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*Original article*

## ***Inclusive methodological strategy for teaching-learning football in students with Attention Deficit Hyperactivity Disorder in the Physical Culture class***

*Estrategia metodológica inclusiva para la enseñanza-aprendizaje del fútbol en estudiantes con trastorno por déficit de atención con hiperactividad en la clase de Cultura Física*

*Estratégia metodológica inclusiva para ensino-aprendizagem de futebol em alunos com transtorno de déficit de atenção e hiperatividade na aula de Cultura Física*

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## ABSTRACT

It is well known that the most common way to reduce the effects of Inclusive methodological strategy for teaching - learning football in students with attention deficit hyperactivity disorder in the physical culture class (ADHD) has historically been through pharmacological products. However, it is irrefutable that the influence of physical exercise has avoided undesirable side effects and has achieved significant favorable changes in patients. This physical activity was basically implemented preventively, mainly under medical, chronic conditions and disabilities, also to contribute to the cognitive and behavioral sphere. The objective of this work consisted of proposing a group of methodological recommendations in the Physical Education class to improve the living conditions of children with ADHD in the Sagrado Corazón Fiscomisional Educational Unit of Esmeraldas, Ecuador. The empirical methods used were scientific observation, the survey applied to students and the interview directed to teachers. Once these recommendations were implemented, a survey of both components of the process was also used to obtain a preliminary assessment of the effect of this proposal, because it turned out to be a methodological aid of high value to prepare teachers and students in their influences as a counselor in the case of the teacher and as an academic social collective in the case of the group of students.

**Keywords:** Attention Hyperactivity Disorder, Physical Education.

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## RESUMEN

Es bien sabido que la forma más común de reducir los efectos del trastorno por déficit de atención con hiperactividad ha sido históricamente a través de productos farmacológicos. Sin embargo, es irrefutable que la influencia del ejercicio físico ha evitado indeseables efectos secundarios y ha logrado cambios favorables significativos en los pacientes. Esta actividad física fue implementada básicamente de forma preventiva, principalmente bajo condiciones médicas, crónicas y discapacidades, también para contribuir a la esfera cognitiva y comportamental. El objetivo de este trabajo consistió en proponer un grupo de recomendaciones metodológicas en la clase de Educación Física para mejorar las



condiciones de vida de niños con trastorno por déficit de atención con hiperactividad en la Unidad Educativa Fiscomisional Sagrado Corazón de Esmeraldas, Ecuador. Los métodos empíricos que se utilizaron fueron la observación científica, la encuesta aplicada a estudiantes y la entrevista dirigida a profesores; también se emplea, una vez implementadas estas recomendaciones, una encuesta a ambos componentes del proceso para obtener una valoración preliminar sobre el efecto de esta propuesta, debido a que resultó ser una ayuda metodológica de alto valor para preparar los profesores y estudiantes en sus influencias como orientador en el caso del profesor y como colectivo social académico en el caso del grupo de estudiantes.

**Palabras clave:** trastorno de atención con hiperactividad, Educación Física.

## RESUMO

É bem sabido que a forma mais comum de reduzir os efeitos do transtorno de déficit de atenção e hiperatividade tem sido historicamente por meio de produtos farmacológicos. Contudo, é irrefutável que a influência do exercício físico evitou efeitos colaterais indesejáveis e alcançou mudanças favoráveis significativas nos pacientes. Essa atividade física foi implementada basicamente de forma preventiva, principalmente em condições médicas, crônicas e deficiências, também para contribuir na esfera cognitiva e comportamental. O objetivo deste trabalho foi propor um conjunto de recomendações metodológicas nas aulas de Educação Física para melhorar as condições de vida de crianças com transtorno de déficit de atenção e hiperatividade na Unidade Educacional Fiscomisional Sagrado Corazón de Esmeraldas, Equador. Os métodos empíricos utilizados foram a observação científica, o inquérito aplicado aos alunos e a entrevista dirigida aos professores; Uma vez implementadas estas recomendações, recorre-se também a um levantamento de ambas as componentes do processo para obter uma avaliação preliminar do efeito desta proposta, porque se revelou uma ajuda metodológica de elevado valor para preparar professores e alunos nas suas influências. como conselheiro no caso do professor e como coletivo social acadêmico no caso do grupo de alunos.



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**Palabras-chave:** trastorno de atención e hiperactividad, Educación Física.

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## INTRODUCTION

### *General concepts of attention deficit hyperactivity disorder*

Attention Deficit Hyperactivity Disorder (ADHD) is assumed to be a neurodevelopmental disorder in the executive functions of the brain located in the prefrontal cortex. This action prevents the self-control of nervous impulses and also constitutes a difficulty in the attention times of the person. Among other statements, it can be said this disorder generates a deficit in the inhibition of behavior which accelerates a delay or deterioration in the development of four neuropsychological functions: non-verbal working memory, verbal working memory, self-regulation of affect /motivation/activation and reconstitution (Tirado *et al.*, 2004).

However, as some critics on the subject might comment on the case, ADHD is not a disorder that ends in adolescence, but rather its manifestations, complexity and potential for damage are modified. The diagnosis of ADHD is complex due to its high clinical heterogeneity and the absence of a biological marker. There is various evidence that indicates a delay in brain maturation, mainly in regions that mature gradually with age, which points to an immature profile of functional activation (Rodillo 2015). In experiments applied to children with ADHD, a delay of 2-5 years has been discovered in obtaining cortical area and thickness, mainly at the level of the frontal, superior, temporal and parietal regions (Rodillo, 2015; Cunill, Castells, 2015). However, another study has revealed delayed maturation in the area of the tracts, specifically at the level of fronto-striatal, fronto-cerebellar and fronto-parieto-temporal connections (Guerrero, 2016).

Attention deficit hyperactivity disorder is not only one of the most common psychiatric diseases in children, it can also occur during adulthood (Cunill, Castells, 2015).

ADHD also has an impact on social, academic and occupational functioning. The clinical manifestations of the disorder are variable in patients and are related to alterations in the front striatal and mesolimbic circuits. Genetic and environmental factors intervene in this



disorder, which usually cause a vulnerability to developing this alteration. Although there is concern about the issue, causal associations have not yet been confirmed in some of these cases. The treatment that is eventually recommended includes combining the pharmacological procedure with the psychosocial one (Cunill, Castells, 2015). The success of the first one is mostly limited to short-term symptomatic improvement, while those of the latter are unclear. Even so, pharmacological treatment has increased exponentially during the last two decades, coinciding with the commercialization of new medications (Cunill, Castells, 2015).

According to Guerrero (2016), children with ADHD can spend a long time doing a task as long as it truly motivates them. Preventively, it is necessary that the task requires immediate reinforcement for the child. When the activity is monotonous and boring, children often stop paying attention. It is very normal for this to happen, even to those who do not suffer from ADHD; the difference is that the latter have a greater capacity for perseverance.

Rusca-Jordán, Cortez-Vergara, (2020) dedicate their study to understanding psychosocial manifestations of children with ADHD. According to their observations, these children who have difficulties establishing a social relationship may appear to be rude, wanting to impose their like and decision in the game, which generates rejection by their peers. This directly affects self-esteem and, in some cases, a depressive comorbidity appears, others are labeled negatively or treated differently at home and at school, this represents a challenge to concentrate, stay still and think before speaking; all of these challenges must be faced by the teacher in the classroom, so he must be prepared to enable correct functioning in the teaching-learning process in a school environment.

In multiple research projects, ADHD has been associated with different manifestations of social life; issues related to criminal behavior and antisocial attitudes (Retz *et al.*, 2021); associated with medical and health problems (Melegari *et al.* 2021); linked to psychological studies, especially in the stage of adolescence (Dekkers *et al.*, 2022). Review works have also been carried out where the functional physiological structure of the organism in patients with ADHD and its implications at a cognitive, psychological, pedagogical and social level are systematically analyzed (Parlatini *et al.*, 2023).



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### *ADHD associated with physical activity and sports*

It is well known that the most common way to reduce the effects of ADHD has historically been through pharmacological products. However, it is irrefutable that the influence of physical exercise has avoided undesirable side effects and has achieved significant favorable changes in patients. This physical activity has been basically implemented preventively, mainly under medical, chronic conditions and disabilities, also to contribute to the cognitive and behavioral sphere. In a study developed by Zang (2019), after carrying out an exhaustive bibliographic review provided by internet search engines such as Web of Science, MEDLINE, EMBASE, Google Scholar, Cochrane Central and <http://www.ClinicalTrials.gov>, it was possible check the following results:

1. Anxiety and depression can be alleviated through physical activity.
2. Hyperactivity and lack of concentration of attention can be mitigated with physical exercise.
3. Regarding the effects of ADHD, aggressive behaviors are also controlled with physical exercise.
4. To achieve such positive effects, it is suggested that you practice aerobic exercises better than yoga.

On the other hand, Tandon *et al.* (2019) conducted a study where they showed that children with ADHD have a high risk of developing health problems and suffering from obesity. This author compared children who have obese ADHD with other children who face other risks and obtained that the firsts ones have the tendency to practice less physical activity, less sleep and limited play time with technologies and this increased with age and with the worsening of the living conditions of the social class to which he belongs.

On the contrary, Cummings *et al.* (2020), more than a characteristic that tends to decrease with its collateral conditions, see in sport and physical activity a potential to increase talent in children with ADHD, since according to their studies, physical activity and sport improves the concentration of the attention and mood.



Those authors offer an explanation of the most common types of medications prescribed for people with ADHD. According to this work, the two types of medications are classified as stimulants and non-stimulants. The most common stimulants are those called dopamine and norepinephrine, which help the person to focus better on their activities. Among the best stimulants are the amphetamines: aderol, dexadrine and dextrometaphin, dextromethylphenidate and methylphenidate. As part of the non-stimulants are: atomoxetine and nortriptyline. All of these medications can be avoided or reduced with the help of systematic physical activity.

Among the sports that contribute the most to the treatment of people with ADHD are combat sports and according to Bayrakdarođlu and Tekin (2020), in this classification those that contribute the most are: Taekwondo, Karate, Judo and Tai Chi. And although these positive effects have been demonstrated, the number of researches dedicated to this topic is still insufficient.

Montalva-Valenzuela *et al.* (2022) also confirm physical activity therapy to counteract the effects of ADHD, but their strategy consists of performing aerobic exercises. Based on their studies, researchers propose a 20-minute session of physical activity, sports, or exercise regimen to achieve improvements in physical-motor functions in children and adolescents with ADHD.

To make the success of these sessions a reality, they propose a method (Cunill, Castells, 2015) that follows below.

In a 60-minute session for 12 weeks, these exercises should be performed per week: (1) receiving, throwing and bouncing the ball; (2) perform balance training; (3) try to do stunts; (4) aim and throw; (5) play tennis; (6) walk on a rope; (7) perform juggling games; (8) practice beach soccer and handball; (7) perform coordination exercises; and (8) throwing and receiving the ball.

This method proved to be effective, although in general a variety of research needs to be carried out in different age groups to be able to demonstrate that physical activity is an efficient tool for such purposes, which is why the objective of this work consists of proposing





a group of methodological recommendations in the Physical Education class to improve the living conditions of children with ADHD in an Educational Unit in Ecuador.

## MATERIALS AND METHODS

This research was carried out at the "Sagrado Corazón" Fiscomisional Educational Unit in Esmeraldas, Ecuador, with a population of 15 teachers, including five from Physical Education and 30 students from the 7th grade of Basic General Education (EGB) level. The objective of the diagnosis is to determine the knowledge that Physical Education (PE) teachers have about the treatment of adolescents with ADHD in order to contribute to the improvement of the neurodevelopmental condition.

In the study, interviews with teachers, surveys with students and scientific observation were applied to the teaching-learning process (PEA), specifically to five Physical Education (PE) classes. In these classes, the PE teacher's treatment was visualized to achieve an inclusive class, specifically with the student who suffers from ADHD. A population of 30 students was taken who constantly interact with this child.

In these checks, treatment for people with ADHD is sought from a pedagogical point of view; that is, the cognitive, procedural and evaluative component was measured through the different instruments or empirical methods.

In scientific observation, the teaching-learning process was evaluated in the PE class and the distribution of dimensions and corresponding indicators will be as follows.

### *Scientific observation applied to the PEA*

#### 1. Cognitive dimension.

a) Indicator: visualization of the mastery of knowledge and skills that the teacher must have to work with people who have ADHD.

b) Indicator: visualization of the knowledge that students have to relate to the child who has ADHD in the group.



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## 2. Procedural dimension.

- a) Indicator: carrying out activities dedicated to improving the condition of ADHD in the context of PE.
- b) Indicator: quality of interpersonal relationships between students and the case of the student with ADHD in carrying out the activities.

## 3. Assessment dimension.

- a) Indicator: How activities designed to improve the knowledge, skills and attitudes of adolescents with ADHD are evaluated.
- b) Indicator: Way in which students self-evaluate their attitudes related to the student with ADHD.

### Student survey

#### 1. Cognitive dimension

- a) Indicator: level of knowledge that students have about the treatment of people with ADHD.

#### 2. Procedural dimension.

- a) Indicator: Mastery of skills that students must have to interact in a constructive and understanding way with people with ADHD

#### 3. Assessment dimension.

- a) Indicator: level of assessment and self-evaluation that students have regarding this topic.

### Interview with teachers of the educational unit

#### 1. Cognitive dimension.

- a) Indicator: level of knowledge that teachers have about the treatment of people with ADHD.

#### 2. Procedural dimension.



b) Indicator: Mastery of skills that teachers must have to work with people with ADHD from PE class.

3. Assessment dimension.

a) Indicator: level of assessment and self-evaluation that teachers must have regarding this topic.

#### *Brief characterization of the student with ADHD*

The child with ADHD in the study is an eight-year-old student, white skin, medium height, robust, generally talkative, jovial, hyperactive, he is attracted to PE, if he is adequately motivated and if he receives levels of help to carry out some actions such as participating in games. recreational or develop skills such as kicking the ball, running with the ball in hands, throwing, rolling, jumping. Despite his disorder, he maintains positive relationships with his classmates and his teacher.

#### *Contextualization of ADHD treatment in Ecuador*

In Ecuador, a trajectory of Inclusive Education has survived, even without using this term from the beginning, thanks to the personal effort and commitment of the families of children with disabilities. The main references date back to 1940, when, at the initiative of family members and private organizations, the first care centers were created with charity and beneficence criteria.

The first institutional centers emerged between 1950 and 1960, established in Quito and Guayaquil to care for people with deafness, blindness and mental retardation. In 1982, the Law for the Protection of the Handicapped was approved and in 1983 the Special Education Section of the Ministry of Education and Culture was founded. Through this, national special education programs begin to be coordinated and thus paves the way for study plans and programs based on different disabilities, including ADHD.



But the story did not stop there, it was consolidated. There were many events and laws that were created in the country to benefit this vulnerable sector of the population, in such a way that laws were created that required educational centers to have a specific curricular design adapted to the conditions and abilities of the students with disabilities. The content advocated eliminating learning barriers, guaranteeing physical, curricular and promotional support and adaptations tailored to their needs, as well as training teaching staff to promote early detection and attention to learning problems and factors associated with learning.

## **RESULTS AND DISCUSSION**

Scientific observation: During the five PE classes reviewed, the following results could be determined.

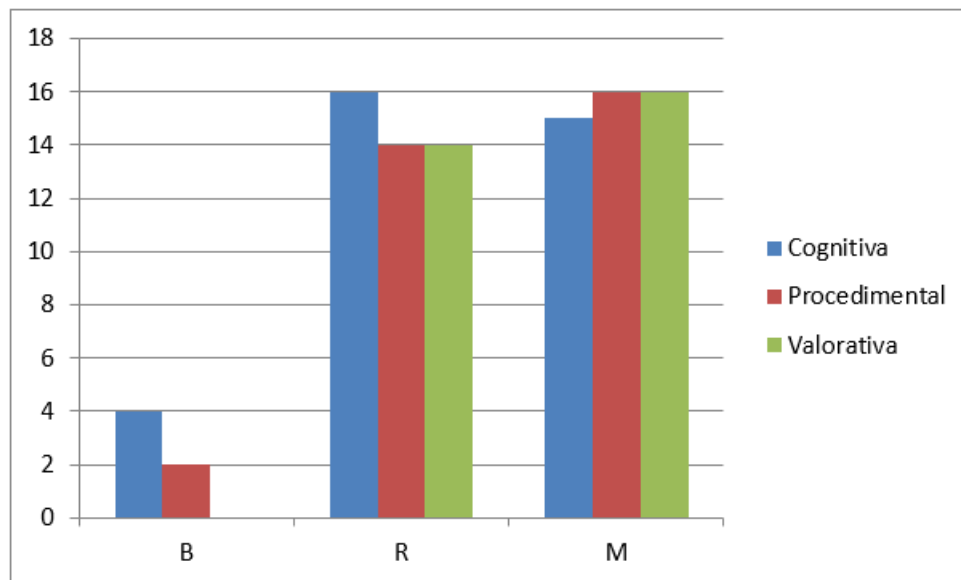
- Some insufficiencies were observed on the part of the PE teacher regarding the mastery of knowledge and skills that must be possessed in a psychopedagogical and didactic way to work with people who suffer from ADHD. Few activities were perceived to be linked to these individual differences. On many occasions the teacher has been found calling the attention of the student with ADHD and to the detriment of this, effective strategic tasks are not conceived to face this educational challenge.
- The group of students does not receive professional guidance to know how to help, advise and support the progress of their classmate with ADHD. He is often treated with pity by some, rejection and with a certain ignorance by others.
- Activities for treatment with this type of student are limited to the role of the school psychotherapist. Most teachers and students did not plan to develop the skills and knowledge of this type of student.
- Although the lack of training for working with people with ADHD prevails, it cannot be said that the interpersonal relationships between them are unfavorable. Overall, there is good empathy between all members of the group.



- As there are no specific activities for the treatment of these cases, the evaluative and self-reflective processes are also insufficient.

### *Student survey*

As shown in Figure 1 in both the Cognitive and Procedural dimensions, the students obtain a rating of Poor and Fair and only Good for 6 students respectively. However, in the evaluative dimension, no student is rated Good. This reveals the possible causes of such a result, since by not promoting different methodological actions from the PE contents so that students know and practice the effective way to interact with a person with ADHD and help their academic and interpersonal growth (Figure 1).



*Fig. 1. - Results of the test*

### *Interview with teachers*

Unlike the survey, what is sought with this instrument is not to obtain information to corroborate, through the scientific method, whether or not an action plan is necessary to contribute to better treatment for people with ADHD, through in the interview, the interpretation of the teachers is assessed, since they are the ones who must methodologically influence this treatment. That is why the questions are developed in such a way that they



can offer their points of view, their convictions and their feelings and intuitions on this very sensitive topic of inclusive education. The answers to the questions asked. It is ordered as follows:

- The level of knowledge that teachers have about the treatment of people with ADHD is poor; they do not have a conceptual notion in detail about the characteristics, potentialities and weaknesses that children with ADHD have, as well as an adequate methodology to work with them.
- The skills that teachers must have to work with people with ADHD from the PE class are insufficient; they refer to assigning physical activities that lead the child to expend energy such as planks, squats, walking or lifting weights with artisanal attributes such as knobs with sand.
- The level of assessment and self-assessment that teachers have regarding this issue is very low: it is also an undesired result, consequent on a weak theoretical-practical foundation on working with people with ADHD. There are no indicators in the PE teachers' planning that can evaluate the work done regarding the topic of people with ADHD.

By analyzing the insufficiencies found in this diagnosis, a set of methodological actions is proposed to strengthen the work with people with ADHD in light of the theoretical references that support this research. Among these supports the following stand out:

- Physical exercise is used as an efficient and sustainable alternative that sometimes replaces the use of pharmacology.
- The activities must motivate enough to keep the individual in conscious action.
- The activities will transmit educational, constructive and pacifist content, in such a way as to keep these children away from hostile, criminal and unproductive environments.
- Within the proposed physical activity, aerobic exercises are prioritized.





- 60 minutes of exercises per week are proposed; preferably, the exercises proposed by Montalva-Valenzuela, *et al.* (2022) are recommended (Table 1).

*Table 1. - Distribution of activities*

Days	Monday	Tuesday	Wednesday	Thursday	Friday	*Saturday	*Sunday
<b>Activities</b>	<b>Morning</b> <b>Session:</b> outdoor walks <b>Afternoon</b> <b>session:</b> Invite the child to structure the activities they will do during the week, including recreational games or sports that they will decide to practice during the week.	<b>Morning</b> <b>Session:</b> <b>Soccer</b> <b>Afternoon</b> <b>session:</b> Seek collaboration from them to carry out some work during the day, whether academic in nature. co or for other purposes in the context of the school day	<b>Morning</b> <b>Session:</b> Swimming walks on the beach <b>Afternoon</b> <b>session:</b> Work on the child's potential to improve his self-esteem, preferably the sports he prefers or in which he excels.	<b>Morning</b> <b>Session:</b> <b>Soccer,</b> interactive games to develop concentration <b>Afternoon</b> <b>session</b> Propose the child to decipher puzzles, hobbies, word searches, problem situations.	<b>Morning</b> <b>Session:</b> cycling, hiking <b>Afternoon</b> <b>session:</b> Invite the child to do slow motion activities in groups or individually. Preferably imitate positions related to the practice of sports such as batting, throwing, marching and others, typical of the student's routines.	<b>Morning</b> <b>Session:</b> All day, <b>whenever</b> <b>possible</b> Motivate and control that the child plays the turtle game: they must move like the turtle and hide their head if they detect a noise or movement. surprising lie	<b>Morning</b> <b>Session:</b> All day, <b>whenever</b> <b>possible</b> Motivate and control the child to invent a language: the idea is for them to invent a symbol for each of the letters of the alphabet and write messages

*(\*) The weekend activities will be family-oriented since it is assumed that on those days children and adolescents will develop in the company of their parents.*

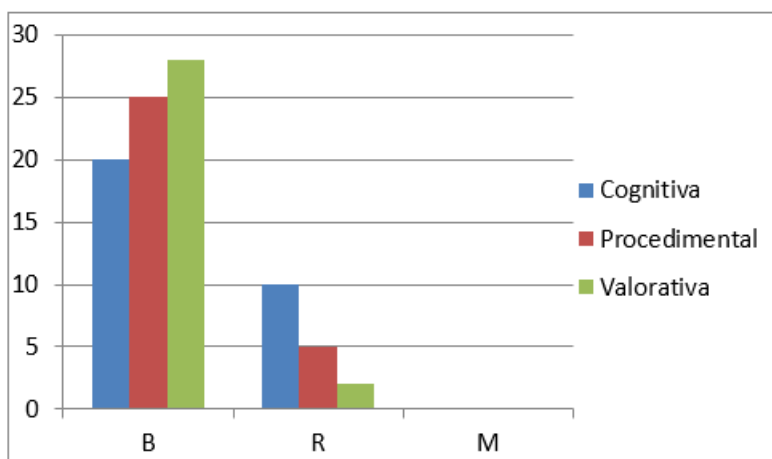
According to Table 1, in the mornings, mainly sports activities will be carried out, coherently inserted into the PE classes, and in the afternoons, indoor activities will be carried out, especially protecting them from the sun's rays that gradually cause more damage due to global warming. The practice of soccer is reiterated on Tuesdays and Thursdays due to the



potential that this sport offers to encourage the deployment of the child with ADHD on the field, running, kicking, heading and interacting with the members of the team.

The activities in the afternoon session come from a selection of the best of Colectivo de Autores (2019): 15 activities to do with children with ADHD, which complement PE classes with this approach to individual differences. It is important to highlight that the proposal of these activities must be agreed upon with the center management to be allowed and supported by the teaching staff.

Once these activities have been developed within a period of eight weeks, the group of authors determines to apply a global survey to students and teachers to somehow know the state of opinion regarding the impact of these methodological recommendations. Figure 2 shows the preliminary results of this research.



*Fig. 2. - Survey results after applying the methodological recommendations*

At first glance, it can be seen in Figure 2 that the results are substantially superior to the initial diagnosis survey, since as a consequence of the planned application of these methodological recommendations, the majority of teachers are evaluated as good, only a minority of Fair and none of Poor. From this perspective, it can be summarized that in these conditions the teacher and the group are more prepared to positively influence the learning of a student with ADHD. It is important to emphasize that although the actions are specifically directed at an individual with ADHD, it is no less true that if the entire group





develops them, surely the collective results are valued much more than the individual ones, and even more so if it is a point as sensitive as inclusive education is.

This work, in general, provides a reference of notable value to the scientific topic related to the science of physical culture associated with people with ADHD which, although the work of Wang *et al.* (2023) offers a review of the effects of physical activity on inhibitory function in children with ADHD, this study confirms that physical activity can counteract the effects of the inhibitory component of ADHD in 60-minute sessions, unlike this proposal that recommends actions that can be extended at different times of the day and combines sporting, psychological and social influences.

In the case of Skalidou *et al.* (2023) also agree that the final objective is to use physical activity to alleviate the effects of ADHD, but on this occasion the route is through swimming, a sport that guarantees coordination, endurance, physical-muscular exercise with thinking ability in direct contact with the aquatic environment. It is also worth noting that the study population focuses more on adulthood. This is not the same case in the work of Medjralou, Zaoui, (2023), who dedicate more of their work to early ages, as they confirm that Physical Education can help correct many impulsive attitudes generated by ADHD and an ideal alternative may be playing small games during work sessions in the school context.

## CONCLUSIONS

In this research, the authors have first carried out a systematization of basic concepts related to ADHD, as well as their relationship with the sciences of Physical Culture and sport, which points towards the potential that PE and sport have to compensate for the effects of this condition in the social life of children, adolescents and adults.

An initial diagnosis was carried out to check the knowledge and skills possessed by a representation of teachers and students from an educational unit in Ecuador and it was shown that the diagnosed subjects lacked knowledge and methodological procedures to work with adolescents with ADHD, this is to the detriment of the Inclusive Education that is expected in this new 21st century.



The methodological recommendations proposed in this work have preliminarily demonstrated that the preparation of teachers and students in an educational unit can change favorably with respect to the treatment that must be sustained to achieve satisfactory results with adolescents with ADHD.

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*Conflict of interests:*

The authors declare not to have any interest conflicts.

*Authors' contribution:*

The authors have participated in the writing of the work and analysis of the documents.





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