Community Preventive Services Task Force

Physical Activity: Classroom-based Physical Activity Break Interventions

Community Preventive Services Task Force
Finding and Rationale Statement
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CPSTF Finding and Rationale Statement

Context

Physical activity among children is a public health priority (HHS 2008). The U.S. Department of Health and Human Services recommends that young people ages 6–17 years participate in at least 60 minutes of physical activity daily (HHS 2018). Regular physical activity in childhood and adolescence improves strength and endurance, helps build healthy bones and muscles, helps control weight, improves cognitive function, reduces risk of depression, and may improve cardiovascular health (HHS 2018). Most children in the United States, however, are not active enough to achieve health benefits (Child & Adolescent Health Measurement Initiative 2016; Merlo et al. 2020).

Schools have an important role in promoting and supporting daily and weekly physical activity among students. Adding short bouts of physical activity during classroom time adds a few minutes of physical activity to the school day and interrupts periods of sedentary behavior, and it may also enhance attention to educational content. Classroom-based physical activity interventions can be used to supplement other school programs and policies to promote physical activity among students such as physical education programs, recess breaks, and active travel to school interventions (CDC 2018).

Intervention Definition

Classroom-based physical activity break interventions regularly engage students in short bouts of physical activity between classroom lessons. Activities aim to achieve moderate-to-vigorous intensity physical activity (MVPA) among students in the classroom. Breaks typically last four to ten minutes and are scheduled one to three times each school day. Interventions include training for teachers and may include access to web or video resources designed to engage students in classroom and age-appropriate exercises and dance routines.

CPSTF Finding (March 2021)

The Community Preventive Services Task Force recommends classroom-based physical activity break interventions for primary school students to increase physical activity. Sufficient evidence of effectiveness shows that when trained classroom teachers deliver these interventions, children meaningfully increase the amount of time they spend engaged in physical activity during the school day.

Rationale

Basis of Finding

CPSTF selects and evaluates recently published systematic reviews to provide program planners and decision-makers with effective intervention options. A team of specialists in systematic review methods and school-based physical activity programs and policies selected and evaluated the following published review:

> Masini A, Marini S, Gori D, Leoni E, Rochira A, Dallolio L. Evaluation of school-based interventions of activity breaks in primary schools: a systematic review and meta-analysis. *Journal of Science and Medicine in Sport* 2020;23:377-84.

The team also abstracted information from the included studies and conducted additional analyses. The CPSTF finding is based on meta-analytic and narrative results from the published systematic review, additional analyses of data from included studies, and expert input from team members and CPSTF.

The Masini et al. review included 22 studies (search period through April 2019). Authors examined the effectiveness of classroom-based physical activity breaks in primary schools. Outcomes included time spent in physical activity (overall or during the school day), performance on fitness and cognitive tests, short-term academic achievement measured primarily through lesson test scores, and observed student classroom behaviors. Six studies were included in meta-analyses for three outcomes. Results are summarized in Table 1.

Table 1. Intervention Effects on Physical Activity and Classroom Behavior

Outcome	Number of Studies	Summary Effect Estimate (95% Confidence Interval)	Direction of Effect
Physical activity: time spent in moderate-to-vigorous intensity physical activity	2	Mean difference: 4.29 minutes per school day (-0.15, 8.74)	Favors the intervention
Physical activity: step counts during the school day	3	Mean difference: 960 steps per school day (710, 1210)	Favors the intervention
Classroom behaviors: observed student time "on task" during lessons following activity breaks	2	Mean difference: 26.15 minutes (-2.76, 55.06)	Favors the intervention

All 22 studies included in the review provided results for one or more outcomes. Masini et al. provided narrative descriptions of these results, summarized in Table 2.

Table 2. Intervention Effects on Student Outcomes (Based on Narrative Descriptions)

Student Outcomes	Number of Studies	Narrative Summary	Direction of Effect
Physical activity: moderate-to-vigorous intensity physical activity measured by accelerometers	5	Four studies noted increases among intervention group students. Differences were statistically significant in three studies.	Favors the intervention
Physical activity: step counts measured by pedometer	5	Three studies reported statistically significant increases in step counts.	Favors the intervention
Fitness measured by muscle strength and endurance tests or aerobic fitness testing	2	One study reported statistically significant improvements in some muscle strength and endurance tests, but neither study observed statistically significant differences in measures of aerobic fitness.	Inconsistent effects

Student Outcomes	Number of Studies	Narrative Summary	Direction of Effect
Cognitive function measured by standardized tests of attention	5	Four studies examined differences in attention function tests. Differences were not statistically significant.	Inconsistent effects
Academic achievement measured with standardized math or reading tests	4	Two studies reported no differences in math and reading test scores. One study found grade-dependent differences in reading scores. Another study reported greater math score improvements for students receiving 20 minute breaks compared to students receiving 10 minute breaks	Inconsistent effects
Classroom behaviors measured as the observed student time "on task," or through questionnaires or reports from teachers about student attitudes	11	Ten studies, including seven studies measuring observed student time "on task," reported favorable or favorable and statistically significant differences in student attention during lessons.	Favors the intervention

The team abstracted additional information from each of the studies included in the Masini et al. review, recategorized some of the studies based on intervention components, and examined absolute differences in the measures of physical activity. The team excluded six studies from the Masini et al. review as evaluations of physically active lessons (further considered in a separate CPSTF review [https://www.thecommunityguide.org/findings/physical-activity-classroom-based-physically-active-lesson-interventions]).

CPSTF considered evidence from the remaining 16 studies for classroom-based physical activity break interventions. Their conclusions were consistent with Masini et al. for all outcomes: physical activity (meaningful increases in both school day moderate-to-vigorous intensity physical activity and step counts), fitness (inconsistent effects), cognitive function (inconsistent effects), academic achievement (inconsistent effects on both reading and math test scores), and classroom behaviors (favorable).

Applicability and Generalizability Issues

Intervention settings

The CPSTF finding is applicable to primary school settings in the United States. Included studies were conducted in the United States (7 studies), Canada (2 studies), the United Kingdom (2 studies), Australia (1 study), the Netherlands (1 study), Poland (1 study), Macedonia (1 study), and Switzerland (1 study).

The Masini et al. review focused only on studies conducted in primary schools, so included studies provide no evidence on the potential effectiveness of physical activity break interventions in preschool, middle, or high school settings.

Population characteristics

The CPSTF finding is applicable to primary school students in the United States. Most of the included studies examined primary school students in grades 3, 4, or 5 (12 studies). The median age of study participants was 9.6 years, and 50.6% of participants were female.

U.S. studies that reported information about race and ethnicity included Black or African American students (median of 19.8% from 5 studies) and Hispanic or Latino students (median of 21.0% from 4 studies). The median proportion of students in study schools who were enrolled in a free or reduced lunch program was 47% (5 studies). None of the included studies reported stratified analyses for any of the considered outcomes based on these characteristics.

One study included in the review observed that student passive motor and verbal off-task behavior improved to a greater degree among students with low attention levels at baseline, suggesting that physical activity breaks improve student time "on task" among children at higher risk for inattention (Ma et al., 2014).

Intervention characteristics

The CPSTF finding is applicable to a range of intervention characteristics, though few studies provided specific information about the types of exercise or dance routines used. Evaluated physical activity breaks ranged from 1 to 3 sessions per school day, and from 4 to 20 minutes in duration. In 14 (88%) of the 16 studies evaluated by CPSTF, classrooms implemented breaks at least once every school day.

Data Quality Issues

The review team abstracted and evaluated the 16 classroom-based physical activity break studies using Community Guide methods. Study designs included randomized trials (9 studies), controlled before-after designs (3 studies), single group before-after designs (3 studies), and a post implementation evaluation (1 study). Only one study was rated as having good quality of execution; the remaining studies were rated as being of fair quality. Of seven studies reporting physical activity outcomes, six provided objective measurements using accelerometers (4 studies) or pedometers (2 studies). Common limitations included incomplete descriptions of the study population or intervention (12 studies) and potential for sampling bias in the selection and assignment of study schools and classrooms (12 studies). Nine of the 16 included studies were of less than 2 months in duration.

Potential Additional Benefits

The Masini et al. review did not report any additional benefits of physical activity break interventions. None of the included studies reported additional benefits. CPSTF did not postulate any additional benefits of these interventions.

Potential Harms

The Masini et al. review did not report on the presence or absence of potential harms. None of the included studies reported harms associated with the interventions. CPSTF notes that depending on the activity, temporary adjustments to classroom desks and chairs might be necessary to ensure that physical activity breaks are conducted safely and to accommodate children of all abilities.

Considerations for Implementation

The following considerations for implementation are drawn from studies included in the existing evidence review, the broader literature, and expert opinion from CPSTF, as noted below.

This CPSTF recommendation and the CPSTF recommendation for physically active lesson interventions [https://www.thecommunityguide.org/findings/physical-activity-classroom-based-physically-active-lesson-interventions], provide two evidence-based options to modestly increase students' physical activity during the school day, interrupt stretches of sedentary time, and improve some measures of student attention to lessons. Additional minutes of moderate-to-vigorous intensity physical activity accumulated through these strategies may also help students achieve the recommended 60 minutes of daily physical activity. Classroom-based physical activity interventions should be used to supplement, not replace, other school programs and policies to promote physical activity among students. These may include recess breaks and the following CPSTF-recommended interventions:

- Interventions to increase active travel to school [https://www.thecommunityguide.org/findings/physical-activity-interventions-increase-active-travel-school] (2016)
- Enhanced school-based physical education [https://www.thecommunityguide.org/findings/physical-activity-enhanced-school-based-physical-education] (2013)
- Combined nutrition and physical activity interventions in schools [https://www.thecommunityguide.org/content/summary-cpstf-findings-evidence-intervention-approaches-prevent-control-obesity-schools] (2018)

CPSTF recommendations support the priorities of CDC's Healthy Schools Guidance and Comprehensive School Physical Activity Program Framework [https://www.cdc.gov/healthyschools/physicalactivity/index.htm]. CDC provides the following program and intervention guidance:

- Increasing Physical Education and Physical Activity: A Framework for Schools [https://www.cdc.gov/healthyschools/physicalactivity/pdf/2019_04_25_PE-PA-Framework_508tagged.pdf] (2017)
- Strategies for Classroom Physical Activity in Schools [https://www.cdc.gov/healthyschools/physicalactivity/pdf/ClassroomPAStrategies_508.pdf] (2018)

The studies included in this review provided training for classroom teachers. Most also provided basic resources such as videos or web links to classroom-appropriate exercises and dance routines. Investigators in included studies noted several advantages of classroom-based physical activity break interventions including simplicity, teacher flexibility to fit breaks into the classroom schedule, and low resource requirements. Interventions should be scalable and the low resource requirements may appeal to school districts with limited resources.

Factors related to the implementation and sustained use of classroom-based physical activity break interventions include the following:

- Support teachers receive from school administrators
- The school system's level of comfort and buy-in
- Resources, time, and spaces available
- Goals of individual classes or courses

This review identified several free, publicly available resources that provide guidance on the implementation of classroom-based physical activity breaks:

- Move for Thought [https://educateiowa.gov/sites/files/ed/documents/1213_np_lt_MoveforThought_0.pdf] is an integrated physical activity strategy for learning in primary school classrooms.
- Active Academics® [https://activeacademics.org/?pid=20&homepage] offers classroom teachers practical physical activity ideas that can be integrated into regular classroom content areas.
- Springboard to Active Schools [https://schoolspringboard.org/classroomphysicalactivity/] provides professional development, technical assistance, and tools and resources for promoting physical activity in the classroom.
- Active Schools [http://www.activeschoolsus.org/] provides information on implementing physical activity in the classroom, including links to activity ideas and webinars and trainings for classroom teachers.

Evidence Gaps

CPSTF and Masini et al. identified several areas that have limited information. Additional systematic reviews could examine effectiveness for preschool, middle and high school students as the Masini et al. review did not consider these settings. Additional research and evaluation could help answer the following questions and fill existing gaps in the evidence base.

- What are the effects of classroom-based physical activity breaks on the following outcomes:
  - Proportion of students that achieve 60 minutes of moderate-to-vigorous intensity physical activity per day (objectively measured), as recommended in the 2018 Physical Activity Guidelines for Americans, 2nd edition [https://health.gov/sites/default/files/2019-09/Physical_Activity_Guidelines_2nd_edition.pdf]
  - Physical fitness, including aerobic fitness, muscle strength and endurance, flexibility, and body composition
  - Cognitive functions
  - Educational outcomes (e.g., lesson uptake)
  - Academic achievement (e.g., test scores and year-end grades)
  - Other student health outcomes
- How do intervention effects vary by participant characteristics, including student age and grade, household income, parents' education, and race/ethnicity in U.S. populations?
- What is the relationship between student time "on task" and cognition, educational outcomes, and academic achievement?
- How do intervention duration and frequency affect outcomes?
- What are barriers to teacher and school adoption and sustained implementation, and what are solutions to address them?
- How might physical activity breaks be tailored so they are developmentally appropriate, culturally relevant, and inclusive of students with disabilities?

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Disclaimer

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