between normal and pathological can be easily disturbed. What frames anxiety at normal levels is represented by the individual's ability not to let it influence daily activities in such a negative way that it leads to preventing their realization. In addition, pathological anxiety is completely different from ordinary worries and fears (Tudose, Tudose & Dobranici, 2011).

#### **1.4. The benefits of Physical Activity on mental health**

Physical activity (PA) participation has been advocated as a mental health promotion approach as well as an adjunctive treatment therapy for mental illness (Faulkner & Duncan, 2018, apud Dale et al. 2019). While the physical health benefits of PA are well documented (Poitras et al., 2016; Warburton et al., 2006, apud Dale et al. 2019), the mental health benefits of PA for children and youth are less studied.

Three important issues of particular relevance to the mental health of children and young people are depression, anxiety, and self-esteem. Specific to adults, systematic reviews have linked PA with fewer symptoms of depression or anxiety in clinical (Rosenbaum et. al, 2014, apud Dale et al. 2019) and non-clinical (Rebar et al., 2015, apud Dale et al. 2019) populations, with some promising evidence, which was also highlighted by a meta-analysis examining PA and depression and anxiety in children and youth.





Furthermore, self-esteem has been identified as a buffer in the onset of childhood mental illness (Ahn & Fedewa, 2011, apud Dale et al. 2019), and a previous systematic review showed a positive relationship between PA and self-esteem among children and youth (Ekeland et al., 2015, apud Dale et al. 2019).

In addition to the beneficial effects of PA on cardiovascular disease, diabetes, hypertension, cancer, osteoporosis, and obesity, a growing literature suggests that PA may improve mental health, including depression, anxiety, self-esteem (SE), self-concept (SC), anger, stress, executive function, and so on (Liu et al. 2015).

There was also evidence supporting the effectiveness of PA in improving the physical self-concept domain of self-esteem. the strongest evidence was found for improvements in physical self-perception accompanied by improved self-esteem in most studies measuring these outcomes (Lubans et al., 2016, apud Dale et al., 2015).

Moreover, exercise promotes brain vascularization, changes in neuronal structure, neuronal resistance to injury, and increased levels of brain-derived neurotrophic factor (BDNF) in the hippocampus (Cotman & Berchtold, 2002, apud Gorham et al., 2019).

In general, the possibility of developing a passion for a sport can bring the mind's attention to the search for new patterns of action, leaving a small place and time to think about negative thoughts, which before they were exclusive or dominant (Amorosi, 2003, apud Amorosi 2014).

It is important that all stakeholders, including parents, schools, carers, health professionals, policymakers, children, and adolescents themselves, are informed about the potential benefits of adhering to 24-hour movement guidelines (Sampasa-Kanyinga, 2020).

## **2. Psychological Research**

### **2.1. The purpose of the study**

The study aims to analyze the behavioral characteristics of children who are physically active and, respectively, physically inactive children, such as adaptability, depression, and anxiety.

### **2.2. Hypotheses**

The objective of the research is to identify the possible differences between athletic boys and non-athletic boys, both samples being from the urban environment and falling within the age range of 6-11 years. We will try to identify differences in terms of adaptability, anxiety, and depression.

### **2.3. Participants of the study**

The sample of the study has been composed of 60 children, aged between 6-11 years. The sample has been divided into two equal parts. The research was carried out on children from the urban environment, all children are living in Constanta.

The research period was between October and December of 2021 and was carried out by applying the PRSC 6-11 test to the parents of the two samples of children. It should be mentioned that there was no meeting with the participating children, but it was done by filling out the forms in writing, on sheets, by the children's parents. The parents were given the necessary information for the research and the necessary directions to complete the questionnaires. Privacy was also ensured in terms of personal data, to be the state of mental well-being of individuals.



## 2.4. Research Instruments

BASC 2 is a multidimensional and multimethod system, used in the assessment of behavior and self-perception, for children and young people aged between 2 and 25 years. The BASC-2 was constructed to facilitate the differential diagnosis and educational classification of a variety of emotional and behavioral problems that may be encountered in children, as well as to assist in the establishment of treatment and intervention plans (Reynolds et al., 2011).

When used individually, the BASC-2 components are stable and psychometrically sophisticated instruments that provide useful information. When used as an integrated system, the BASC-2 provides information about a child or youth from a variety of sources, providing the clinician with a coordinated set of tools for assessment, diagnosis, and treatment planning (Reynolds et al., 2011).

## 2.5. Data analysis and interpretation

From the quantitative point of view, **to support of hypothesis 1**, we conducted a quantitative analysis based on the Adaptability Variable. The average of the representatives who practice physical activity obtained a result of **17,03**, as well as the representatives who do not perform physical activity, obtained an *average of 13,63* both categories being aged 6-11 years. **To support of hypothesis 2**, a quantitative analysis based on the Depression Variable has been conducted. The average of the representatives who practice physical activity and obtained the result of **6.93**, as well as the representatives who do not practice physical activity, we obtained an *average of 10.30*, both categories being aged 6-11 years. **To support hypothesis 3**, a quantitative analysis based on the "Anxiety Variable" has been conducted. The average of the representatives who perform physical activity obtained a result of **7.30**, as well as the representatives who do not perform physical activity obtained an *average of 9.23*, both categories falling into the age of 6-11 years

	Physically active children		Physically inactive children	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Adaptability	17,03	4,115	13,63	3,935
Depression	6,93	2,227	10,30	3,573
Anxiety	7,30	2,548	9,23	3,739

Table no.1 Results obtained on Adaptability, Depression, and Anxiety on BAS-2 PRS-C

The data collected showed a difference between adaptability, depression, and anxiety between physically active children and physically inactive children. However, for the conclusion of significant differences between the two samples, the data has been introduced in IBM SPSS.

Physically active children and physically inactive children	Kolmogorv-Smirnov		Shapiro-Wilk	
	<i>Statistic</i>	<i>Sig.</i>	<i>Statistic</i>	<i>Sig.</i>
Physically inactive	,104	,200*	,983	,892



Adaptability	Physically active	,097	,200*	,971	,558
	Physically inactive	,111	,200*	,968	,489
Depression	Physically active	,155	,065	,932	,055
	Physically inactive	,129	0.88	,943	,107
Anxiety	Physically active	,112	0.79	,965	,405

Table no.2 Test of Normality of Adaptability, Depression, Anxiety

After the calculation of normality, the parametric method T-test has been used to find possible significant differences between the samples.

								99% Confidence Interval of the Difference	
								Lower	Upper
	F	Sig	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference		
Adaptability	,065	,800	-3,271	58	,002	-3,400	1,039	-5,481	-1,319
			-3,271	57,884	,002	-3,400	1,039	-5,481	-1,319
Depression	7,761	,007	4,379	58	,000	3,367	,769	1,828	4,906
			4,379	48,579	,000	3,367	,769	1,821	4,912
Anxiety	6,431	,014	2,340	58	,023	1,933	,826	,280	3,587
			2,340	51,160	,023	1,933	,826	,275	3,592

Table no.3 Independent t-Test for independent samples

The results showed a significant difference regarding adaptability 0.002 ( $p < .001$ ), depression 0.000 ( $p < .001$ ), and anxiety 0.023 ( $p < .001$ ) between the analyzed samples. Regarding these results, it can be considered that physical activity may have a beneficial impact on mental health in children.

From a qualitative point of view, in the following lines we will present and analyze the possible causes that cause children with low physical activity to be affected by mental health problems, rather than those who are active.

The physically active children have better results than the physically inactive children, and in line with these Abrahamson's paper (2017) highlights that each individual's adaptability





level is strongly influenced by executive control processes, which are enhanced by physical activity. Furthermore, the benefit of physical activity on mental health is increasing resilience level, which means an unexpected positive adaptation despite a high risk of failing in adjustment when experiencing psychological adversity (Cicchetti, 2010 apud Gerber et al., 2012).

Another important aspect that research evidenced is that emotional resilience is enhanced by physical activity which can help to cope with stress (Bernstein & McNally, 2018). In the literature was found that there is a positive correlation between physical activity, self-mastery, and social interaction, results that can be considered very important when we discuss about adaptability (Salmon, 2001).

There was evidence that physical activity has an important impact on physical self-perception, which includes self-concept and self-esteem, aspects that have an important role in social relationships (Lubans et al., 2016). Research finds that the effect of physical activity on depressive symptoms in overweight children was partially impacted and observed changes in perceived appearance and global self-worth. (Lubans et al., 2016, apud Petty et al., 2009).

The result of the study is consistent and supported by the meta-analysis conducted by Sampasa-Kanyinga (2020 apud Li et al., 2023) which attests those high levels of negative feelings experienced by children, such as anxiety, depression, and stress, may be correlated with low levels of physical activity. Moreover, it emphasizes the idea that mental health, including self-esteem, well-being, and optimism, can be strongly influenced, among many other factors, by any physical activity that involves consuming an energy intake.

Internally, research by Lu et al. (2023), conducted on 1389 children, highlights that the benefits of sport spill over into the structure and functioning of chemicals inside the brain. For example, releasing more endorphins as a result of physical activity can reduce pain levels and even introduce well-being, happiness, and euphoria that depression avoids. Physical activity can facilitate an interaction with natural environments which may improve the mood, affective states, and other indicators of well-being (Thompson et al., 2011, apud Lubans et al., 2016).

In addition, its positive effects are also manifested in the sleep cycle, allowing the child to sleep more, have more energy, and even counterbalance the imbalance caused by insufficient sleep. As a result, children have the opportunity to develop harmoniously, and even to "satisfy their basic needs for social interconnection, self-acceptance, and the development of goals in life (Lu et al., 2023, p. 2)."

Also, the need for physical activity as a form of support, emotional rebalancing proves to be extraordinarily important in a child's life, because the environment in which they are introduced, starting with the age of 6, namely school, seems to outline the favorable context in which most children, for at least once, face melancholic states, depressive and anxious.

Looking for when anxiety states occur and their contributing factors, researchers Cartwright-Hatton et al., 2006, Lichtwarck-Aschoff & van Rooij, 2019 apud Li et al., 2020) found that at least half of the adult population experiencing anxious states experienced their onset before the age of 11. They looked at 269 children aged 7 to 12 and found a strong correlation between low levels of physical activity and high levels of anxiety. The explanation for this result is attributed to the amount of positive affect children feel as a result of sports, mediated by resilience and agility. The more physically active a child is, the better his body can respond appropriately to stressful stimuli, developing his resilience and allowing him to return to emotional balance much faster than a child who leads a sedentary lifestyle.



Moreover, the meta-analysis conducted by Li et. al, (2023) includes in its area of presentation, the most significant arguments supporting the positive impact of physical activity on mental health, namely: the perspective of distraction, self-efficacy, and social interaction.

The distraction perspective brings to the fore the fact that exercise creates a diversion that shields children from negative stimuli, improving their well-being both during and after the activity. Self-efficacy is stimulated when children perceive physical exercise as a challenge, and in the case of the third perspective, it is considered that practicing a sport involves at least social interaction, which favors better integration into the community and emotional balance (Li et. al, 2023).

### **Limits**

Despite the results of the current research finding a beneficial impact of physical activity, some limitations need to be considered. The analysis has been established on the children's parents, which can be considered the knowledge that parents have of their children, also the time spent with children can affect how well they know the children. Some of the questionnaires were completed by fathers, and some by mothers, an aspect that we should consider important because some of the children may spend more time with the parent who did not complete the questionnaire.

In addition, the children come from different schools and different parts of the city, and this demographic and environmental difference can impact the research result. It must be mentioned that another aspect is the frequency of the physical activity, which is unknown, some of the children may have more physical activity times per week than others, which may affect the results.

Another limitation associated with this research is the lack of knowledge on how much physical activity is enough that a physically inactive child should be considered physically active. Parameters are not presented to find exactly how much physical activity the children are doing.

### **Conclusions**

Results of the present study provide evidence of the possible benefits of physical activity on mental health in children. It seems that the level of adaptability is higher in physically active children. Instead, the collected data showed lower levels of depressive and anxiety behaviors in physically active children in comparison with physically inactive children.

Future research is encouraged to investigate with better parameters the relationship between physical activity and mental health in children. More collected data from children directly and different aspects that children interact with is needed. Additionally, more comparisons should be made based on different observations.

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