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MOTOR ACTIVITY AND THE EFFECTS ON DEVELOPMENT IN EVOLUTIONARY AGE

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Abstract

In recent years several studies have been carried out attesting to the importance of motor education within Primary schools. The integration of physical activity into the school curriculum is a way to increase levels of movement by interrupting static moments produced by the traditional lesson, and in unison, stimulate with active methodologies the acquisition of more complex content and making them more motivating. Motor exercises are therefore not only beneficial or health-based but, when linked with cognitive objectives, they can also improve school learning. A systematic review has been carried out on the main search engines to understand the results obtained in the cognitive, motor and educational fields at European level and beyond, reflecting on any adjustments to be made or taking for example those experiments that have obtained positive needs, as a sample for a strengthening of motor activity in primary school, still not always carried out also at institutional level and not easy to investigate in this particular target audience.

Negli ultimi anni sono stati condotti numerosi studi che attestano l'importanza dell'educazione motoria all'interno della scuola primaria. L'integrazione dell'attività fisica nel curriculum scolastico è un modo per aumentare i livelli di movimento interrompendo, i momenti statici prodotti dalla lezione tradizionale e, all'unisono, stimolare con metodologie attive l'acquisizione di contenuti più complessi e renderli più motivanti. Gli esercizi motori non sono quindi solo benefici o basati sulla salute ma, se collegati a obiettivi cognitivi, possono anche migliorare l'apprendimento scolastico. È stata effettuata una revisione sistematica sui principali motori di ricerca per comprendere i risultati ottenuti in ambito cognitivo, motorio ed educativo a livello europeo e non solo, riflettendo sugli eventuali adeguamenti da apportare o prendendo ad esempio quegli esperimenti che hanno ottenuto bisogni positivi, come campione per un potenziamento dell'attività motoria nella scuola primaria, ancora non sempre svolto anche a livello istituzionale e di non facile indagine in questo particolare target di riferimento.

Key words

School Achievement, Motor Skill, School, Physically Active Learning, Valuation Test
Rendimento Scolastico, Abilità Motorie, Scuola, Apprendimento Fisicamente Attivo, Test Di Valutazione

1 Equally distributed contribution. Manuela Valentini: planning and coordination. Alice Mercatelli: bibliographic research.

Introduction

Physical activity in evolutionary age acquires a primary role; specifically, movement leads to the development of numerous benefits on children's health. Several studies have shown that increasing levels of physical activity in school improves school performance and cognitive functions (Diamond et.al., 2007 p. 1387–1388). The *World Health Organization, (WHO),* in 2010 developed a series of recommendations on physical activity for children and young people between the ages of 5 and 17; carry out at least 60 minutes of moderate to vigorous physical activity, in which at least three times a week, aerobic activities, strengthening muscles and bones must alternate. WHO states that physical activity is important to improve health in preventing the development of many pathologies such as obesity, cardiovascular diseases, metabolic diseases, anxiety and depression, and in bones (WHO, 2010). Surely through regular sports activities and practice, young people can find free, structured movement and sports games. There are individual or group games in which children and adults can experience different areas, motor, cognitive, affective, social and relational. Once in contact with the peer group, the educator guides them to confront and clash with their own selves, with others and with the environment in compliance with shared rules. Game-sport activities, starting the sport, gradually, preparatory, where there are inherent ethical, formative, educational values that are found in the social sphere. Proposed are also movement games drawn from the popular tradition where you can still have memory of a past that connects to a present, made of knowledge, skills lost but important to pass on to the younger generations. The discovery of a motility inherent in man, ancestral, where hiding-reappearing, chasing-stopping, taking-running, etc. they are lived experiences where the little one finds a sense of his motility. The school is considered the place and environment in which children live and learn to behave on a social, relational and motor level. In this educational context, specific skills and abilities are learned and then increasingly complex movements are developed (McMullen et.al., 2018, p.3). A useful physical activity because it allows: a) to develop adequate physical behaviors; b) a physically active life bringing benefits to present and future health. To increase the levels of physical activity, consequently, it is necessary to intervene in the school environment because it is the one in which children spend most of their time (Watson et.al., 2017, p. 2). Their safe zone and the teacher where to work to propose the movement as much as possible. Over the years, numerous and different methodologies have been tested to try to make changes in the educational-didactic field, by inserting physically active moments within the school curriculum.

1. Material and methods

This systematic review starts from the database of the University of Urbino Carlo Bo, where keywords such as "Physical Activity" and "School Achievement" have been inserted. More use has been made of PubMed, Science Direct, BioMed center and Ebsco electronic bibliographic databases, scientifically valid and reliable sites for published results. No other databases were used because they reported searches that were not relevant with the application for departure. The inclusion criteria were 1) association between the motor, cognitive and psychological area, observing the effects on school performance (2) age: only studies carried out in Primary schools , in children aged between six and 11, have been analyzed 3) only the most recent studies conducted between 2000 and 2020 (4) experimental research only 5) from different countries: the United States, Canada, Australia, Tokyo, Denmark and Norway. In bibliographic research, studies of systematic revisions such as "Physical Activity, Fitness, Cognitive Function, and Academic Achievement in Children: A Systematic Review" (Donnelly et. al., 2016 pp. 1197–1222) because while analyzing the relationship between physical activity and the various physical and psychological components, content consistent with the aspects considered, the survey methodology is not among the inclusion criteria, compared to more different studies. No other databases were used because they reported research that was not relevant to the starting question: none of the works focused much on the medical part, such as the study of "Putting Physical Activity

Where it Fits in the School Day: Preliminary Result of the ABC for Fitness Program"(Katz et. al, 2010 pp. 1-10) which analyzes the problem of non-physical activity in children with physical causes that may arise such as childhood obesity. This research, therefore, while considering the physical part, does not deal with school performance. Another example is "Be smart, exercise your heart: exercise effect on brain and cognition"(Charles H. Hillman, Kirk I. Erickson and Arthur F. Kramer, 2014 pp. 59-65) which predicts the benefits of physical activity on the cognitive realm of humans and that of animals: excluded because the animal is not the subject of this study. All research referring to the Scuola of Infanzia (3-6) was also excluded, such as the study of "Rationale and Methods of the Movi-da 10!" (Sánchez-López et al., 2019 pp. 1-10) with the Movi-da 10 programs for preventing and combating adiposity, conducted on children aged four and six. The strategy was to include research dealing with two main elements: physical activity, specifically physical exercises, large-scale physical-motor and up-to-motor, and moto rapacity, associated with school performance i.e. learning and school performance related to two important disciplinary fields 1) logical-mathematical and 2) linguistic (bed-writing).

The studies then analyses and deepens the following topics:

1. Importance of physical and motor activity in Primary schools
2. The importance of the development of motor skills in children in order to promote adequate psycho-motor growth
3. Development of significant learning environments
4. Cognitive development of the child
5. New teaching methodology based on physically active learning

The aim of this bibliography research is to:

1. Analyze the role of physical activity within Primary schools
2. Understand the meaning and importance of movement for children of evolutionary age.

In summary, movement not only benefits the physical part but can also support and help the psychical part. In fact, we want to demonstrate how the motor area is connected to the cognitive one, starting from school, to help children build meaningful learning. A bibliographical research project included 13 studies analyzing this correlation, specifically:

Authors Year Country	**Number of Children**	**Activities**	**Experiment Duration**	**Results**	**Search engine**
Resaland Geir K. et.al 2016 Norway	1129	1. The "Active Smarter Kids" intervention has three components: 2. 90 minutes of physical activity in class 3. 5 minutes a day of active breaks 4. 10 minutes a day of physically active tasks.	1 year November 2014 June 2015	Combining physical activity with teaching disciplines seems to be a useful model for stimulating school learning in the weakest children.	Science Direct

Have Mona et.al 2016 Denmark	505	Integrated PA program in mathematics lessons.	1 year August 2012 / June 2013	Primary results: change in the performance of mathematics. Sub-results: Change in executive functions.	Bio Med Central
Mullender-Wijnsma J Marijke et al. To 2016 Netherlands	499	Program "Fit & Vaardig op School [F&V]" The use of physical activity to teach mathematics and spelling.	2 years	Physically active school lessons have significantly improved Maths and spelling performance for primary school children and are therefore a new and promising way of teaching.	Pubmed
Spyridoula Vazou & Miriam A.B. Skrade 2016 United States	157+127	"Move for Thought" program integrating physical activity into the classroom.	1 year	Interventions based on theory to improve school performance by examining the effects of integrating the PA with a school subject.	Pubmed
Donnelly and Joseph, et.al 2017 United States	316+ 268	"A+PAAC" integration of physical activity into school lessons as opposed to active breaks (active breaks are extraneous moments to normal school lessons. That is, they are not included in the curriculum but serve as active moments to stop the normal course of lessons and to increase the levels of movement of children).	3 years old	Intervention has increased levels of physical activity and mental health benefits and has not reduced school education time.	Pubmed

Watson Et.al 2018 Australia	617	ACTI-BREAK program: 5 minutes a day of moderate to vigorous physical activity and 3 active breaks a day.	1 year	Evaluate **improvements** in children's educational outcomes.	Bio med central
Have Mona et.al 2018 Denmark	505	Integration of the PA into mathematics lessons.	9 months	This intervention improved the results in mathematics.	Pubmed
Hraste Mladen et.al 2018 Japan	36 children	Integration of a physical activity program with mathematics and geometry.	3 weeks	Results suggest that this new method, physically active, is considered efficient for teaching mathematics and geometry.	Pubmed
McMuller J et.al 2019 Ireland	420	Integration of the movement in the classroom related to school content.	1 year	The children who took part in this intervention positively perceived the lessons of integrating the movement into the classroom.	Ebsco
Mavilidi Myrto F et.al 2019 Australia	10 public schools	"Thinking While Moving in English" program (TWM-E) 3 lessons from 40 minutes to weeks where movement-based learning is incorporated into English and math classes.	6 weeks	Primary results: measure children's levels of physical activity. Secondary results: Observe the behavior of children during PA lessons. The TWM-E program has the potential to improve levels of physical activity in Primary School children along with school results.	Bio Med Central
De Berg Van et.al 2019 Netherlands	312	"Juggling" program 20 lessons where juggling has been integrated into the teaching of mathematics.	2 months	The juggling program "Juggling" has increased children's levels of fun during mathematics, has neither worsened nor improved children's mathematical performance.	Pubmed

Egger Fabienne et al. To 2019 Switzerland	142 children	Pa program. Children divided into three groups: combined, aerobic, cognitive. Purpose: To examine the effects of three types of PA on children's educational outcomes.	20 weeks	Results showed that the combined group (physical + cognitive exertion) benefited both physically and cognitively (mathematical performance). Inclusion of PA in physical and cognitive active breaks improves the cognitive functions of school-age children.	Pubmed
Mo Ching Mok Magdalena et.al 2020 Croatia, Lithuania, Macedonia, Poland, Romania, Serbia, South Africa and Turkey	3036	Program "Brain Break" active breaks of 3-5 minutes where children performed in groups physical activity exercises in class, 2 times a day for 5 days a week. Physical exercises were presented to children through videos.	1 year	This program improves learning, attitudes towards the PA and personal motivation.	Pubmed

Source: own processing

2. Results

In all research analyzed, primary results were calculated using standardized tests aimed at evaluating school performance and skills. Physical activity has been calculated by the accelerometer. The fun or motivation was analyzed with questionnaires, focus groups and semi-structured interviews.

Motor tests most utilized:

Authors	**Year**	**TEST NAME**	**AGE**	**WHAT EVALUATES**	**Results**
Kiphard and Schilling	1974 first edition. 2007 most up-to-date edition	Ktk	5-14 years old	Evaluate body control and coordination. Includes balance exercises to run as quickly as possible within a time of 20 seconds.	Results are marked in a separate table by gender. There is a table for boys and one for girls.

Ulrich	1985	TGMD	3-10 years old	Composed of two below-scales: one that evaluates locomotor skills and object control, the other that evaluates skills with the ball. It is used to identify children with gross motor development.	The results are evaluated on a scale of 1 to 0 depending on the presence or absence of such criteria.
Zimmer and Volkamer	First edition 1987, second 2006	MOT 4-6	4-6 years old	Evaluate motor skills such as locomotion, stability, object control, and motion skills.	The results are observed in 20-25 minutes.
Ulrich	2000	TGMD-2	3-10 years old	The performance of large movement. Specifically, motor skills and movement skills.	The results are evaluated on a scale of 0 to 1. 0 indicates the absence of a performance and 1 the presence. The time of administration is 15-20 minutes.
Bruininks R.H and Bruininks B.D	2005	BOT-2	4-21 years old	Investigate the development of large and fine motor skills. Identify individuals with deficits in coordination. It consists of 53 items divided into 8 sub-tests.	The results vary according to the individual items, on a scale of 2 points to 13.
Henderson, Sugden, Barnett	2007	M-ABC	4-12 years old	Evaluate movement in children. Specifically, manual dexterity skills, ball skill and balance ability. It has 32 items and is divided into 4 age groups.	The results are awarded on a six-point scale: five corresponds to the weakest performance and zero to the best performance.
Schenkelberg et al.	2018	Cmsp	3-5 years old	Assess locomotor abilities (jumping, sliding, galloping) and ability to control objects (roll, slide, kick, take, and throw).	The results were awarded by attributing 1 point if the ability was present and 0 if it was absent.
Ulrich	2019	TGMD-3	3-10 years old	Evaluate and observe the performance of 13 motion skills. These are divided into two subcategories: in the first there are locomotor skills and in the second instead those with the ball.	The results are calculated on a scale of 0 to 1. 1 indicates the presence of that performance and 0 when it is absent.

Source: own processing

Tests to evaluate school results in Primary schools are different, but most studies use three types of tests. The first is the Wechsler Individual Achievement Test-Third Edition (WIAT-III). This scale is a tool of proven reliability and validity (Wechsler, 2009) and aims to measure improvements or deterioration in children's educational performance. WIAT-III is administered individually by trained and qualified research staff, followed by a researcher who must carefully check the scores of all tests (Lambournea et.al., 2013, p. 4). In the literature the test that is used most to evaluate mathematical performance is the MG test. Its use can be found in a 2016 research conducted by Have et al. The study was conducted from August 2012 to May/June 2013, and the test battery included measurements of; mathematical skills, cognitive functions, creativity, aerobic capacity, and physical activity (Have etal., 2016 p.5). All tests were performed at participating schools or in the classroom or gym, except for the cognitive function test which was performed in a room with up to two students. Specifically, this has an administration time of 45 minutes and consists of 24 activities that evaluate mathematics in terms of understanding quantities, numbers, relationships, addition, and geometry. MG is a common test material often used in Danish Primary schools and used for more than 25 years. It is a multiple-choice test and the different response options have been selected in such a way that they refer to typical mistakes made by students. This then provides a score that reflects the participant's math skills and is conducted individually with paper and pencil in a separate class without help. Two tests are used to evaluate spelling and reading performance levels: The One-Minute Test and a spelling test. They were used, for example, in a randomized 2015 study by Mullender-Wijnsma et al. Children's reading ability in the research was assessed using the One-Minute test, which specifically implies that children must read aloud as many words as possible in one minute; this exercise is then repeated with a file with several other words. The files on the spelling include two parts: in the first the teacher reads a sentence and repeats a word from it, the children must then write that word correctly. The second part is to identify spelling errors individually in some words. This research also aimed to measure school success in mathematical skills, with another specific test: The Speed Test-Arithmetic that evaluates mathematical speed performance; to execute as many sums as possible within one minute. This test is carried out individually and the contents change according to the age of the children but specifically involves the sense of numbers, arithmetic, algebra, geometry and fractions. For example, in the second and third primary schools the test gives great importance to the resolution of mathematical problems, in the fourth and fifth classes instead the focus shifts to algebra and fractions. This study found that children who participated in active classes for 22 weeks showed significant improvements in math skills and spelling (Mullender-Wijnsma et.al., 2015 pp. 2-3). The One-Minute test was also used in another 2017 study as a tool for evaluating mathematical skills. This research, in fact, aimed to evaluate the improvement in school performance by activating an intervention that required teachers to integrate active breaks within the school day (Watson et.al., 2017 pp. 7-8). The school results were evaluated with two tools differentiated according to the discipline that was considered: the reading results were observed with the WARP test (Wheldall and Madelaine, 2013); the mathematical results with the One-Minute test. WARP is designed to monitor the fluidity of reading in students between the age of two and five and asks children to read 200 words in one minute (Wheldall and Madelaine). Manual for the Wheldall assessment of reading passages WARP, 2013. The number of words read correctly in that minute indicate the student's level of fluency in reading. This tool has three initial evaluation steps and a series of progressive steps. The administration is done by an experienced primary school teacher, who will individually have each child take the test (Watson et.al., 2017 pp. 8-9). The one-minute test, on the other hand, was designed for the Australian school environment. It has 33 elements that each focus on different topics on operations: addition, subtraction, multiplication, and division (Westwood 2000 p. 108.). A primary school researcher with qualifications and experience, will administer the test to the whole class at the beginning and end of the intervention. These two evaluation tools were essential for measuring children's educational performance, which is improved in the classes participating in the intervention. The ACTI-BREAK program was

designed to be efficient in terms of time and feasibility to promote physical activity in schools and thus combat a sedentary lifestyle (Watson et.al., 2017, p.10). The relationship between increased physical activity and improvement in school performance has not always been demonstrated. In fact, nine researches have shown that, by raising the time spent on physical activity, there are improvements in school performance. For example, in the (Physically Active Math and Language Lessons Improve Academic Achievement: A cluster Randomized Controlled Trial (Mullender-Wjnsma et al. , 2016) the "F&V" intervention positively improved mathematical and spelling performance compared to children in the control class; classroom-based physical activity improves children's math achievement – A randomized controlled trial (Have et al. , 2018) showed that the integration of physical activity into mathematics improved children's scientific performance. Certainly, beneficial to positively develop mathematical skills. Unlike in four searches (Donnelly et. al., 2017; M. McMullena et.al., 2018; van den Berg et.al., 2019; Vazou and Skrade, 2016) this report has brought neither improvement nor deterioration. An increase in fun, motivation and greater involvement by children in taking physically active lessons has emerged. Enjoyment and pleasure are in fact intrinsically motivating components if they are added to the school lesson (Vera van den Berg et. al., 2019 pp.1-14). This indicates that the new teaching and methodological strategies should not have as their sole objective the increase of school performance but also to develop programs that increase the levels of fun, socialization and motivation.

3. Discussion

According to the studies considered here, we can claim that this research is divided into two categories:

1. Those that focus on the effect of active breaks within the school curriculum
2. Those that instead integrate physically active learning moments into school lessons

Active breaks

Specifically, we mean those studies that have introduced physical moments active in static lessons within school lessons. Breaks could last from five to ten minutes and could include physical exercises of different difficulty: from the simplest to those that require more concentration. For example, the study conducted by Egger et. al in 2019 examining the effects of different physical exercises used at school in the form of physically and cognitively active breaks (Egger et. 2019 pp.1-20). Similarly, the ACTI-BREAK program devised by Watson, et al. al (2017) focused on the integration of active breaks lasting five minutes (Watson et.al., 2017 p. 1-11). The first study examines the effect on school performance of different types of activity (Egger et.al., 2019 pp1-20), in the second, the exercises proposed to children include activities of different difficulties: from the simplest to those requiring more concentration (Watson et.al., 2017, p. 1-11). However, the results of both research show that implementing active breaks within the school setting increases motor performance and improves school performance. From this comparison we can therefore deduce that active breaks are innovative strategies that are able to improve learning. The physical exercises to be proposed must, however, have the following characteristics: initially prepare easy activities and then get to the execution of more challenging exercises, so it will be important over time, to increase the difficulty of the exercises that must be proposed taking into account both the physical objectives and cognitive ones. During active breaks, physical and cognitive performance must be combined, such as having a certain type of movement shown by the teacher linked to a keyword. Also, in the 2020 study conducted by Mo Ching Mok et. al, we understand the importance of interrupting normal school lessons with active breaks that improve the attitude of children towards their health and towards physical activity (Mo Ching Mok et al., 2020 pp.1-11).

Physically active learning

A 2017 study (Donnelly et.al., 2017) had the goal of implementing physical activity in the school curriculum, not in the form of active breaks but by requiring the teacher of discipline to hold at least two 10-minute lessons a day in which children practiced physical activity. Active breaks, in fact, serve as dynamic moments to interrupt the normal course of lessons and to increase the levels of movement of children, but this intervention instead considered movement as a teaching methodology used by the teacher to explain concepts related to a specific discipline. Other research had the effect of a physical activity integration program in the classroom to promote school learning and performance, such as research conducted by Have et. al (2016 pp.1-11) which associates physical activity with mathematical results. This intervention in fact consisted in teaching mathematics in an active way based on the idea that if a phenomenon is connected to bodily experience, it can be better understood. The results showed that physical activity in the classroom improved children's educational performance and cognitive abilities. Other studies, such as that of Vazou et. to (2016), have et. al (2018) and finally the one designed by Hraste et. al (2018) aimed to evaluate the effect of the integration of physical activity in mathematics lessons (Vazou et.al., 2016 pp.1-16; Have et. al., 2017 pp.1-11; Hraste et. al., 2018 pp.1-14). These three works have shown that physically active lessons produce an improvement in mathematical skills and facilitate school learning by also raising children's movement levels, thus producing positive effects on both cognitive and physical components. Unlike the research conducted by Van den Berg et. al (2019) which wanted to observe the effect of a juggling program on mathematics teaching: it did not detect improvements or worsening in school performance; however, he stressed that although school results have not reported significant improvements, this program has raised the levels of enjoyment of the same. Enjoyment and pleasure are in fact intrinsically motivating components if they are combined with the school lesson (Vera van den Berg et. al., 2019). Another study conducted by McMullen et.al (2018) had also reported among its results greater involvement and fun by the children of the intervention group (McMullen et.al., 2018 pp.1-32). This indicates that the new teaching and methodological strategies should not have the sole objective of increasing school performance but developing programs that increase the levels of fun, socialization and motivation.

Motivation and fun

In fact, learning is shown to improve when associated with positive emotions such as joy and pleasure. The integration of movement into classrooms therefore increases children's levels of fun by giving them the opportunity to learn better. One way to increase involvement in physical activity is to vary the teaching proposal of the activities as much as possible to make them more enjoyable, as is also reported by a study conducted by Resaland et. (2016) in which the researchers tried to structure the intervention by designing three types of activities: physically active activities conducted in the classroom or outdoors, the integration of active breaks and finally the active homework. The results of this study not only showed that physically active lessons stimulated and facilitated learning in mathematics but also implemented children's levels of fun. This solicitation is due to two factors: first of all to the different types of activities proposed and secondly to the integration of movement with mathematical contents allowing to find the answer to a problem by incorporating the movement and therefore to become an active subject who experiences experiences and learns in a meaningful way. Motor activity not only benefits the physical part but can also support and help the psychic part (Resaland et. al., 2016 pp.1-7).

Limitations and problems encountered

Physically active lessons are educational strategies that can be adapted in every school context and can be used in different disciplines. However, this feature does not make them flexible because they are not easy to implement. In fact, most research has shown that teachers are concerned about the implementation of active lessons. The limits found were those of space and time. That is, the active programs were structured on times that ranged from 20 to 30 minutes

requiring teachers to take children to safe places such as gyms. The program "Thinking while Moving in English" (Mavilidi et. al., 2019, pp. 1-12) was the first to be flexible and organized on the teacher's requests. This project, in fact, leaves the freedom for educators to decide how to implement the activities. Teachers were free to design, develop and integrate movement-based programs according to class needs, thus overcoming space and time barriers and promoting the dissemination of this new methodology. In addition, all the research showed that the teachers of the intervention group before implementing these activities had to participate in seminars, lectures held by experts and refresher courses (Mavilidi et. al., 2019, pp. 1-12). Training is very important because when you want to experiment with a new methodology, it is advisable to study and deepen the topic to evaluate the strengths and weaknesses, contextualize the context, the most effective interventions to implement and compare the results.

Conclusions

All the studies examined were considered because they were the ones which best deepened and enriched the research question with practical examples. Specifically, it has been seen that Primary School is the setting where it is best to increase the levels of physical activity by proposing to the pupil's movement content aimed at school objectives. Physically active learning is an experiential form, of doing, of acting, combined with thinking that brings benefits both physically and cognitively. What is the situation in Italian Primary Schools? In the National Guidelines for the Curriculum, we read: "Motor education is therefore an opportunity to promote cognitive, social, cultural and affective experiences" (National guidelines for the nursery school curriculum and the first cycle of education. Annali 2012, p.76). Contextualizing this writing, we can assert that physical education within Primary School should not be a simple repetition of physical exercises but acquire formative, pedagogical value, through which the child can live experiences of various kinds. The curriculum of most Italian schools devotes little time to physical activity. In fact, the latter is not only practiced a few hours a week but is very often seen as an alternative and not important subject to be carried out. The little attention given to it, in addition to generating discontent in the children who prefer it above all, involves physical and social problems. Physical education is very popular with pupils because it offers the opportunity to play, have fun, move, cooperate, relate and socialize. The integration of motor work into the school day in Italian schools is a difficult innovation to put into practice due to space and time problems. First, because very often the classes are small compared to the number of children it can contain, therefore even muscle stretching could hinder the exercise of the partner. Secondly, because the inclusion of some physical exercises in school lessons may require additional hours to be practiced. These limitations would make it difficult to carry out physically active lessons: it is therefore necessary to rethink the spaces and times more suited to the students.

Strengths for the teacher in using physically active learning:

1. Improvements in educational performance and in the development of social attitudes based on cooperation, collaboration and respect
2. Helps children with difficulty to learn better
3. Active lessons could also be held in the corridors or at other schools of the school, as well as in gyms
4. Active lessons used as moments of review, recovery or enhancement then inserted within the design as important moments to devote a precise time to Physically active learning is in fact an innovative methodology that brings benefits on a physical, cognitive and social level (Dewey, 1951). Its insertion within the Italian school is certainly difficult and takes a long time, since the structure of the school lesson is still, in many situations, characterized by the frontal lesson and the use of the textbook with static and sedentary moments of sitting hours. at the desk. A different way of doing school that provides an adaptation to the frontal lesson made not only of moments of group work, training workshops, also of planning of didactic paths based on the cognitive value shared with the body-kinesthetic experiences that must find space and time every day

at school to achieve meaningful learning that focuses on the subject who experiences and knows with the body and with the senses (Dewey, 1951). A pupil-child-Person left free to move, relate, experiment, to find and autonomously build their own knowledge, understand it and internalize it. A knowledge that passes through the body, more immediate, allows it: an experiential, concrete, agitated knowledge to develop new ones; to raise physical activity levels, improve motor skills; to foster new social relationships. A way of doing school where the pupil can learn while having fun: a trilogy that is too important because it contains everything he needs.

References

Allen, K.A., Bredero, B., Van Damme, T., Ulrich, D.A., Simons, J. (2017). Test of Gross Motor Development-3 (TGMD-3) with the Use of Visual Supports for Children with Autism Spectrum Disorder: Validity and Reliability. J Autism Dev Disord 47, 813–833. https://doi.org/10.1007/s10803-016-3005-0

den Berg, V.V., Singh, A. S., Komen, A., Hazelebach, C., Hilvoorde, I.V., Chinapaw Mai, J.M. (2019). Integrating Juggling with Math Lessons: A Randomized Controlled Trial Assessing Effects of Physically Active Learning on Maths Performance and Enjoyment in Primary School Children. Mr Int. J. Environ. Res. Public Health 16, 2452. **https://doi.org/10.3390/ijerph16142452**

Bruininks, R.H. & Bruininks, B.D. (2005). Test of Motor Proficiency. 2nd edition. Manual.: AGS Publishing. Circle Pines. https://www.researchgate.net/publication/277921770_Dyspraxia_as_a_psychomotor_disorder_of_school_age_children

Cools, W, Martelaer, K. D. , Samaey, C., Andries, C. (2009). Movement skill assessment of typically developing preschool children: a review of seven movement skill assessment tools. Journal of Sports Science & Medicine, 8(2), 154-168. http://europepmc.org/article/MED/24149522

Dewey, *J, Instrumentalistic*Pragmatism. Edited by Dario de Salvo p. 4 https://cab.unime.it/journals/index.php/qdi/article/view/842/0

Diamond, A., Barnett, W.S., Thomas, J., Munror, S. (2007). Preschool program improves cognitive control. Science, 318(5855), 1387–1388. http://dx.doi.org/10.1126/science.1151148

Donnelly, J.E., Hillman, C. H., Castelli, D., Etnier, J.L.,Lee, S., Tomporowski P., Lambourne, K., & Szabo-Reed, N.A. (2016). Physical Activity, Fitness, Cognitive Function, and Academic Achievement in Children: A Systematic Review Med Ski Sports Exerc, 48(6), 1197–1222. https://dx.doi.org/10.1249/MSS.0000000000000901

Donnelly, J.E., Hilman, C.H., Greene, J.L., Hansen, M.D., Gibson, A.C., Sullivan, D. K, John, P., Mayo, S.M., Lambourne, K., Szabo-Reed, A.N., Herrmann, D.S. , Honas, J.J., Scudder, M.R., Betts, J.L., Henley, K., Hunt L. S., &. Washburn, A.R. (2017). Physical activity and academic achievement across the curriculum: Results from a 3-year cluster-randomized trial, Prev Med, 99, 140–145. https://dx.doi.org/10.1016%2Fj.ypmed.2017.02.006

Egger, F. , Benzing, V. , Conzelmann, A. , Schmidt, M. (2019). Boost your brain, while having a break! The effects of long-term cognitively engaging physical activity breaks on children's executive functions and academic achievement. PLoS ONE 14(3): e0212482. https://dx.doi.org/10.1371%2Fjournal.pone.0212482

Henderson, S., Sugden, D. (1992). Movement assessment battery for children. London: The Psychological Corporation. http://dx.doi.org/10.4236/health.2010.27104

Henderson, S.E., Sugden, D.A. & Barnett, A.L. (2007). Movement Assessment Battery for children – 2 Examiner's Manual. London: Harcourt Assessment. https://www.researchgate.net/publication/277949751_The_second_version_of_the_Movement_Assessment_Battery_for_Children_A_comparative_study_in_7-10_year_old_children_from_the_Czech_Republic_and_the_United_Kingdom

Have, M., Have Nielsen, J., Gejl, A.K., Ernst, M.T., Fredens, K., Støckel, J.T., Wedderkopp,

N., Domazet,L. S.,Gudex, C., Grøntved, A & Kristensen P.L. (2016). Rationale and design of a randomized controlled trial examining the effect of classroom-based physical activity on math achievement, BMC Public Health,16, 1-11. https://doi.org/10.1186/s12889-016-2971-7

Have, M., Have Nielsen, J., Ernst, M.T., Gejl, A.K., Fredens, K., Grøntved, A., Kristensen P.L. (2018). Classroombased physical activity improves children's math achievement – A randomized controlled trial. PLoS ONE 13(12), 0208-787. https://doi.org/10.1371/journal.pone.0208787

Hraste, M. , De Giorgio, A. , Jelaska P. M. , Padul, J. , Granić, I. (2018). When mathematics meets physical activity in the school-aged child: The effect of an integrated motor and cognitive approach to learning geometry. PLoS ONE 13(8), 0196-024. https://doi.org/10.1371/journal.pone.0196024

Hillman, C.H, Erickson, K. L & Kramer, A. F. Be smart, exercise your heart: exercise effects on brain and cognition. Nat Rev Neurosci 9, 58–65 (2008). https://doi.org/10.1038/nrn2298

National Guidelines for the Curriculum of the Kindergarten and the first cycle of education in 2012. Ministry of Education, University and Research. Annals of Public Instruction. https://files/pdf/20120906/indicazioni-nazionali-2012-per-il-curricolo-di-scuola-infanzia-e-primo-ciclo-del-4-settembre-2012.pdf

National guidelines for kindergarten and first cycle of education. National Indications and New Scenarios, integration of 2018. http://www.indicazioninazionali.it/wp-content/uploads/2018/08/Indicazioni_Annali_Definitivo.pdf

Katz, D. L, Cushman, D. , Reynolds, J. , Njike, V. , Treu, J. A, Walker, J. , Smith, E., Katz, C. (2010). Putting physical activity where it fits in the school day: preliminary results of the ABC (Activity Bursts in the Classroom) for Fitness Program. Prev Chronic Dis. http://www.cdc.gov/pcd/issues/2010/jul/09_0176.htm

Lambournea, K., Hansen, D.M., Szabo, A.N., Lee, J., Herrmann, S.D., & Donnelly, J.E. (2013). Indirect and direct relations between aerobic fitness, physical activity, and academic achievement in elementary school students. Ment Health Phys Act, 6(3), 165–171. https://dx.doi.org/10.1016%2Fj.mhpa.2013.06.002

Mavilidi, M. F., Lubans, D.R., Morgan, P.J., Miller, A., Eather, N., Karayanidis, F., Lonsdale, C., Noetel, M., Shaw, K., & Riley, N. (2019). Integrating physical activity into the primary school curriculum: rationale and study protocol for the "Thinking while Moving in English" cluster randomized controlled trial. BMC Public Health19, 379. https://doi.org/10.1186/s12889-019-6635-2

McMullen, J., MacPhail, A., & Dillon, M.J. (2019). "I want to do it all day!" – Students' experiences of classroom movement integration. International Journal of Educational Research,94. 52-65 https://doi.org/10.1016/j.ijer.2018.11.014

Mo, C.M., Chin, K.M., Korcz, A., Popeska, B., Edginton, C.R., Uzunoz, F.S., Podnar H., Coetzee, D., Georgescu, L., Emeljanovas, A., Pasic, M., Balasekaran, G., Anderson, E., & Durstine, J. L. (2020). Brain Breaks®Physical Activity Solutions in the Classroom and on Attitudes toward Physical Activity: A Randomized Controlled Trial among Primary Students from Eight Countries. Mr Int. J. Environ. Res. Public Health, 17, 166. https://doi.org/10.3390/ijerph17051666

Mullender-Wijnsma, M.J., Hartman, E., de Greeff,J.W., Doolaard, S., Bosker, J. R., & Visscher, C. (2016). Physically Active Math and Language Lessons Improve Academic Achievement: A Cluster Randomized Controlled Trial. Pediatrics, 137(3), 2015-2743. https://doi.org/10.1542/peds.2015-2743

Resaland, G.K., Aadland, E., Moe, V.F., Aadland, K.N., Skrede, T., Stavnsbo, Mette., Suominen, L., Johannessen, J.S., Glosvik, Ø., Andersen, J.R., Kvalheim, O.M., Engelsrud, G., Andersen, L.B., Holme, I.M., Ommundsen, Y., Kriemler, S., Mechelen, W.v., McKay, H.A., Ekelund U., Anderssen S.A. (2016). Effects of physical activity on schoolchildren's academic performance: The Active Smarter Kids (ASK) cluster-randomized controlled trial.

Preventive Medicine 91, 322-328. https://www.researchgate.net/publication/307978335_Effects_of_physical_activity_on_schoolchildren%27s_academic_performance_The_Active_Smarter_Kids_ASK_cluster-randomized_controlled_trial

Sánchez-López, M., Ruiz-Hermosa, A., Redondo-Tébar, A. et al. Rationale and methods of the MOVI-da10! Study –a cluster-randomized controlled trial of the impact of classroom-based physical activity programs on children's adiposity, cognition and motor competence. BMC Public Health 19**,** 417 (2019). https://doi.org/10.1186/s12889-019-6742-0

Schenkelberg, M. A., O'Neill, R.J., Dowda, M., & Pat, R. R. (2018). How Does the Relationship Between Motor SkillPerformance and Body Mass Index Impact PhysicalActivity in Preschool Children?. Pediatric Exercise Science, 30, 266-272. https://www.researchgate.net/publication/319498668_How_Does_the_Relationship_Between_Motor_Skill_Performance_and_Body_Mass_Index_Impact_Physical_Activity_in_Preschool_Children

Ulrich, D.A. (1985). Testof GrossMotorDevelopment. Austin, TX: Pro-Ed; 1985.14. http://dx.doi.org/10.4236/ape.2012.23016

Ulrich, D.A. (2000). Testof GrossMotorDevelopment(2nded.). Austin,TX:Pro-Ed. http://dx.doi.org/10.4236/ape.2012.23016

Ulrich, D. A. (2016). Testof GrossMotorDevelopment(3rded.). Austin,TX:Pro-Ed. https://doi.org/10.1007/s10803-016-3005-0

Vazou S & Skrade M.A.B. (2016): Intervention integrating physical activity with math: Math performance, perceived competence, and needsatisfaction. International Journal of Sport and Exercise Psychology, 09.2-22. https://www.researchgate.net/publication/299399526_Intervention_integrating_physical_activity_with_math_Math_performance_perceived_competence_and_need_satisfaction

Watson, A., Timperio, A., Brown, H. & Hesketh K. D. (2017). A primary school active break programme (ACTI-BREAK): study protocol for a pilot cluster randomised controlled. Trials, 18, 4-33. https://dx.doi.org/10.1186%2Fs13063-017-2163-5

Wechsler D. Wechsler Individual Achievement Test £rd Edition (WIAT III). The Psychological Corp. London: 2009. http://dx.doi.org/10.1177/0734282910385645

Westwood, P.S. (2000). One Minute Test of Basic Number Facts. In: Numeracy and learning difficulties: approaches to teaching and assessment. Camberwell: ACER Press, 108. https://doi.org/10.4236/ape.2020.103020

Wheldall, K., Madelaine, A. (2013). Manual for the Wheldall assessment of reading passages (WARP). Sydney: Multilit Pty Ltd. https://doi.org/10.4236/ape.2020.103020

World Health Organization. International classification of functioning, disability and health: ICF. Geneva: World Health Organization, 2001. 3. Magalhães LC, Cardoso AA, Missiuna C. Activities and participation. https://www.who.int/

Zimmer, R. & Volkamer, M. (1987) Motoriktest für vier- bis sechsjärige Kinder (manual). Beltztest, https://www.thefreelibrary.com/Movement+skill+assessment+of+typically+developing+preschool+children%3a...-a0201944819

Zimmer, R. (2006) Diagnostik der Bewegungsentwicklung von Kindern: Beobachten – Einschätzen – Dokumentieren. 2nd international conference Learning processes in early childhood and assessment issues. Bolzano-Italy https://www.thefreelibrary.com/Movement+skill+assessment+of+typically+developing+preschool+children%3a...-a0201944819

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https://www.treccani.it/vocabolario/italiano/

https://www.who.int/