



Let's move Europe:

*School-based promotion of healthy lifestyles to prevent obesity*

# Strategies for creating physically active school environments



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# 1

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THE RECESS

# 1.1 Background

School recess, sometimes referred to as break or lunchtime, can be defined as the “non-curriculum time scheduled between lessons” [1]. This may include morning, lunchtime and afternoon breaks, either alone or in combination. **Recess can make up 20% of the school day, it is often overlooked in the development of school policy.** School recess time usually involves access to outdoor spaces and provides children and adolescents with opportunity for unstructured play and socialisation with peers [2,3].

## Benefits of recess



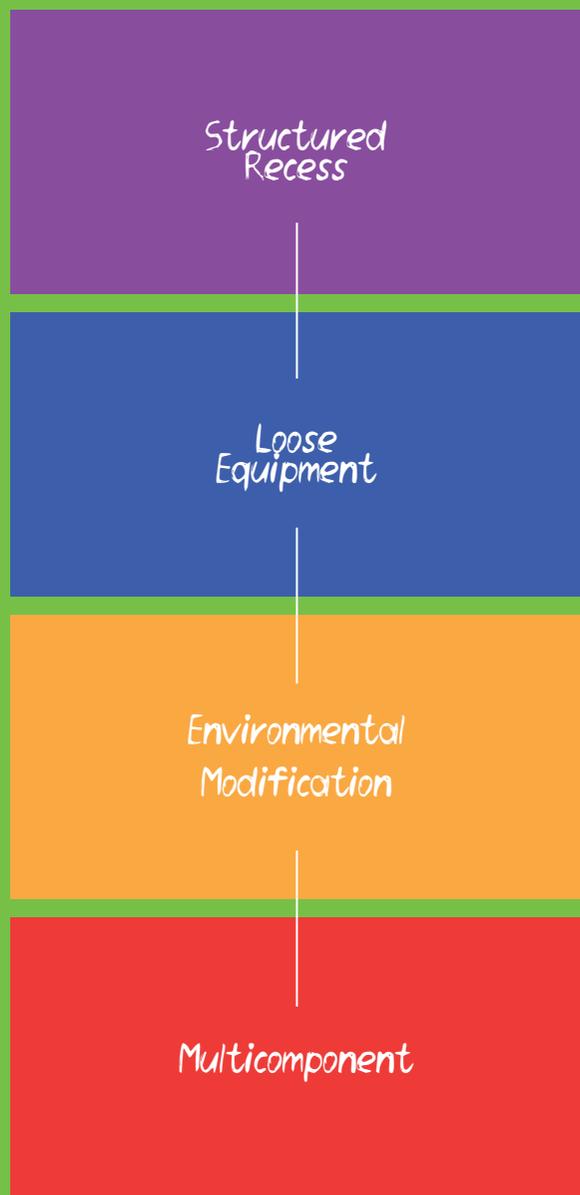
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Recess provides an opportunity for children to be active during the school day and so has the potential to make a substantial contribution to meeting physical activity guidelines. In addition to the established health benefits, increased physical activity has been linked with improved cognitive function [4] and academic achievement [5]. Physical activity during recess has been linked to improved peer-relationships, increased relatedness and a better school social climate [6].

While there is limited research to date evaluating the effectiveness of recess-based interventions in post-primary schools. Integrating recess-based interventions within the school day shows promise in promoting levels of physical activity, however it is difficult to draw conclusions on the effectiveness of single components.

Despite these benefits, one of the few national surveys conducted on recess time also indicates that the time allocated to recess in schools may be in decline, with a decline of 45 minutes per week amongst younger pupils and 65 minutes per week in post-primary schools in England [2].

## 1.2 Categories of strategies to promote physical activity during recess



# 1.2.1 Structured recess

Several interventions have been used to provide additional opportunity for physical activity at recess through structured approaches. This can include organised games or activities led by a teacher, coach, or older pupil. Providing activities during recess may limit the actual time available for children to play spontaneously. Structured games may be less suitable for younger children or those who do not enjoy sports or activities that are structured. Time required to organise, and set-up structured time needs to be set aside to organise and set up these activities at the start of recess.

Intervention Type - Structured Recess	Description / Example
Organised Games	Teachers, coaches, older students lead or supervise activities and game and encourage or reward participation.
Staff or Leadership Training	Staff training or educational resources are provided for teachers, leaders or pupils who can then lead activities during recess
Parkour or free running activities	Parkour activity involving running, jumping, climbing, swinging and rolling to travel from A to B is first taught first in Physical Education class and then introduced into recess and supervised by a teacher or leader
Video/Technology related Games	Video games which require physical activity to take part, or which lead children in physical activity used during recess periods.



## 1.2.2 Loose equipment

The provision of portable equipment such as beanbags, balls, hoops, frisbees, skipping ropes, parachute/tent, tunnels can help to stimulate physical activity play during recess.

Some instruction or role modelling by leaders (teacher or older pupil) might be initially required particularly for younger pupils. Loose equipment has an advantage over fixed equipment or changes in infrastructure because it can be changed regularly e.g., type of loose equipment available can be altered throughout the year.

Student leaders can take responsibility for putting out and returning all equipment. In addition to reducing the burden on teachers and school leaders this approach may help to maintain the interest of children, which in turn may lead to more sustained changes in their physical activity and sedentary behaviour levels.



### Intervention Type - Loose Equipment

Recycled Material

### Description / Example

Use of recycled or repurposed objects such as car tyres and milk crates to provide physical activity opportunities. These can be arranged as an obstacle course or a stimulus for active play and their arrangement be changed regularly to stimulate physical activity.

Recreational equipment

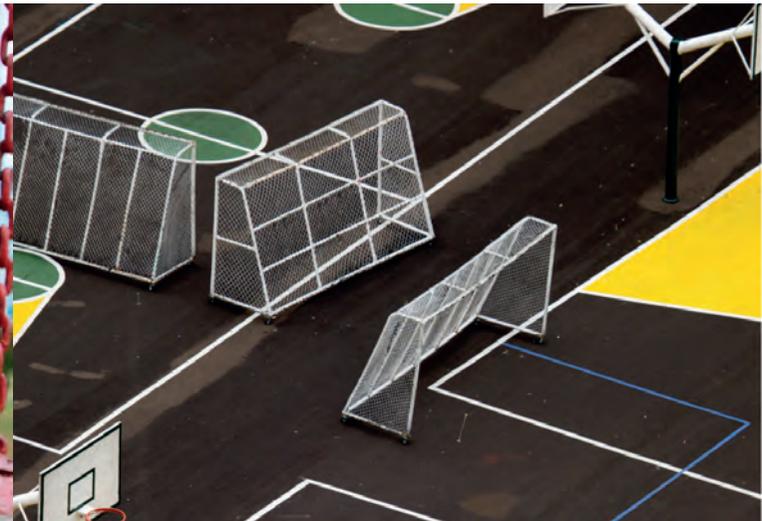
Small equipment such as balls, hoops, beanbags, skipping ropes, parachutes or other equipment to be provide during the recess period promote physical activity

# 1.2.3 Environmental modifications

Making changes to the physical environment in and around the school can also increase physical activity. Fixed playground markings have been shown to encourage physical activity in the short term but ideally should be accompanied by additional components maintain their effectiveness over time.

Dividing the playground into zones each set up for different activities (e.g., a zone for an obstacle course, a zone for imagination play, a zone for soccer) can help to vary the use of space and stimulated physical activity structure. This type of modification of the recess environment allows school leaders to change the use of space over the course of the school year allowing more flexibility than permanent playground markings.

Intervention Type - Environmental modifications	Description / Example
Playground Markings	Permanent or semi-permanent playground markings can encourage pupils to play active games (hopscotch, board games, etc.) without the need for additional equipment. Playground markings can be used to divide the area in zones. Adding greenery or using natural space to help create a play environment conducive to physical activity.
Structured Play Equipment	Fixed, or semi-permanent equipment such as playground equipment, climbing walls, Tibetan bridges, bars or climbing frames to increase the opportunities for physical activity and active play.
Reducing playground density	Reducing the number, the number of children in a recess space by staggering recess timings to increase opportunities for physical activity and access to any of the fixed or loose equipment and space.
Policy/Plan development	Creating action plans for improving the school environment to encourage in ways that will increase physical activity.



## 1.2.4 Multi-component interventions

Multicomponent interventions have been shown to be more effective than those focused on a single component. Combining a number of elements (e.g., changing playground marking and supplying loose equipment) or organised play.

Some of examples of interventions which include structured recess, loose equipment, environmental modifications and a combination of these measures in a multicomponent approach.



### Intervention Type - Multicomponent interventions

Playground markings + loose or structured equipment

Playground markings + adult supervision of games + loose equipment

Playground markings + teacher/ student training

### Description / Example

Adding playground markings and supplementing this with providing loose equipment during recess to encourage physically active play.

Adding playground marking and engaging teachers, older pupils or peer role-models to demonstrate how the markings can be used or encourage participation. Loose equipment can be used to supplement the activities and encourage a change in activities over time to maintain interest.

Adding playground markings and providing training to teachers and pupils on how to use these to maximized physical activity opportunities for children.

# 1.3 Policy, education and support

The interventions described above, if implemented on their own, are unlikely to result in a sustainable change in physical activity during school recess. Interventions need to be accompanied by changes in policy, training of staff and student education to have maximum impact. In addition, school leaders should consider the development of a cohesive policy for school recess (incorporated into a wider policy on physical activity). A school policy should detail the nature and length of school breaks, staffing for supervision of these breaks and describe the proposed benefits of recess for children on physical activity, wellbeing, learning and development [2].

The Center for Disease Control and Prevention (CDC) and the Society of Health and Physical Educators (SHAPE America) [7] have provided an infographic which described 5 strategies for school leaders wishing to increase physical activity during recess. The infographic is shown in Figure 2. Their website also provides a range of free resources to help school leaders implement these strategies:



1

## Make Leadership Decisions

1. Identify and document recess policies.
2. Put documented recess policies into practice and revise as needed.
3. Develop a written recess plan.
4. Designate spaces for outdoor and indoor recess.
5. Establish weather guidelines to ensure student safety.
6. Train school staff and volunteers for recess.



2

## Communicate and Enforce Behavioral and Safety Expectations

7. Establish and communicate behavior management strategies.
8. Teach conflict resolution skills.
9. Ensure that recess spaces and facilities meet recommended safety standards.



3

## Create an Environment Supportive of Physical Activity During Recess

10. Provide adequate physical activity equipment.
11. Add markings to playground or physical activity areas.
12. Create physical activity zones.
13. Provide planned activities or activity cards.
14. Provide a combination of recess strategies.



4

## Engage the School Community to Support Recess

15. Establish roles and responsibilities for supervising and facilitating recess.
16. Involve students in planning and leading recess.
17. Mobilize parents and others in the school community to support and sustain recess at school.



5

## Gather Information on Recess

18. Track physical activity during recess.
19. Collect information on recess to show the effect on student and school outcomes.

**Figure 2 Center for Disease Control (CDC) and the Society of Health and Physical Educators (SHAPE America) 5 strategies for recess planning.**

[https://www.shapeamerica.org/standards/guidelines/strategies\\_for\\_recess\\_in\\_schools.aspx](https://www.shapeamerica.org/standards/guidelines/strategies_for_recess_in_schools.aspx)



2

CLASSROOM AND  
OTHERS SPACES

“  
The design of school physical environments are key: to increase the physical activity of students and to reduce their sedentary lifestyles (for a review, see Jones et al.[8] and Love et al.[9]).

The recent focus on the design of the classroom and other school spaces reflects of the expansion of ergonomic thinking in education, lags behind its development in the workplace. Issues relating to the type of furniture, sound and thermal comfort, lighting, decoration, spatial configuration, etc., are emerging as important factors in the quality and efficiency of school work, and more broadly in the quality of school life in general, including physical life.

Interventions relating to these factors can have significant impact on all the school community and all the aspects of work and school life: pedagogical practices, relationships between students, class atmosphere, student mobility, etc.



**It is important to note that these interventions should ideally be part of a genuine institutional approach to managing change within the school. Such change will involve the various stakeholders in the school community (students, school principals, teaching/supervisory staff, parents, etc.), as a co-construction project, adapted to the characteristics of the school [2].**

**The very positive feedback from the Finnish national “Schools on the move” programme highlights the importance of this type of approach citing that; “Enabling schools to make decisions is one of the reasons why Schools on the Move has become a success story”.**

## 2.1 Change the classroom environment

Children spend considerable time in the classroom. The **classroom determines to a large extent the level of sedentary behaviour imposed on young people, as well as the conditions for their development of good posture.** Changing the configuration of the class therefore can have positive impact on both.

The concept of “**flexible learning spaces**”, more commonly referred to as “**flexible classes**”, which offer students a range of changing workspaces, is already used widely.

Morton et al. [10] using the CASE project (Creating Active School Environments) framework, and others [11–13], highlight the **importance attached by various stakeholders in the education community to interventions focused on the furniture and design of the classroom.**



The main drawbacks of the classical configuration often called “by bus” (all the students sitting, on the same type of furniture, most of the time in line and facing the teacher) are well known:

- It offers frequent and prolonged sedentary sitting and little mobility to students,
- It offers only the possibility of sitting posture, for long periods, which is relatively difficult to hold over time for children, and that it exerts a greater pressure on the lumbar region than a standing position,
- It offers a uniform furniture, which cannot be suitable for all students.

Generally speaking, **this configuration therefore does not appear conducive to reducing the sedentary behaviour of young people nor optimal for their postural development.**



Recent scientific data [14,15] suggest that the flexible classroom configuration, with the possibility of varied and changing postures, is much more conducive to reducing student sedentary behaviour and respecting their postural hygiene. By allowing students to move around in space and organising a relatively frequent change of workspace, flexible environments significantly break up and reduce the long periods of sedentary sitting.

## 2.1.1 Good postural hygiene management in the flexible classroom

Flexible classroom arrangements are based on the assumption that **students' postures may differ depending on the activities practised**. Listening, speaking or reading activities may be carried out in reasonably relaxed positions.

But don't forget, it is important that **in writing and drawing activities, students have the opportunity to sit in a position as close as possible to their needs**. It is well established that a good sitting posture is not only essential to the good postural development of young people, but it also has positive effects on school learning, while reducing student fatigue.

School ergonomics has long clearly defined the necessary **conditions for a good sitting posture to learn and practise writing and drawing activities**: feet flat on the ground, the rule of the 3 angles of 90° (hips, knees, ankles), stable and free scapular belt to promote the fine motor skills of the arm and hand.

However, **the proper sitting position may vary significantly from one child to another**. As a result, some students are likely to sit better and perform better at some workspaces than others.

The **necessity and effectiveness of back support is also an important consideration**.

Many of the seats offered in the flexible classroom do not offer a backrest. It is accepted that **stools or stability balls stimulate postural support**, thus strengthening the back muscles. It is nevertheless advisable to **limit the duration of their use**, because of the fatigue they generate, and the poor compensating postures which may result when the muscles of the back no longer properly support the spine. The organisation of rotations between the different workspaces need to take account of this. Finally, **when the seats have a backrest, it is particularly important that it is comfortable and within reach of the student's back** (not leaning too far back).



**In summary, when designing a flexible classroom, in order to reduce students' sedentary lifestyle and ensure their proper postural development, particular attention should be paid to the following:**

- Offer various **working positions, suited** to the activities being practised (listening, discussion groups, reading, writing and drawing activities, etc.), and as much as possible, to the individual needs of the students,
- **Allow students to move around the classroom** and organise **frequent** changes of workspace,
- Offer both: (a) **limited seating times without back support** (stools, stability balls) to develop back posture support and to avoid fatigue; and (b) **seating with backrests**, allowing students an effective use of the back support,
- **For drawing and writing activities**, offer, **working positions respecting the ergonomic rules of writing in a sitting position**.

## 2.1.2 Other solutions

The development of **active hallways** or corridors, which **transform everyday journeys into paths that develop motor skills** by means of floor markings or other multicoloured tiles, are also frequently implemented and documented. A recent review of the literature by Suga et al.[16], although focused on recess time, emphasised the positive, and inexpensive, impact on student physical activity of changes in the school environment such as markings. It is conceivable that the beneficial effects of markings could also be considered for hallways in addition to recess playgrounds.

In addition, **posters**, which are already widely used throughout schools for a variety of purposes, are another low-cost and potentially effective form of school environment improvement to promote student physical activity. The well-known old adage “a picture is worth a thousand words” (often attributed to Confucius) underlines the importance of images as a factor in the effectiveness of the content displayed. In the area of student health promotion, the recent thesis of Copetti Klohn [17], for example, specifies that the use of imagery to optimise the transmission of promotional messages must be precisely tailored to the age of the students.



## 2.1.3 Some examples of strategies

Proposal 1	Active furniture (chairs, tables, stability balls, cushions, etc.)
General description	Use suitable furniture (chairs, tables, benches, etc.) or objects (stability balls, cushions, carpets, etc.) to refurnish the classroom in order to allow students to change their position regularly and to be less sedentary and more active.
Objective/Goal	Reduce sedentary behaviours and increase physical activity among students in the classroom.
Theoretical support	Scientists: Guirado et al. [19]. Professional: Schools on the move
Resources	Human: an advisor, a coordinator and a project group bringing together the main stakeholders (principal, teachers, student and parent representatives, etc.). Financial/material: the classroom can be refurnished by combining, depending on the means available, the purchase of specific furniture and objects and the reuse of furniture already in place.
Implementation advice	Depending on the size and number of students, and the budget, you can choose to set up all or part of the room and rotate the children during the day or during the week. Arrange the classrooms according to your resources and tastes, see the illustrations below for examples. Allow enough space for free movement between work areas.
Illustrations	Flexible Learning Spaces – Classroom Design for Today’s Student   Families Magazine
Feasibility conditions	The motivation of teachers is paramount, as well as their participation in all phases of the project. It is important that they encourage children to use the different options available in the room.

Proposal 2	Organisation of work zones and regular changes between zones (movement between zones)
General description	Offer work zones (with varied postures) in the classroom based on themes, changes at the end of each work period, and active movement between zones.
Objective/Goal	Enable active physical activity or active breaks between learning times.
Theoretical support	Professional: iPlay project, classroom energiser breaks [18]. Scientific: Classroom approaches [10,19]
Resources	Financial/material: low cost Human: the teacher Time: Preparation of the room beforehand and tidying up / changes of work areas between 30 min and 1 hour depending on the work and age.
Implementation advice	Each work zone corresponds to a learning theme. Each zone offers the opportunity to learn in varied postures: sitting in different positions or on different furniture, standing, lying down. Active movements using material on the ground, such as: hopping, side-stepping, jumping with feet together, etc. Offer an appropriate number of work zones according to the space/size of the class Change the organisation often (weekly). Provide zone changes according to attention capacities, depending on the work and age (between 30 min and 1 hour). Change at the teacher's signal (all together) so that there is no movement between zones during work periods (timer). Offer progressive exercises if the children have finished earlier. Offer to choose and organise work areas with students (for older students), based on their suggestions. Take time to design the classroom, modify it, tidy it up.
Illustrations	<a href="https://www.familiesmagazine.com.au/flexible-learning-spaces/">https://www.familiesmagazine.com.au/flexible-learning-spaces/</a> <a href="https://www.josianecaronsantha.com/blog/miniformations-l-amenagement-flexible-classe-flexible-flexible-seating">https://www.josianecaronsantha.com/blog/miniformations-l-amenagement-flexible-classe-flexible-flexible-seating</a>
Feasibility conditions	Acquire a minimum of adapted furniture in combination with existing furniture. Co-build the project with the stakeholders concerned. Motivation of teachers

Proposal 3	Organisation of workflow
General description	Allocate the choice of work/work areas based on the outcomes of games (e.g., a precision game such as darts). Possibility to mix with proposal 2
Objective/Goal	Provide physical activity or “active breaks” during class time.
Resources	Financial/material: low cost Human: the teacher
Implementation advice	Specific play areas in the classroom Regularly change the games Student participation in choices
Feasibility conditions	Motivation of teachers Student acceptance/adherence Co-build the project with the stakeholders concerned.

Proposal 4	Corridor designs (floor markings, signage/wall posters, etc.)
General description	Create fun spaces for physical activities in the corridors allowing the development of children's motor skills. Different types of courses can be set up (balancing, jumping, coordination work, etc.) on all possible surfaces (floor, walls, doors, etc.).
Objective/Goal	Increase the children's spontaneous physical activity time and develop their different types of motor skills. Convert frequently used spaces.
Theoretical support	Scientific [16]
Resources	Human: a coordinator and a project group bringing together the main actors (principal, teachers, student and parent representatives, etc.). - Financial/material: low cost (purchase of coloured adhesive tapes, collages of symbols and images, use of existing markers, decorative elements likely to promote motor activities, etc.).
Implementation advice	Use all available surfaces (grounds, walls, doors, coat racks, etc.). Use bright colours and different shapes. Vary the types of movements required (balancing, jumping, coordination, etc.). Set rules to limit the noise.
Illustrations	<a href="https://www.cssdgs.gouv.qc.ca/2018/07/03/ca-bouge-a-gerin-lajoie/">https://www.cssdgs.gouv.qc.ca/2018/07/03/ca-bouge-a-gerin-lajoie/</a>
Feasibility conditions	Acceptance/adhesion of all the staff and students

## Proposal 5

## Design of stairs (markings and signs/floor and wall displays)

General description

Add fun features to the stairs so that children enjoy using them: a variety of posters, riddles, encouraging words, etc., arousing children's curiosity and allowing them to improve their knowledge on different topics.

Objective/Goal

Make it fun to use the stairs.  
Encourage children to use them "for play", beyond just their necessary use.

Theoretical support / basic

Science/Scientific [16]

Resources

Human: a qualified leader/coordinator and a project group bringing together the main actors (principal, teachers, student and parent representatives, etc.).  
- Financial/material: low cost (purchase of coloured adhesive tapes, collages of symbols and images, use of existing markers, decorative elements likely to promote motor activities, etc.).

Implementation advice

Use various means: attractive colours on the steps, motivating phrases, encouraging posters, riddles, movement related to mathematical operations, etc.  
Ensure that students are able to move safely.  
Set rules to limit the noise.

Feasibility conditions

Acceptance/adhesion of all the staff and students

## Proposal 6

## Informational Posters on Physical Activity and Healthy Lifestyle

General description

Display (fun) posters on the benefits of physical activity and a healthy lifestyle.

Objective/Goal

Educate students about the importance of physical activity and a healthy lifestyle.

Theoretical support / basic

Scientific [17,20]  
Professional: WHO Guidelines  
<https://www.ncbi.nlm.nih.gov/books/NBK566048/>

Resources

Human: A qualified person who organises the placement of posters in strategic (high-traffic and visible) locations.  
Teachers who motivate/encourage children to be interested in the posters.  
Financial/material: low cost (printing and framing of posters)

Implementation advice

Choose high-traffic and/or visible locations for the placement of posters.  
If you create your own posters, make sure the design is fun and attracts students' attention.  
Consult students and teachers in the choice of posters.

Feasibility conditions

Acceptance/adhesion of all the staff and students  
Guidance for students to better understand the messages.

## Proposal 7

## Renovation of toilet spaces

General description

The toilet spaces can also be decorated according to the principles presented above for the design of other spaces. Markings on the floor, for example, can be added in the common access area for the toilets or in front of the mirror. Active exercises can be suggested while drying hands.

Objective/Goal

Allow for active physical activity or active breaks during toilet breaks.

Resources

Financial/material: low cost  
Human: a qualified leader/coordinator and a project group bringing together the main actors (principal, teachers, student and parent representatives, etc.).

Implementation advice

Change the layout regularly.  
Posters, signage and pictograms provided or made with students.

Feasibility conditions

Acceptance/adhesion of all the staff and students  
Spacious toilet spaces

# REFERENCES

1. Ridgers ND, Salmon J, Parrish A-M, et al. Physical activity during school recess: A systematic review. *Am J Prev Med* 2012; 43: 320–328.
2. Baines E, Blatchford P. School break and lunch times and young people's social lives: A follow-up national study Final report. In: *The Encyclopaedia of Child and Adolescent Development Part 1 (Child)*. New York: Wiley-Blackwell, www.nuffieldfoundation.org (2019, accessed 12 May 2022).
3. Baines E, Blatchford P, Golding K. Recess, breaktimes, and supervision. In: *The Encyclopedia of Child and Adolescent Development*. Wiley, pp. 1–11.
4. Biddle SJH, Ciaccioni S, Thomas G, et al. Physical activity and mental health in children and adolescents: An updated review of reviews and an analysis of causality. *Psychol Sport Exerc* 2019; 42: 146–155.
5. Singh A. Physical activity and performance at school: a systematic review of the literature including a methodological quality assessment. *Arch Pediatr Adolesc Med* 2012; 166: 49.
6. Haapala HL, Hirvensalo MH, Laine K, et al. Recess physical activity and school-related social factors in Finnish primary and lower secondary schools: Cross-sectional associations. *BMC Public Health* 2014; 14: 1114.
7. Centers for Disease Control and Prevention and SHAPE America—Society of Health and Physical Educators. *Recess Planning in Schools: A Guide to Putting Strategies for Recess into Practice*. 2017.
8. Jones M, Defever E, Letsinger A, et al. A mixed-studies systematic review and meta-analysis of school-based interventions to promote physical activity and/or reduce sedentary time in children. *J Sport Heal Sci* 2020; 9: 3–17.
9. Love R, Adams J, van Sluijs EMF. Are school-based physical activity interventions effective and equitable? A meta-analysis of cluster randomized controlled trials with accelerometer-assessed activity. *Obes Rev* 2019; 20: 859–870.
10. Morton KL, Atkin AJ, Corder K, et al. Engaging stakeholders and target groups in prioritising a public health intervention: the Creating Active School Environments (CASE) online Delphi study. *BMJ Open* 2017; 7: e013340.
11. Lanningham-Foster L, Foster RC, McCrady SK, et al. Changing the school environment to increase physical activity in children. *Obesity* 2008; 16: 1849–1853.
12. Benden ME, Blake JJ, Wendel ML, et al. The impact of stand-biased desks in classrooms on calorie expenditure in children. *Am J Public Health* 2011; 101: 1433–1436.
13. Benden M, Wendel M, Jeffrey C, et al. Within-subjects analysis of the effects of a stand-biased classroom intervention on energy expenditure. *J Exerc Physiol* 2012; 15: 9–19.
14. Kariippanon KE, Cliff DP, Ellis YG, et al. School flexible learning spaces, student movement behavior and educational outcomes among adolescents: A mixed-methods systematic review. *J Sch Health* 2021; 91: 133–145.
15. Hartikainen J, Haapala EA, Poikkeus A-M, et al. Comparison of classroom-based sedentary time and physical activity in conventional classrooms and open learning spaces among elementary school students. *Front Sport Act Living* 2021; 3: 168.
16. Suga ACM, Silva AA de P da, Brey JR, et al. Effects of interventions for promoting physical activity during recess in elementary schools: a systematic review. *J Pediatr (Rio J)* 2021; 97: 585–594.
17. CopettiL; K. S. The use of informative and decorative pictures in health and safety posters for children, <https://centaur.reading.ac.uk/84830/> (2019, accessed 12 May 2022).
18. Lonsdale C, Sanders T, Parker P, et al. Effect of a scalable school-based intervention on cardiorespiratory fitness in children: A cluster randomized clinical trial. *JAMA Pediatr* 2021; 175: 680.
19. Guirado T, Chambonnière C, Chaput J-P, et al. Effects of classroom active desks on children and adolescents' physical activity, sedentary behavior, academic achievements and overall health: A systematic review. *Int J Environ Res Public Health* 2021; 18: 2828.
20. Williamson C, Baker G, Mutrie N, et al. Get the message? A scoping review of physical activity messaging. *Int J Behav Nutr Phys Act* 2020; 17: 51.