



## **Adventure sports as a tool to improve motor coordination in students in early childhood education and the early years of elementary school: an integrative review**

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### **1 INTRODUCTION**

Developmental coordination disorder (DCD) is a common chronic health condition that is poorly recognized and understood in school settings. The most recent DSM 5th Edition (AMERICAN PSYCHIATRIC ASSOCIATION, 2013), defines DCD as a condition marked by a significant impairment in motor coordination development that interferes with academic achievement and/or activities of daily living.

Four diagnostic criteria comprise DCD: (1) Performance in daily activities requiring motor coordination is substantially below that expected, given the person's chronological age and measured intelligence. This may be manifested by significant delays in performing motor milestones (e.g., walking, crawling, sitting), dropping things, "clumsiness," poor performance in sports, or poor handwriting; (2) The disorder in criterion "A" significantly interferes with academic performance or activities of daily living; (3) The disorder is not due to a general medical condition (e.g., clumsiness), cerebral palsy, muscular dystrophy) and does not meet the criteria for a Pervasive Developmental Disorder; (4) If intellectual disability is present, the motor difficulties are greater than those normally associated with it (AMERICAN PSYCHIATRIC ASSOCIATION, 2013).

As for motor development, Cotrim et. al (2011) state that "it is characterized by the occurrence of qualitative and quantitative changes in the motor repertoire throughout life." (p. 523) The authors agree that its definition has changed over the years, and it is currently known as a dynamic process. Therefore, the changes that occur in motor development are understood as successive processes, in which mature and refined movements are increased and improved, as well as complex and specific movements adapted to the particular demands of recreational activities, of daily life and, especially, of



sports practices that stimulate the motor behavior to change from an attractive state to another attractive state (THELEN; SMITH, 1994 apud COTRIM et. al, 2011).

Through the influence of the environment and the proposed tasks, the opportunity for structured practice and the instructions transmitted effectively are determining factors for it to be possible to acquire new motor skills and that they are improved throughout the development cycle, adding to this repertoire essential motor skills such as running, jumping, throwing, receiving, among others (PELLEGRINI; BARELA, 1998 apud COTRIM et. al, 2011).

In fact, school Physical Education has been undergoing several transformations in its pedagogical practice, therefore, it is important to transmit new knowledge associated with the various manifestations of the body culture of movement in order to expand the possibilities of the teacher activities that extend beyond exercise and repetitions provided by the traditionally known sports (FREITAS et. al, 2016).

As mentioned in the previous paragraphs, it was necessary - and, it should be noted, it is still a necessity - that Physical Education and its professionals go beyond their most common parameters, used in most classes and sporting meetings, to stick to multiple aspects of other modalities. This way, adventure sports, which can provide possibilities of manifestation of the playful element, thus awakening new sensibilities and experiences in the relation body-subject of the students of Kindergarten (FRANÇA, DOMINGUES 2015). From this angle, therefore, it is necessary to approach the definition of Adventure Activities.

According to Marinho and Schwartz (2005), adventure activities are defined as diverse sporting practices manifested, mainly, during leisure time, have innovative characteristics and differ from traditional sports, with conditions for practice, objectives, motivations and the means for their development are others. Besides this, they are activities that contain risks or dangers, duly calculated, not requiring previous training, like other usual sports.

Adventure sports arise from new paradigms that bet on the (re) rapprochement with nature, self-realization, leisure activities, and improvement in quality of life, and that intend to replace competition, performance, and effort with uncertainty, risk, and freedom (COICEIRO, 2007; COSTA, 2000; MARINHO; BRUHNS, 2003; PASSOS, 2004).

The constant emergence of new modalities, accompanied by a growing number of fans from different cultural backgrounds, age groups, social levels, and professional areas, shows not only the economic potential, but also that adventure sports are a reality in today's context (MARINHO; BRUHNS, 2003).

Regarding risks, Franco, Cavasini, and Darido (2014, p. 108 apud LOUREIRO et. al, 2018) point out that the mere fact of working with adventure/radical body practices produces a demand for ordered efforts that surpass the intentionality of performing safe practices, dealing with properly



calculated risks and uncertainties, remembering that teachers must provide safety equipment so that there is no physical or psychological damage arising from these practices.

Pereira; Monteiro (1995) mentioned that the pedagogical potential of these sports is enormous because they can promote educational situations with extraordinary experiences, present strong motivation, and are full of emotions and feelings. Adventure sports also help to better control body movements, confidence in oneself and one's partner, overcome obstacles, overcome existing limitations, and a sense of strength. In addition to improving physical strength (such as power, speed, endurance) and motor skills (such as fine and extensive motor coordination).

In the late 20th century, many of those who used adventure activity for educational proposals used the terms experiential education and adventure education as synonyms (DE CLAYNE; GUTHRIE, 2006). Adventure education focuses on growth and development through activities based on experiential education principles seeking the improvement of motor and psychic abilities through the exploration of real circumstances.

The guiding question of the present study and, therefore, the central question to be answered in this integrative review is whether adventure sports are effective in improving motor coordination in students.

## **2 OBJECTIVE**

To investigate the effect of this type of sport on motor skills in students in kindergarten and early elementary school.

## **3 METHODOLOGY**

In the present research the integrative literature review based on Whittemore and Knaf (2005) was employed through the construction of analyses formed based on six stages in order to obtain a better understanding of the subject based on previous studies, these being: identification of the topic and selection of the hypothesis or research question for the articulation of the integrative review, definition of criteria for the inclusion and exclusion of studies/sampling or literature search, definition of the information to be extracted from the selected studies/categorization of the studies, evaluation of the studies included in the integrative review, interpretation of the results, and presentation and presentation of the review/knowledge synthesis.

According to Mendes et al. (2008) "the objective of the integrative review is to gather and systematize research results on a theme or delimited question in a systematic and orderly way, helping to develop and obtain more knowledge on the subject", thus, the present text sought scientific articles that dealt with the theme of adventure sports as a tool to improve motor coordination in students.



The search was conducted by two researchers, who undertook a rigorous analysis of articles, dissertations, theses, and abstracts, as well as research reports done in the field of Physical Education, in the health descriptors (DECS), (using the terms "adventure sports" or "motor coordination" OR "motor coordination and adventure sports" OR "adventure sports for children" OR "adventure sports and students"), as well as searches in the electronic databases Lilacs, Google Scholar, Scielo, EBSCO, and BDEF.

As inclusion criteria, it was established that:

- 1) the studies/works must have been published from 2011 to 2021;
- 2) published studies/works should evaluate the use of adventure sports for improving motor coordination;
- 3) the studies/works must be written in Portuguese;
- 4) studies/works must be original including review articles, books, dissertations, theses, notes, abstracts, or letters to the reader;
- 5) studies/work should use instruments to evaluate the use of adventure sports to improve motor coordination.

Nevertheless, the selection of these researches was developed with Relevance Tests. In Relevance Test 1, the publication period of the studies was considered, as well as the language. In Test 2, the productions were selected considering the title and/or abstract, responding to the adequacy to the theme of interest, excluding the productions according to exclusion criteria. (PROCHNOW, et al, 2012).

In this integrative review, the quality assessment was performed based on the Google Academic database. The tool assists in the search for relevant scientific material, from scientific articles to books; thus, these contents are possible to be used as bibliographic references in the elaboration of other materials, such as Course Completion Papers, Monographs, Dissertations, and Articles.

The tool collects results both in repositories of educational institutions, and also in libraries of government agencies; moreover, this database uses as repositories (in Portuguese) different sources, the following can be highlighted:

- 1) FGV Digital Library
- 2) Lume UFRGS
- 3) SciELO Brazil
- 4) BDJur
- 5) BDM UnB
- 6) Seer Portal UFBA



#### 4 DEVELOPMENT

As for the results, 1,606 results were found with the keywords "motor coordination sports" OR "adventure sports" OR "motor coordination sports" OR "adventure sports for children" OR "adventure sports and students" OR "students" OR "students" in all indexes and all sources. Considering only the studies published in SCIELO, 18 productions were obtained; meanwhile, 1,324 were obtained in LILACS and 264 in the Database in Nursing (BDENF). After Relevance Test 1, 549 articles were selected from the aforementioned databases, which, with Relevance Test 2, resulted in 5 articles described below.

Chart 01 - distribution of the studies found in the databases

<b>BASES</b>	Total found	Relevance Test 1	Relevance Test 2
<b>LILACS</b>	1.324	245	1
<b>SCIELO</b>	18	12	1
<b>BDENF</b>	264	237	3
<b>TOTAL</b>	1.606	549	5

Source: Authors, 2022.

When evaluating the objectives expressed in the selected studies, considering that some of them have more than one objective, it was observed that most of them were intended to characterize what it means, in contemporary days, motor coordination (N=4), followed by analyzing the conduct of development and progression of motor coordination from the effects of sports practice (N=4). The other studies sought to dissertate on the body practices of adventure in nature, in the context of childhood education, integrating the perspective of the discipline of adventure sports in nature (N=1).

Subsequently, it was observed the incidence of the benefits of the practice of adventure sports regarding motor coordination in children in kindergarten and / or elementary school (early years) (N=5). Regarding the method used for the construction of the selected studies, there was a general predominance of quantitative methodology (N=4) and experience report (N=1).

Moreover, with regard to the places where the studies were carried out, those that have this description show that most were developed in the school setting (N=3), in NGOs (N=1), and in the Municipal Center for Children's Education (N=1). It is worth mentioning the publication source of the selected articles: the 5 selected studies were found in 3 different databases (SciELO, LILACS and BDENF). The selected studies were published in different journals; Caderno de Educação Física e Esporte (N=1) Revista Conexões (N=1), Revista Brasileira de Ciência e Movimento (N=1), Cadernos Brasileiros de Terapia Ocupacional (N=1) Journal Physical Education (N=1).

Therefore, all studies (N=5) were carried out with children, which is necessary to emphasize, because this group is the target of this integrative review. Therefore, all the studies (N=5) included in this review showed significant changes and benefits to the life and motor coordination of children who



started practicing adventure sports in spaces intended for physical education and body and mental development.

Chart 2 - Characteristics of the studies included in this integrative review

Author and Year	Study Type	Goal	Intervention	Variables Evaluated	Conclusion
SANTOS LR; FERRACIOLI M; 2020.	Scientific Article	To identify the prevalence of children with motor difficulties in a sample from the city of Fortaleza/CE.	The procedure of the study was developed through the intervention and analysis of four hundred and twenty-three children, ages 7-10, of both genders, with the Movement Assessment Battery for Children (MABC-2).	MABC-2	It concluded that 11.6% of the children were identified as having motor difficulties and 25.8% as being at risk for motor difficulties. Girls showed superior performance than boys in the throwing and grasping component.
FERREIRA JK; SILVA PC; 2020.	Experience Report	To present challenges, limits, and possibilities of inserting adventure body practices in nature in physical education classes in early childhood education, in a transversal project of environmental education, through a ludic approach.	The procedure of the study was developed through an intervention in 2017, in a Municipal Center for Early Childhood Education. The project involved 95 students, between 3 and 5 years old, from kindergarten II, pre I and pre II classes.	KTK	It proved that it is possible to work in a transversal way in schools with themes that involve physical education.
SILVA et al, 2021.	Scientific Article.	To analyze the motor proficiency of children and the teaching approach used by a physical education teacher in the 1st and 5th grades of a public municipal school, located in the southern region of the state of Minas Gerais	The study procedure was developed through the intervention of a physical education teacher in the 1st and 5th grades of a municipal school located in the southern region of the state of Minas Gerais.	TGMD-2	It showed a drop in the motor proficiency of the schoolchildren between the 1st and 5th grades of elementary school, and that basic elements of the organization of the teaching work were not verified in the teaching approach.
SOURCES et al, 2020.	Scientific Article	To verify the effects of a jiu-jitsu program on motor coordination.	The procedure of the study was developed through experimentation, with familiarization with the children through previous passages in each battery of examinations. The experimental group was subjected to a program of 60 Jiu-Jitsu classes for eight months.	KTK	The practice of jiu-jitsu positively influenced the children's motor coordination.
FERNANDES et al, 2017.	Experience Report	To analyze the magnitude of change in the coordinative level of 43 schoolchildren aged 6 to 7 years, of both sexes, submitted to two physical activity intervention programs.	The procedure of the study was developed through the intervention in a group of schoolchildren between 6 and 7 years old, of both sexes, submitted to two different intervention programs of physical activities, separated in an experimental group and a control group.	KTK	Overall, boys had higher mean scores than girls, and there was a decrease in coordination levels in older schoolchildren.

Source: The authors, 2022.



## 5 DISCUSSION

The objective of the present work was to verify through literature whether adventure sports contribute to the improvement of motor coordination in students in kindergarten and early elementary school.

Thus, the main point that this integrative review was able to show throughout the construction of the text is that the Adventure Sports, when integrated into the physical activities of students in Kindergarten, promotes, through its practices, more critical individuals about their own body aspects, as well as changes and makes progress at high levels the motor development of each of these individuals. (FRANÇA, DOMINGUES, 2015).

Among the motor skills considered in the context of these students' development, basic motor skills are included, i.e., those involving the trunk, arms, and legs large muscle groups. These skills include postural tasks to maintain the body in specific orientations relative to the environment, locomotion to transport the body through space, and the manipulative tasks to explore and interact with objects in the environment (COTRIN, et al, 2013).

For Field; Temple (2017), who report that in their study boys and girls showed a similar prevalence of participation in various physical activities. However, more girls participated in informal physical activities than boys, and more boys participated in formal team sports. In addition, boys participated more often in activities that included object control skills (e.g., games and team sports). The authors posit that the results revealed similar locomotor proficiency for boys and girls but different object control proficiency attributing such a pattern to the fact that spending time in object control dominated activities provides opportunity for practice and skill improvement. Unexpectedly, there were few associations with physical activities and motor skill levels. In addition, the authors state that the students, regardless of gender, showed an improvement in motor coordination as they played the sports.

In the initial survey of the study, adventure body practices and their possibilities for exploration were considered; adventure body practices are related to the movements that primordial people already used for the purpose of survival, among them hunting, fishing, and tree climbing (MOURA, 2018).

Thus, in recent years, Physical Education has approached the collective health, in the search for a concrete and dialectical reference to understand health in this historical particularity, thus, always seeking innovation and other ways of teaching, the adventure body practices in school environment appear in this context and become socialized during physical education classes under the guidance of teachers responsible for the content. Thus, during the field experiences, children could know the essential characteristics of adventure body practices, such as controlled risk, vertigo, resilience and overcoming (SILVA, et al, 2021).



Global coordination and experimentation lead the learner to acquire movement dissociation, this means that she should be able to perform multiple movements at the same time, each member performing a different activity, with a gesture unity conversation, if the individual can follow the activities developed by the teacher, that is, an activity with movement association and dissociation and in the middle of all this still present some rhythm, it can be considered that she presents a reasonable global motor coordination (INÁCIO et al., 2016).

Passion (2017) recommends about adventure sports the simultaneity, there is the possibility of intervention in the specific reality of the class of school Physical Education, which provides that, within its potential scope, transcend the purely technical methods to learn the body practice and motor skills, but also enable students to reproduce themselves transform. The authors believe that the participation and contribution of sport as a curricular component can provide students with more meaningful and effective learning in the educational process of school development. Studies have attempted to model the trajectory of motor skills from childhood to adult expert performance. The research has focused on two distinct paths in this developmental process. The first is a performance-centered pathway with the amount of domain-specific practice as the sole contributor to expert performance. The second is a pathway to schedule different stages of athletic development before reaching an expert level.

The practice of adventure sports is an excellent way to improve children's motor development, so Freitas et al. (2016) believe that increasing the diversity of sports content, pedagogical possibilities should also be expanded to provide students with an improvement in motor coordination. However, even if it is inserted in the movement of physical culture, more research is still needed to enable the teacher to effectively master these contents throughout the teaching practice in school.

Duek et al. (2020) describe based on the reported experience that it is possible to introduce adventurous physical practices in early childhood education as a way to innovate the content of traditional physical education so that children are attractive, experience various content in a pleasant way stimulating the development of motor skills and through monitoring over time it is possible to check whether these skills are being increased through practices that require them.

Motor development encompasses cognitive and motor aspects in an integrated manner in the set of motor skills and, develop concomitantly with language, cognitive and affective structures, develops and enhances the concepts related to the approach of human globality is the science that has as its object of study the man through his body in motion and in relation to its internal and external world. Motor development is characterized by different changes in movement throughout life, these changes occur gradually and continuously depending on the age of the child (PAIXÃO, 2017).

For children to fully develop their motor skills it is important to offer alternatives for sports practice, contemplating individual interests and the development of different motor skills, contributing





to the discovery of talents, participation in sports games involves a complex interaction of physical, psychological, and social factors, the focus of the general medical evaluation should be related to health, in relation to the well-being of the individual and everyone around him, characteristics such as speed, muscular power, and agility are important for athletic success and are primarily determined by genetics (FRANCO, 2008).

According to Ferreira et al. (2016) the actions carried out through adventure sports not only represent different activities of everyday life, but also promote, together, the interest and participation of children, greatly promoting the development of motor skills and necessary for the general sports development of student children. Therefore, as an educational and sports practice, adding adventure sports to schools can bring fundamental benefits to the enrichment of school sports activities.

The practice of adventure sports can be seen as an exposure to risks by parents and managers. According to Tahara and Cornicelli Filho (2013) it is undeniable that many are the obstacles and difficulties that will permeate the trajectory of innovative teachers of courses with this type of content, but keeping the perseverance and willingness to propose to students that are different from the usual contents of Physical Education classes should be greater, because the adventure activities and school sports can achieve the relative success of teaching and education among students improving their motor skills and helping to awaken their interest in the discipline.

Ford et al. (2009) made this distinction, with organized sport activities characterized as "deliberate practice" and unorganized activities as "deliberate play." Therefore, future research should make a clear distinction between hours spent in deliberate practice and hours spent in deliberate play when investigating differences between youth who specialize in one sport and those who try more than one sport. In addition, not including retrospective training history for more than one year assumes that children have not changed their training history much over the course of their athletic careers, thus assuming little change in sport participation over the years.

From this perspective a constraint-theoretic model that explains motor development and considers the constraints of the person, the task, and the environment. According to this model, the motor domain of children is influenced by constraints related to the task, the individual, and the context. On this basis, each sport context has particular demands and requires specific characteristics and skills, which delimit a child's motor behavior (PIMENTEL, 2017).

In addition, the demands of the environment (context) tend to delineate the motor repertoire and act on the level of performance of each motor skill (task). The child's characteristics (individual) can be structural (e.g., weight and height) and functional (e.g., motivation and nervous system maturation) in nature. The environment, in turn, is related to physical structures or sociocultural factors and the task may be linked to the goal, for example: recreational or competitive) (TAHARA; CORNICELLI FILHO, 2013).



The studies compiled in the present work indicate the importance of the systematic practice of activities such as Parkour, Hiking, Climbing, Bungee Jumping and among other adventure sports classes, for the development of motor coordination in children, being done in additional classes during the elementary school years for the full development even of their basic motor skills. Cotrim et al. (2013) identified differences in the level of development of basic motor skills of children who had regular physical education classes during elementary school I and children who did not have regular classes. Therefore, the differences in development may be derived from students' previous experiences, considering that basic motor skills do not develop naturally, in which the teacher plays a crucial role in this process (FORD et al., 2009).

It was clear during the construction of this review that as these students perform and repeat the movements developed in the adventure activities, but they incorporate the basic and specific motor skills, as well as their techniques. With the experimentation of the various forms of displacement over possible obstacles, as well as the observation of other classmates practicing these movements, children can acquire courage and confidence and, little by little, they can appropriate the movements and better reproduce them. (SENA; LEMOS, 2020)

The confirmation that the practice of the mentioned extracurricular activity can be related to the promotion of specific development can be attributed to the fact that the content of these classes comprises predominantly locomotor skills. Differently, extreme sports activities do not involve the use and manipulation of objects and implements related to the manipulative skills evaluated in the texts selected for the study of the present integrative review and, therefore, the practice of activities by children during the time spent at school did not cause any additional benefit for the development of object control skills (TAHARA; CORNICELLI FILHO, 2013).

Thus, extracurricular activities called extreme sports, along with regular physical education classes, provide development beyond age expectations; however, for the skills that make up the motor basis of playing extreme sports, which were locomotor skills (PIMENTEL, 2017).

The results observed in recent studies clearly indicate that children around 10 years of age are able to demonstrate motor proficiency in performing basic motor skills, provided they have experienced regular activities aimed at developing these motor skills. However, not all children have the opportunity to have such experiences outside the school environment. Therefore, the inclusion of regular Physical Education classes in schools that serve Early Childhood Education, which can be associated with other activities, is crucial for the expected development of basic motor skills. Considering that the level of proficiency to perform basic motor skills can be crucial for involvement in physical activities and programs and even in future regular physical education classes, regular physical education classes, associated or not with extracurricular activities at school, are essential from



the perspective of keeping the child, future adolescent and adults, active in the years to come (TAHARA; CORNICELLI FILHO, 2013).

Extreme sports are complex and require a lot of care and differentiated procedures. However, they involve motor practices and unique experiences for children, which can greatly broaden their motor repertoire, at least in the set of motor skills, as observed in the present study. Thus, rather than avoiding or not providing the practice of such motor experiences, their practice should be planned and organized accordingly, making the risk of their practice similar to the risk of practicing any other activity (MARINHO & SCHWARTZ, 2005).

Finally, extreme sports activities certainly provide a differentiated involvement and motivation, becoming a unique stimulus for children to have an involvement in the proposed activities. Moreover, the extreme sports classes developed in the school context, along with physical education classes, contributed to a performance above expectations for the age between nine and 11 years old regarding the development of locomotor motor skills. Thus, it is worth mentioning the importance of physical education classes in the early years of elementary school I, taught by professionals in the area, who should offer their students the opportunity for an organized and structured practice.

## 6 CONCLUDING REMARKS

Based on the results found in this study, it can be concluded that the process of inserting adventure sports for children in the context of early childhood education was satisfactory because the proposed activities were based on playfulness, encouraging learning through play and movement. Thus, the children were appropriating knowledge and creating high expectations in relation to the proposed activities.

During the construction of this research, it was possible to observe as most relevant points, through the analysis of the texts, that it is scientifically proven the importance of movements in the lives of children, in their schooling processes, especially adventure sports; the practice of these sports promotes, significantly, the motor and cognitive skills, besides helping them in the criticality and better resolution of everyday problems. It is also important to point out that the participation, enthusiasm, and commitment of these students, in classes that involve adventure sports, is also greater, given the difference in the performance of each one of them.

In this way it is possible to understand that Adventure Sports collaborate to the improvement of motor coordination in children, and it was proven after the analysis of the selected texts, that these individuals, after doing adventure sports, developed each movement with greater precision; moreover, it was possible to verify that the performance of these activities encourage children to explore movements, besides providing more strength and physical conditioning.



Moreover, together, it could be verified that psychological and emotional issues such as insecurity, shyness, self-esteem and self-control, were traits worked too much during the experiences of each study brought to the surface. Thus, in a subsidiary way (but no less important), the emotional control of each child, when facing climbing, tree climbing, and zip-lining classes, for example, began to be seen differently and consequently, worked in different ways in Physical Education classes.

In this sense, it is necessary that the professionals in the area receive more and more training to be able to perform this function with determination, as well as to prepare the schools with the right equipment for the practice of Adventure Sports.



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