Journal of Physical Education and Sport ® (JPES), Vol. 24 (issue 4), Art 109, pp. 957 - 967, April 2024
online ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 - 8051 © JPES

Original Article

Educational space, play, motor activities in the kindergarten: systematic review and graphic design of the exterior

MANUELA VALENTINI[1], DENISE DIAMANTINI[2], CHIARA TONI[3], ARIO FEDERICI[4]
[1,2] Department of Humanities, University of Urbino Carlo Bo, ITALY
[3] Order of Architects of Pesaro and Urbino, ITALY
[4] Department of Biomolecular Sciences, University of Urbino Carlo Bo, ITALY

Published online: April 30, 2024
(Accepted for publication April 15, 2024
DOI:10.7752/jpes.2024.04109

Abstract
This study investigates strategies to increase physical activity levels among kindergarten children to meet the guidelines set by the World Health Organization. A systematic review was conducted, analyzing 19 studies identified through comprehensive searches of major databases. The review aimed to identify elements and equipment that should be incorporated into outdoor spaces to promote moderate and intense levels of physical activity. Additionally, it aimed to assess whether combining structured activities with free play contributes to increased levels of motor activity. The results of the review were as follows: fixed equipment, mobile equipment, open spaces and structured motor pathways have positive effects on moderate and intense physical activity levels; the combination of structured activities and free play also has positive effects on both physical activity levels and the improvement of certain motor skills. Furthermore, it was found that garden size and paving designs do not improve physical activity levels, while sandpits have a negative effect on them. This was followed by the design of the outdoor space. It included appropriately chosen equipment and materials to raise physical activity levels, without neglecting the important role of symbolic play in this age group. Collaboration and shared design with other professionals such as a playground designer and an architect was essential. This made it possible to produce a graphic design and a final rendering of the project.
Key words: educational space, outdoor movement, children's physical activity level, outdoor graphic design.

Introduction

It is widely recognised that pre-school physical activity is important for the overall development of children - physical, cognitive, social and affective (Timmons 2012; Tortella et al, 2020a). The 2019 World Health Organisation (WHO) guidelines on physical activity in children 0-5 years of age state that in kindergarten children should spend 180 minutes daily in physical activity of any intensity and at least 60 minutes of this in MVPA (moderate to vigorous intensity physical activity).

Many studies (Brown et al, 2009; Cosco et al, 2010; Sugiyama et al, 2012; Berg, 2014; Tortella et al, 2020b) report low levels of physical activity in children: for example, one study (De Mei et al, 2018) shows that out of a sample of 48,946 children, 34% of them engage in at least one day per week (at least 1 hour) of structured physical activity and only 1 in 4 children devote at most one day per week (at least 1 hour) to physical play. Kindergartens should be concerned with achieving the levels of physical activity recommended by the guidelines, as children spend almost 8 hours a day there, more than half of their active day, considering that the WHO guidelines recommend 10 to 13 hours of sleep for children of this age.

It has been seen, through some research (Alhassan et al, 2013; Tortella et al, 2012; Tortella et al, 2016; Tortella et al, 2019; Chen et al, 2020; Yunfei et al, 2021), that the presence of structured activities in the educational outdoor space flanked by free play increases both the time spent in movement (less time spent in sedentary activities) and the intensity levels of physical activity (higher MVPA) and motor skills. The presence of a trained teacher, who is familiar with children's motor development, makes it possible through targeted and structured activities to strengthen and improve basic motor patterns. A study (True et al, 2017) reports that the presence of inadequately prepared teachers in American schools is correlated with lower gross motor and locomotor development of children compared to schools where the number of teachers with a university degree is 50% higher.

A place that can be used as the main environment for physical activity in pre-school age is the outdoor educational space of kindergartens, which is instead mainly used for recreation and free play, despite the fact that theories on the benefits that the outdoor and natural environment have on children - physical, cognitive and socio-affective (Crudeli et al, 2012; R. Farnè, 2020) - are recognised and shared. What is little known is the equipment (fixed and mobile) that is most appropriate for increasing physical activity levels in kindergarten.

Corresponding Author: MANUELA VALENTINI, E-mail: manuela.valentini@uniurb.it

Studies have been done for Primary School (Lopez- Fernandez et al, 2016; Frost et al, 2018), but there is a lack of research on pre-school age.

It is important to point out that outdoor school areas and municipal playgrounds in Italy are composed of traditional games, such as swings and slides, which have not been investigated regarding the motor and play potential they offer to children. Therefore, these areas, despite being outdoors, offer few motor proposals to children, and the equipment present is poorly designed to be able to best develop motor skills and raise the physical activity levels of kindergarten children.

Considering, therefore, the low levels of physical activity in the 3-6 age group reported by the studies, few structured proposals made by the pre-school teachers and the lack of adequately designed areas for increased physical activity, it was hypothesised that an outdoor space with certain fixed and mobile equipment could provide support for the teacher planning the activities and could enable children to use it in free play as well, building confidence with their own bodies and with the material and equipment. This would lead to greater use and thus increased levels of physical activity in free play as well.

A systematic review was essential to determine whether or not the hypothesis was correct and then the question was asked as to the best design for an outdoor educational space for pre-school children to promote and increase physical activity levels. The desire was to make a design from scratch: we did not take an existing outdoor educational area as a model, but started with the study of equipment and materials that would promote increased levels of physical activity. Thus the project is unique, customised and rationally designed for children between the ages of 3 and 6 with the help of various specialists.

Additional essential elements for design

In addition to the following systematic review (which makes it possible to scientifically identify what characteristics an educational exterior must possess), other elements are required for theoretical design to make the project as complete as possible.

First and foremost, the teacher must have a theoretical knowledge of the motor development (but also cognitive, emotional and social) of the pre-school child in order to propose activities in line with an adequate and complete growth. He/she must have disciplinary knowledge and therefore ensure that the experiences he/she proposes develop the body scheme, basic motor schemes, lateralisation, motor skills (coordinative and conditional) (Federici, Valentini, Cardinali, 2008).

The preschool teacher must also be aware of the importance of the environment, particularly the outdoor environment, and trained in the management and conduct of the many activities to be proposed to the little ones. Many great authors, such as Rousseau, Fröbel, Montessori and Malaguzzi, and also the new neuroscientific theories support the strong educational value that the physical environment has in the overall development of the child: the arrangement of spaces, objects, materials influence (positively and negatively) (Tortella, Fumagalli, 2019) their cognitive, emotional, motor and social growth. The outdoor environment also has numerous benefits, especially at the motor level: it is therefore necessary to design the outdoor space in such a way as to allow harmonious and global development, especially considering the importance of the body in movement at this age. The outdoors should be designed in such a way as to develop motor skills (gross and fine) to provide knowledge, skills and prerequisites needed at school and for life.

Another useful element when designing an outdoor educational space is compliance with current Italian safety regulations: it is important to include approved and compliant equipment in the environment to ensure the safety of children and teachers. The most important standards are EN 1176 of 1998 and EN 1177 of 2008: the first refers to the fact that all structures anchored to the ground must have a certificate of conformity issued by a competent body; the second is specific to impact-absorbing surfaces.

While it is true that children's safety and security must be ensured, there is also a pedagogical need to teach the perception of risk and danger, but always limited to its range: an environment that is too reassuring would not allow a full experience, especially on a motor level. The right balance must be struck between safety and the possibility of allowing a broader range of experiences (including motor experience): in doing so, the child will also develop an awareness of his or her skills. Alongside the development of a sense of risk and knowledge of one's own abilities, it is important to foster the development of *self-efficacy* (Bandura, 1997), i.e. the confidence the subject has in completing a task by relying on his or her own abilities and skills. The PE teacher should therefore propose activities that are in the "zone of proximal development" (Vygotskij, 1980) so that good *self-efficacy* and an adequate perception of risk can be developed.

When designing an educational outdoor space, it is important to ensure that this space can be of and for all, making it as inclusive an environment as possible. Therefore, it is necessary to be aware of *Universal Design* (Mace, 1997) and *Barrier-Free Design* and their principles: this will result in an outdoor space that is attentive to the needs of all, where one can play and create relationships.

The last essential element is a shared design using different professional figures such as architects, planners, teachers, ... to make the outdoor space the safest and most attentive to the needs of the little ones it is intended for. *Teamwork* is fundamental: specialised figures who pay more attention, due to their own *formae mentis* to certain aspects, details, to make the difference in quality by guaranteeing a complete and exhaustive design.

Methodology

Objective

A careful and meticulous systematic review was carried out with the aim of researching (i) the general characteristics (including fixed equipment, spaces, movable materials) that an outdoor space in the Kindergartens must have and (ii) the integration of structured activities alongside free play in order to have age-appropriate levels of intensity of physical activity with the final aim of a theoretical design of an outdoor educational motor space.

Table 1. PICO structure of labour demand
Source: own elaboration

P	I	C	O
Population	Intervention	Comparison	Outcome
Study of the child population (2-6 years) in the educational space outside the school	Use/inclusion of equipment in outdoor school space and application of structured activities and free play	No use/inclusion of schoolyard equipment and only free play	Increased physical activity levels (MVPA)

Search strategies

For the RS (Systematic Review), the PRISMA Guidelines (Liberati et al, 2015) were used: articles were searched on the main databases and bibliographic analysis was performed. The databases used to find the articles were EBSCO, SportDiscus, OpenAIRE, ERIC, SCOPUS and Google Scholar and the keywords entered were the following: 'outdoor' or 'playground' or 'kindergarten' or 'preschool' or 'design' or 'physical activity level' or 'motor development'.

Considering the adherence or non-adherence of articles to the inclusion criteria, 19 articles were identified.

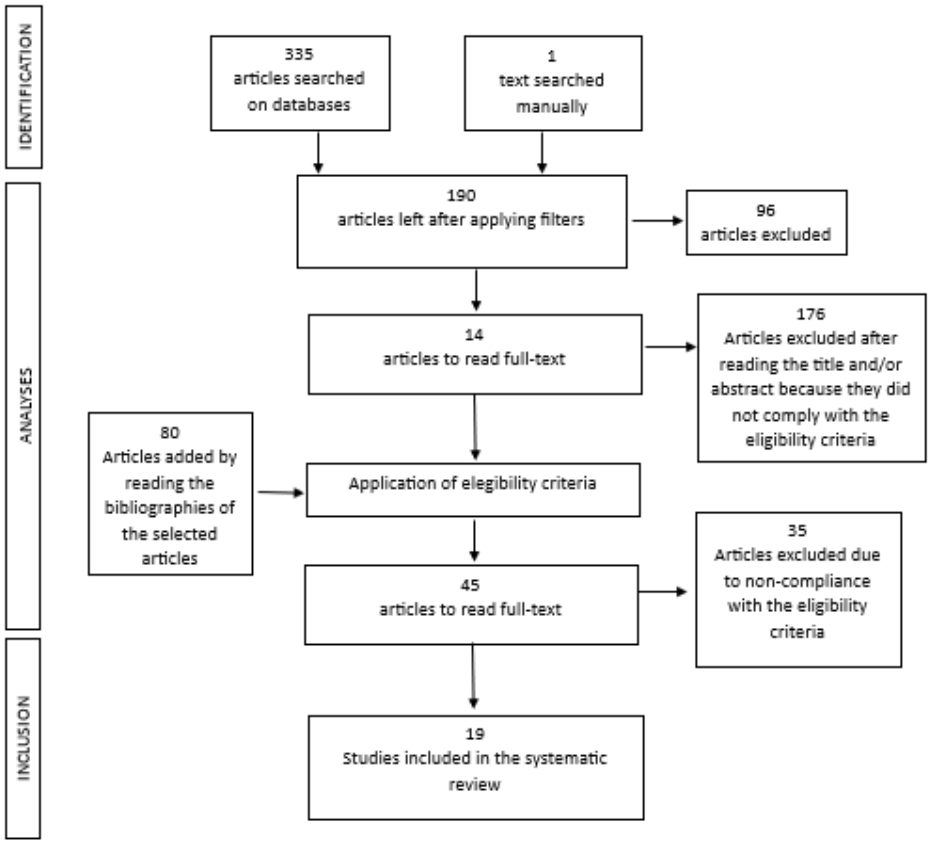

Figure 1. PRISMA flowchart of the study selection process
Source: Own elaboration from PRISMA flowchart (Liberati 2015)

The articles and case studies analysed include the following eligibility criteria:

- Children 2-6 years;
- Increased amount of physical activity and/or motor skills;
- Kindergarten;

- Influence of equipment on physical activity levels;
- Structured activities and/or free play;
- Experimental studies.

Characteristics and summary of data

There are 19 studies taken into account and they are both experimental and qualitative and observational. In order to make the SR more complete, the studies were selected on a global level, not only European. The countries of origin of the case studies analysed are USA (Ridgers et al, 2007; Bower et al, 2008; Hannon, Brown, 2008; Dowda et al, 2009; Brown et al, 2009; Alhassan et al, 2013; True et al, 2017), Italy (Tortella et al, 2012; Tortella et al, 2016; Tortella et al 2019), Australia (Sugiyama et al, 2012; Adams et al, 2018), United Kingdom (Stratton, Mullan, 2005), Canada (Berg, 2014), Belgium (Cardon et al, 2009), Netherlands (Gubbles et al, 2012), Sweden (Chen et al, 2020, Bangladesh (Cosco et al, 2010), China (Yunfei et al, 2021).

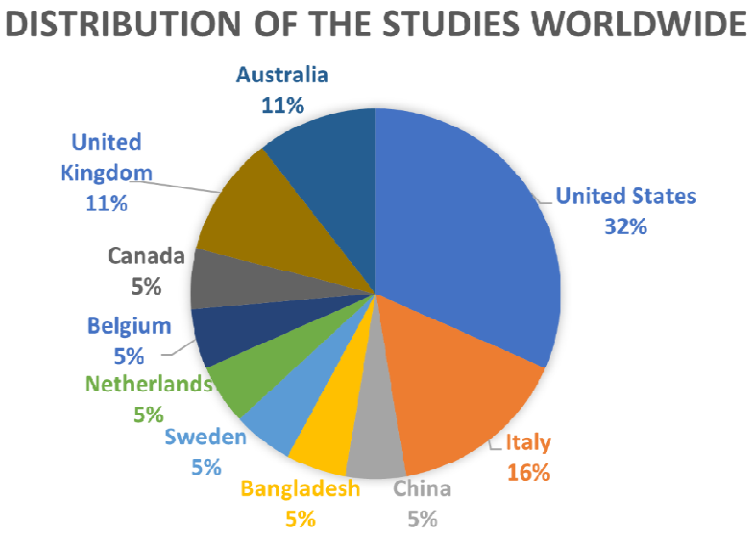

Figure 2. Distribution of studies worldwide
Source: Own elaboration

The publication years of the selected studies range from 2005 (Stratton, Mullan, 2005) to 2021 (Yunfei et al, 2021), covering a wide time span.

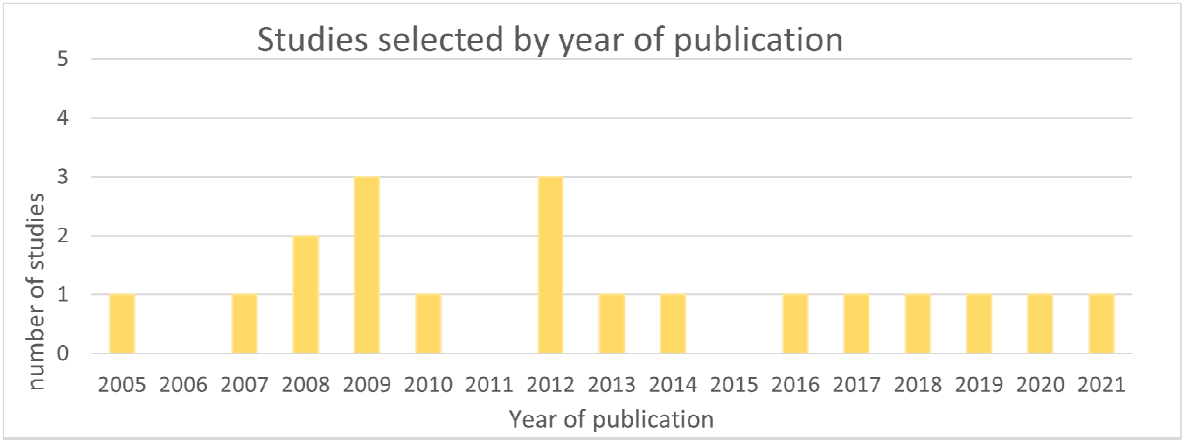

Figure 3. Graph of selected studies according to year of publication
Source: own elaboration

The sample number ranges from a minimum of 53 (Cosco et al, 2010) to a maximum of 583 (Cardon et al, 2009) children. One article (Bower et al, 2008) does not report the number of children involved as the sample but the number of preschools involved (20 kindergartens). The sample age is between 2 and 11 years, considering that only two studies (Stratton, Mullan, 2005; Adams et al, 2018) have the sample age between 4 and 11 years, while the remaining seventeen are between 2 and 6 years old.

Data Extraction

Table 2. Summary of studies in chronological order concerning outdoor characteristics

Author Country, Year, Title	**Number of children; Age**	**Duration, Setting**	**Evaluation tools/methods**	**Activities**	**Results**
Stratton, Mullan, UK, 2005, *The effect of multicolor playground markings on children's physical activity level during recess*	99 children; 4-11 years	5 months; *Outdoor* (schoolyard)	Heart rate monitor	In the courtyards of the experimental group, playground markings were added to the flooring	Patterns in flooring can increase MVPA
Ridgers et al, USA, 2007, *Children's physical activity levels during school recess: a quasi-experimental intervention study*	297 children; 5-7 years	1 year; Outdoor (schoolyard)	Uniaxial accelerometer (Electro Polar)	In the courtyards of the experimental group, playground markings were added to the flooring and facilities for physical activity	MVPA have not improved significantly; interventions are more effective with young children
Bower et al, USA, 2008, *The Childcare Environment and Children's Physical Activity*	20 Kindergartens; 3-5 years	7 months; *Indoor and Outdoor* schools	EPAO; modified SOPLAY	Evaluation of the environment and policies for supporting physical activity in schools	There are higher levels of MVPA in centres with more active opportunities, mobile and stationary equipment, exercise and physical activity training environments
Hannon, Brown, USA, 2008, *Increasing preschoolers' physical activity intensities: An activity-friendly preschool playground intervention*	64 children; 3-5 years	1 mese; *Outdoor* (schoolyard)	Accelerometer (Actigraph GTIM)	After the pre-test, specific materials were added and the post-test was done	Decrease in sedentary behaviour and increase in LMVPA
Cardon et al, Belgium, 2009, *Promoting physical activity at the pre-school playground: The effects of providing markings and play equipment*	583 children; 4-5 years	5 mesi; *Outdoor* (schoolyard)	Uniaxial Accelerometer (Actigraph GTIM)	Introduction of mobile equipment and/or playground markings	No significant improvement in MVPA
Dowda et al, USA, 2009, *Policies and characteristics of the preschool environment and physical activity of young children*	299 children; 3-5 years	1 year and 7 months; *Indoor and outdoor* schools	Accelerometer (Actigraph GTIM) ECERS-R	Schools were assessed using the Environmental Rating Scale and physical activity levels measured	Schools with higher quality scores have: more minutes in MVPA and less in sedentary activities; less fixed equipment; more mobile equipment; larger outdoor spaces
Brown et al, USA, 2009, *Social and Environmental Factors Associated With Preschoolers' Nonsedentary Physical Activity*	476 children; 3-5 years	2 years; *Indoor and outdoor* schools	OSRAC-P	Observation in *indoor and outdoor* settings to determine which contextual factors are predictive of MVPA 89% sedentary activities	89% sedentary activities 8% LPA; 3% MVPA. In the outdoor context children were more active. Contextual factors: open space 23% MVPA, fixed equipment 13% MVPA, mobile equipment 26% MVPA, 81% adult-initiated activities of which 15.4% MVPA
Cosco et al, Bangladesh, 2010, *Behavior Mapping: A Method for Linking Preschool Physical Activity and Outdoor Design*	53 children; 3-5 years -	- *Outdoor schools;*	CARS; Behavior Mapping	The researchers observed children's behaviour and physical activity in the two courtyards	Courtyard 1: Open spaces (40%), in paths (32.4% and 22.9% MVPA) and fixed equipment (15.2%). Courtyard 2: fixed equipment (42.7%), in the sandpit (19.7%) and in open spaces (19.2%)
Sugiyama et al, Australia, 2012, *Attributes of Child*	89 children; 3-5 years	4 months; *Indoor and outdoor* schools	Accelerometer (Actigraph GTIM); questionnaire;	Examination of preschool characteristics related to MVPA	Sedentary behaviour: 80% MVPA: 6% Large number of fixed structures is associated with more physical activity

Care Centers and Outdoor Play Areas Associated With Preschoolers' Physical Activity and Sedentary Behavior			direct observations of spaces	and sedentary behaviour	
Gubbles et al, The Netherlands, 2012, *Play Equipment, Physical Activity Opportunities, and Children's Activity Levels at Childcare*	175 children; 2-3 years	2 months; *Indoor and outdoor* schools	EPAO; OSRAC-P	The association between fixed/mobile indoor/outdoor physical activity facilities and physical activity intensity is assessed	Outdoor physical activity levels are positively associated with mobile jumping equipment and structured trails; swinging equipment and sandpits are associated with sedentary behaviour
Berg, Canada, 2014, *Children's Activity Levels in Different Playground Environments: An Observational Study in Four Canadian Preschools*	161 children; 3-5 years -	- *Outdoor* schools	SOPLAY; CARS	Observations to determine factors influencing physical activity levels in the four schools analysed	In 50.6% of the total observations the children have sedentary behaviour. The school with the highest percentage of VPA has the smallest outdoor area, the least amount of fixed equipment and the most mobile equipment.
True et al, USA, 2017, *Motor competence and characteristics within the preschool environment*	229 children; 3-5 years -	- *Indoor* and *Outdoor* schools	CHAMPS; OSRAC-P; ECERS-R; direct observations	Investigating environmental characteristics that influence motor competence	Classroom size/children ratio, teacher training, media use, yard size and trips to outdoor organisations were found to be predictors of motor competence.
Adams et al, Australia, 2018, *Physical Activity and Fundamental Motor Skill Performance of 5–10 Year Old Children in Three Different Playgrounds*	57 children; 5-10 years (average age 6.9)	2 months; 3 playgrounds (traditional, contempo- rary, adventure)	Accelerometer (Actigraph GTIM); SOFIT	Evaluation of the use of more equipment when children can use it, more physical activity and the use of a wide range of basic motor skills where there is a wide range of equipment	Children in the traditional playground show more MPA. In contemporary and adventure playgrounds, children used a wider variety of equipment and few basic motor skills
Chen et al, Sweden, 2020, *Preschool environment and preschool teacher's physical activity and their association with children's activity levels at preschool*	369 children and 84 teachers; 3-5 years	3 mesi; *Indoor* e *Outdoor* delle scuole	EPAO-SR; Accelerometer (Actigraph GT3X+)	Assessment of environment characteristics and formalised policies for physical activity in schools. Measurement of physical activity levels of children and teachers.	10.2 minutes more MVPA, 15.6 minutes more LPA and 997 more steps in schools with formalised policies for physical activity; time spent in the playground, physical activity levels and teacher steps are associated with higher levels of physical activity.

Source: own elaboration

Table 3. Summary of studies in chronological order concerning structured activities conducted in the outdoor environment

Author Country, Year, Title	**Number of children; Age**	**Duratio Setting**	**Evaluation tools/methods**	**Activities**	**Results**
Tortella et al, Italy, 2012, *Perception-action: the educator's role in attributing meaning to environment and task, with 5-year-old children.*	59 children; 5 years	10 weeks; "First Sport 0246"	Direct observations	30 minutes of structured activities and 30 minutes of free play. Experimental group (A) is offered physical help on the "bar with springs"; control group (B) was only encouraged	97% of group A climbs the bar with springs and all complete the course; 17% of group B climbs independently but no one completes the course. Group A also chooses the tool in free play.
Alhassan et al, USA, 2013, *A Pilot Study to Examine the Effect of Additional*	67 children; 3-5 years	1 month; *Outdoor* (schoolyard)	Accelerometer (Actigraph GTIM)	Group A carries out a structured activity based on the SPARKS programme.	Group A increased the weekly time spent in MVPA and decreased the weekly time spent in sedentary behaviour.

Structured Outdoor Playtime in Prescholers' Physical Activity Levels					
Tortella et al, Italy, 2016, *Motor Skill Development in Italian Pre-School Children Induced by Structured Activities in a Specific Playground*	110 children; 5 years	10 weeks; "First Sport 0246"	Direct observations to assess: - Construction task - Coin throwing task - One-legged balance task - Bar balance task - Balance task on platform - Heel-to-toe walking task - Medicine ball throwing	The experimental group (A) undergoes 30 minutes of structured activities and 30 minutes of free play; the control group (B) only free play.	Significant improvement (43.3%) of group A in 4 out of 6 gross motor activities and no improvement in fine motor activities
Tortella et al, Italy, 2019, *Comparing Free Play and Partly Structured Play in 4-5-Years-Old Children in an Outdoor Playground*	79 children; 4-5 years	10 weeks; "First Sport 0246"	Accelerometer (Actigraph GT3X)	Assessing the intensity of physical activity of: - experimental group A: 30 minutes structured activity; 30 minutes free play - control group B: 60 minutes free play	Significant difference in intensity levels between 5-year-old children in group A and 4-year-old children in group B
Yunfei et al, China, 2021, *Effect of outdoor playground and sports activities design on development of children's fundamental movement skills*	141 children; 3-6 years	10 weeks; *Outdoor* (schoolyard)	MOBAK-1 (*block stacking*, walking in a straight line heel-toe, throwing a medicine ball with both hands); M-ABC-2 right leg balance, left leg balance, coin insertion coin (right), coin insertion (left); KTK (balance beam walking and swing control)	Evaluation of the effect of structured activities and free physical activity in outdoor school and their impact on children's basic motor skills through 30 minutes of structured activities and 30 minutes of free physical activity (experimental group A) compared to 60 minutes of free physical activity (control group B).	Significant improvement (43.3%) in 4 basic gross motor skills and no improvement in fine motor skills in group A compared to group B.

Source: own elaboration

Discussion

The task of this systematic review is to analyse the characteristics that a school exterior must possess in order to increase physical activity levels by promoting it through structured activities and free play.

Characteristics of the school playground

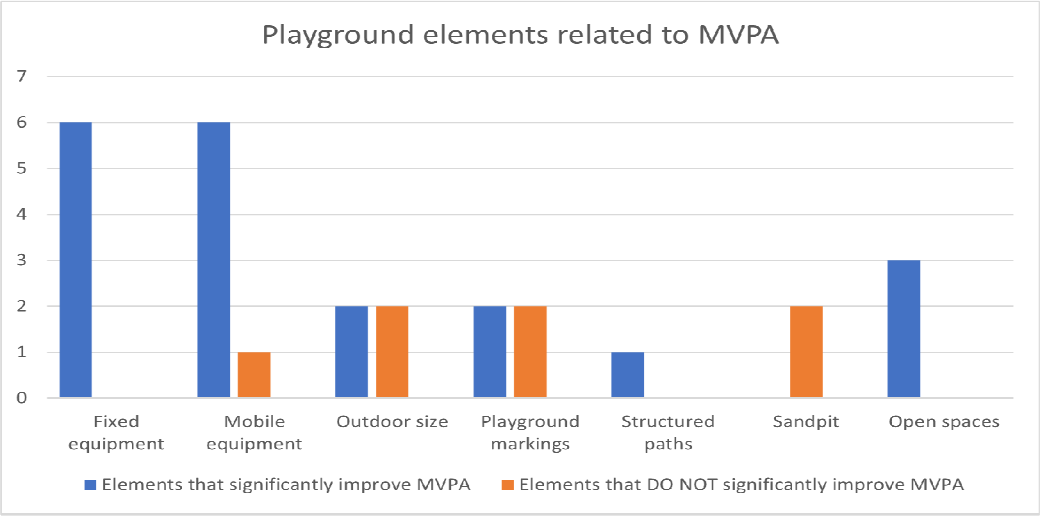

Figure 4. Courtyard elements related to MVPA
Source: own elaboration

Figure 4 shows the characteristics that condition levels of MVPA (moderate to vigorous physical activity). The sandpit is a predominantly sedentary place (Cosco et al, 2010; Gubbles et al, 2012), while the size of the outdoor area (Dowda et al, 2009; True et al, 2016; Berg, 2014; Chen et al, 2020) and playground markings (Stratton, Mullan, 2005; Cosco et al, 2010; Ridgers et al, 2007; Cardon et al, 2008) do not affect children's MVPA. The size of the outdoor area, however, must allow for adequate open space (Berg, 2014); playground markings can positively influence it if it represents an elliptical pathway with a visual obstruction (Cosco et al, 2010).

Aspects that positively influence MVPA are: open spaces (Brown et al, 2009; Cosco et al, 2010; Adams et al, 2018), understood as unobstructed by equipment, mobile equipment (Bower et al, 2008; Hannon, Brown, 2008; Dowda et al, 2009; Brown et al, 2009; Gubbles et al, 2012; Berg, 2014), structured paths (Gubbles et al, 2012) and fixed equipment (Bower et al, 2008; Dowda et al, 2009; Brown et al, 2009; Cosco et al, 2010; Sugiyama et al, 2012; Berg, 2014). For mobile equipment, the novelty effect should be evaluated by conducting new long-term studies and also associating structured activities; whereas quantity (Bower et al, 2008; Dowda et al, 2008) and mobile jumping equipment (Gubbles et al, 2012) have been found to have positive effects on physical activity levels in children.

Fixed equipment, as reported by studies (Dowda et al, 2008; Cosco et al, 2010), should be more than one and of medium size, not one large structure, as this would lead to crowding and difficult use of the equipment. Of these, slides and climbing structures have higher levels of physical activity (Sugiyama et al, 2012), while swinging structures reduce them (Gubbles et al, 2012).

Structured activities and free play

Studies show that the combination of structured activities and free play positively influences physical activity levels in children. The structured activities introduced are the execution of motor pathways (Tortella et al, 2016; Tortella et al, 2019; Yunfei et al, 2021) the introduction of a programme with structured activities for kindergarten (Alhassan et al, 2013). Furthermore, structured activities decrease sedentary behaviour (Alhassan et al, 2013).

These researches also show that through structured activities and free play with certain equipment or without can also improve some motor skills, such as balance (Tortella et al, 2012) and other gross motor skills (Tortella et al, 2016; Yunfei et al, 2021); there are no improvements in fine motor skills (Tortella et al, 2016; Yunfei et al, 2021).

As shown in another study (Cardon et al, 2008), play alone and passive teacher supervision do not promote higher levels of physical activity.

Design of the outdoor educational motor space

Together with the architect, we wanted to design an outdoor educational space that would promote adequate levels of physical activity in children, following the results that emerged from the RS and also taking into consideration other elements (regulations, inclusive criteria, safety, ...). Taking as an example the exterior of the Municipal Kindergarten of Fano (PU) "Quadrifoglio", with the expertise, moreover, of Cercamondi, designer of the company Proludic (a company from which we drew on for the equipment) we designed the outdoor motor space at the hypothesis level.

In addition to the motor area with specific structures, space was also given to symbolic play, which is important for the children's growth.

Motor skills area

The following equipment has been included for the development of motor skills

- an artificial slope with a slide, climbing, ropes and steps: structure to develop upper limb strength, prehension, balance
- an open space to develop basic motor patterns such as running, crawling, throwing and catching, ..;
- moveable equipment (ropes, bricks, mat, balls, ...) for developing joint mobility, eye-hand coordination and balance
- a floor in front of a wall with targets drawn on it to develop mobility, grip and accuracy in throwing;
- a movement board for developing motor imagination;
- a track structure that develops balance, prehension, strength in the upper limbs and has various levels of difficulty;
- a structure for Kindergartens children's motor skills called Gymludic, which has up to 80 different activities to offer, allowing age-appropriate motor development without neglecting any aspect. Because of its flexibility, this facility can be transported inside the school during the winter season to allow continuity of activities;
- a closed circuit in the shape of an '8' that can be travelled on tricycles and scooters or by running, and the view is obstructed by two structures (Cosco et al, 2010).

In addition to promoting mobility, balance and manual dexterity, these facilities encourage peer relationships, help and sociability, which are very important aspects for this age group.

Symbolic Play

Materials and equipment for symbolic play have been placed in the outdoor educational space: they encourage creativity, imagination, divergent thinking and peer relationships.

The materials placed in the outdoor space are as follows:

- an inclusive playhouse, in which everyone (even children with wheelchairs) can enter and play together;
- a wooden stage where a curtain will be placed and there will be a mobile puppet theater;
- a gazebo next to the stage where the theater and puppet theater materials are kept. This can also be used to hold other activities outside;
- *plexiglass* panels on which to paint and draw.

Figure 5. *Qr code* to view project *rendering*

Conclusions

The starting point was to raise the physical activity levels of Kindergarten children through the design of an ad hoc outdoor educational area. Thanks to the systematic review, it was possible to identify the elements that favour the reduction of sedentary levels and the increase of physical activity through the combination of structured activities and free play: therefore, the importance of including fixed equipment such as climbing structures (not swings that reduce physical activity levels), mobile equipment such as balls and hoops, structured paths and open spaces within the outdoor space is emphasised. Thanks to the analysis of the articles, it was possible to arrive at a design hypothesis for an outdoor educational area that saw the collaboration of several figures, each of whom brought their experience, knowledge and professionalism to the project: in this way, the design turned out to be complete and exhaustive, thanks also to the graphic drawings and design of architect Toni, who succeeded in giving 'life' to this space. The close cooperation of several competences certainly resulted in added value. The results of the systematic review were adhered to, and thus elements were included to increase the levels of physical activity, both spontaneous and structured by the teachers.

Indeed, it is to be emphasised that, however, is that this outdoor educational space alone is not enough to raise physical activity levels: it is necessary for teachers to plan with the material and equipment in the garden structured activities aimed both at refining motor skills and raising physical activity and at getting children to become familiar with different materials and structures. In doing so, they will also use the equipment more in free play.

The basic idea of this outdoor educational area is that pupils come to practice the right levels of physical activity, but also that, once achieved, they achieve physical and mental well-being that leads them to feel good about themselves and others. The planned "motor" education area aims to get the child active and in motion in the outdoor environment, so as to also create good habits in the future. An additional goal is to foster relationships among children: developing cooperation, helping relationships, complicity, sharing games. The circuit, the slope with the slide, the playhouse, the "gymnasium," the balance course and the stage are able to develop all these skills without neglecting the playful, imaginative and creative aspect.

The purpose of this project is for children to take pleasure in movement and achieving new goals through the commitment and support of peers and teachers who encourage children to try and try again.

The ultimate goal would be to build this outdoor educational area and do some research and studies that would go to validate or not validate the theoretical study carried out and verify whether or not, through structured activities and free play, offered constantly, the levels of physical activity reach those indicated by the guidelines. In conclusion, the research carried out aims to bring the attention of scholars and teachers to the importance of physical activity in early childhood and of an appropriately designed space to fulfil this function: with this review and theoretical design, a studied model based on scientific results is proposed of how to design outdoor spaces in kindergartens. It would be important to carry out studies on what specific equipment increases physical activity levels, as there is still not enough of it.

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