Community Preventive Services Task Force

Behavioral and Social Approaches to Increase Physical Activity: Enhanced School-Based Physical Education

Task Force Finding and Rationale Statement

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Suggested Citation:

The Community Preventive Service Task Force (CPSTF). *Behavioral and Social Approaches to Increase Physical Activity: Enhanced School-Based Physical Education.* The Community Guide [www.thecommunityguide.org]. The Community Preventive Service Task Force, Atlanta, Georgia, 2013. https://doi.org/10.15620/cdc/168562

Task Force Finding and Rationale Statement

Intervention Definition

Enhanced school-based physical education (PE) involves curricular and practice-based changes that increase the amount of time that K-12 students engage in moderate- or vigorous-intensity physical activity during PE classes. Strategies include the following:

- Instructional strategies and lessons that increase physical activity (e.g., modifying rules of games, substituting less active games with more active games)
- Physical education lesson plans that incorporate fitness and circuit training activities

Program changes may include developing and implementing a well-designed PE curriculum and employing or providing teachers with appropriate training. Programs may be combined with other school- and community-based interventions such as student health education about physical activity, activities that foster family involvement, and community partnerships to increase opportunities for physical activity.

Task Force Finding (December 2013)

The Community Preventive Services Task Force recommends enhanced school-based physical education (PE) to increase physical activity based on strong evidence of effectiveness in increasing the amount of time students spend in moderate- or vigorous-intensity physical activity (MVPA) during PE classes. Enhanced school-based PE resulted in 10 percentage points more PE class time engaged in MVPA as compared with standard PE classes.

Rationale

Basis of Finding

The Task Force recommendation is based on evidence from a systematic review published in 2013 (Lonsdale et al., 14 studies, search period through March 2012). An updated search for evidence (search period January 2012-December 2012) did not identify any additional studies. This finding updates and replaces the 2000 Task Force recommendation on Enhanced School-Based Physical Education.

Evidence from the Lonsdale et al. review demonstrated that students who took part in enhanced school-based PE classes engaged in 24% more MVPA than students who took part in standard PE classes. Students receiving their standard PE lesson (control groups) spent 43% of their lesson time in MVPA; there was an estimated difference of 10 percentage points in favor of the intervention groups compared with the control groups. Thus, intervention groups spent a weighted mean of 53% of PE class time engaged in MVPA

All 14 studies included in the Lonsdale et al. review found that at the post-intervention assessment, students in the intervention group had participated in a higher proportion of MVPA time when compared with the control group. In 11 of the 14 studies, the difference was statistically significant ($p < 0.05$). In 6 out of 14 studies, the intervention group spent at least 50% of PE time engaged in MVPA, and across all studies the intervention group had more minutes of lesson time spent in MVPA than controls (weighted means of 17.8 vs. 14.4, respectively).

The Lonsdale et al. review identified two main types of enhanced PE interventions: (1) "teaching strategies," in which teachers learned ways to encourage MVPA through activity selection, class organization and management, and instruction (9 studies); and (2) "fitness infusion" in which teachers supplement students' participation in sport activities

(e.g., basketball) with vigorous fitness activities (e.g., running, jumping; 4 studies). One study did not provide enough information to determine the nature of the intervention. In all of the studies, the control condition involved standard PE. In subgroup analyses, both intervention types were found to be effective in increasing the proportion of PE class time students spent participating in MVPA.

- Students in the teaching strategies intervention condition were more active than controls (absolute difference = 6 percentage points). The weighted mean of the control groups was 45% of lesson time spent engaged in MVPA and, on average, students in the intervention condition spent 14% more PE time participating in MVPA than did controls.
- Students in the fitness infusion intervention condition spent more time participating in MVPA compared with students in the control condition (absolute difference = 16 percentage points). The weighted mean of lesson time MVPA in the control groups was 27%, suggesting students spent 61% more time participating in MVPA in the intervention condition relative to controls. Most of the fitness infusion studies added the fitness activities onto the last segment (~10 minutes) of the lesson.

Two studies reported more favorable student-level outcomes among students in intervention groups led by PE specialists, compared with classroom teachers, in terms of the amount of time students spent engaged in MVPA during class, and physical fitness levels, and motor skills.

Lonsdale et al. also conducted sub-group analyses to investigate the effects of age, gender, intervention duration, and outcome measurement. None of these factors appeared to moderate intervention effects.

Five of the included studies offered physical activity intervention components in addition to enhanced PE classes. Additional components included homework assignments, and family workshops aimed at increasing family involvement (4 studies), health education sessions outside of PE classes intended to improve knowledge about physical activity and develop behavioral self-management skills (4 studies), and partnerships with community agencies to increase opportunities for physical activity in the community (1 study).

Four of the 14 studies reported the effectiveness of PA-enhancing interventions on students' total physical activity (weekday and weekends). Two studies found statistically significantly higher levels of moderate- and vigorous-intensity physical activity among students in the intervention group when compared with the control group. Across these four studies, there were challenges ascertaining how PE lessons influenced total physical activity as they measured students' activity levels on days with and without PE classes. Also, three of the studies included other physical activity intervention components, such as activities to foster family involvement, classroom curricula emphasizing physical activity and healthy behaviors, and organizational changes within communities.

Three of the 14 studies reported the effectiveness of the intervention on cardiorespiratory fitness as a secondary outcome and showed mixed results. These three studies employed different outcome measures; the only significant favorable effect was seen among girls in one study.

Applicability and Generalizability Issues

Studies included in this review were conducted at schools in the United States (10 studies), the United Kingdom (2 studies), Australia (1 study), and Belgium (1 study). Studies were conducted with students in elementary school (grades 3 through 5; 7 studies), middle school (grades 6 through 8; 5 studies), and high school (grades 9-12; 2 studies). Eight of

the studies included a roughly balanced number of boys and girls; two studies included boys only; and four studies included girls only.

Most of the studies included between 1 and 10 schools; one study included 96 schools. The number of participants in the intervention conditions ranged from 15 to 12,500, with a median of 106. Control condition samples ranged from 18 to 12,500 students, with a median of 89. In several studies, physical activity data were only collected on a subset of students given the complexities and pragmatic issues related to objective measurement and direct observation of physical activity.

Some studies reported characteristics of the student population including urban versus rural settings, or students' race and ethnicity, or socioeconomic status (SES). Outcome analyses were not stratified based on these characteristics, however. None of the studies targeted or examined the effectiveness of the intervention on overweight or obese students specifically. Overall, the Task Force considers the evidence of effectiveness of enhanced school-based PE classes for increasing levels of MVPA to be applicable to all U.S. students.

Data Quality Issues

All of the included studies used experimental or quasi-experimental designs. Eleven studies employed a cluster randomized controlled trial (RCT) design, with randomization occurring at the school or class level. Other studies included an RCT design with treatment allocation at the student level; and two studies used non-randomized controlled trial designs. The control group in each of the included studies participated in a PE program; no studies compared an enhanced PE class to the absence of PE class.

Lonsdale et al. rated the risk of bias of each included study. Of the 14 studies, 5 were rated as having high risk of bias, 8 had moderate risk, and one had low risk of bias. The most commonly identified risks of bias were not clearly reporting or properly carrying out randomization procedures; not reporting or being adequately powered to detect changes in MVPA during PE class; and not having outcome assessors who were blinded to the intervention assignment. Additionally, only 5 of the 14 studies measured or accounted for baseline physical activity levels in the analyses. This is an important consideration when comparing effect sizes across studies.

Other Benefits and Harms

One included study found that enhanced PE significantly improved fundamental movement skills such as locomotor skills (e.g., kicking), balance skills, and ball skills (e.g., throwing, catching). Additional evidence also shows that participation in school-based PE may be associated with lower levels of stress and anxiety (Physical Activity Guidelines Advisory Committee, 2008), can positively affect concentration, memory, and classroom behavior among adolescents (Strong et al., 2005), and can improve standardized test scores or academic performance (Rasberry et al., 2011; Sallis et al., 1999).

No harms to students from enhanced PE classes were identified in the included studies or are reported in the broader literature.

Considerations for Implementation

School-based physical education can provide students with regular periods of active learning throughout childhood and adolescence. In the U.S., government agencies and public health organizations recommend a minimum of 150 minutes of PE class per week for elementary school students, and 225 minutes per week for secondary school students. It is also recommended that students engage in moderate- or vigorous-intensity physical activity for at least 50% of the time they spend in PE class (Institute of Medicine, 2013; CDC, 2011; National Association for Sport and Physical Education, 2011).

As defined by the Institute of Medicine, high quality PE provides students not only with time to be physically active, but also with opportunities to develop competence in a range of fundamental and specialized movement skills which can help foster physical activity throughout their lifetimes (Institute of Medicine, 2013). School-based PE also can enhance learning of helpful self-management skills, such as goal-setting, and rules and tactics of various games, as well as contributing to the social and emotional development of children.

For these reasons, PE classes need to be balanced with high levels of active learning and opportunities for instruction, feedback, and reflection (Institute of Medicine, 2013).

Enhancing the physical education (PE) curriculum to increase the amount of class-time students engage in MVPA is one component of a high quality PE program (Institute of Medicine, 2013). The interventions included in this review enhanced PE lessons by providing teachers with professional training, consultation, and materials that focused on class organization, management and instruction to increase activity and by supplementing the usual PE lessons with high-intensity activities. Program and practice changes can be implemented at all levels of jurisdiction, and without adding more classes or class time to existing schedules.

Increasing the frequency or duration of PE classes is another strategy for increasing children's total MVPA (Institute of Medicine, 2013). However these changes are typically instituted by state, district, and school-level policy makers. This review did not evaluate the effectiveness of policies designed to increase the amount of time that students spend in PE classes. Emerging evidence suggests that students within states or school districts with laws governing PE time take part in or receive more PE class time, however few studies have evaluated the effects of these policies on students' MVPA time or fitness (Chriqui et al., 2013).

Enhanced PE is often part of a comprehensive school-based physical activity program that includes recess, activity breaks, intramural sports, interscholastic sports, walk- and bike-to-school programs, staff wellness and involvement, or family and community participation. All of these opportunities can help children and adolescents achieve the recommended 60 minutes of MVPA daily (Institute of Medicine, 2013; U.S.Department of Health and Human Services, 2008).

The Let's Move! Active Schools [www.letsmoveschools.org] initiative provides guidance and resources for schools to help increase students' physical activity through: physical education, physical activity during school, physical activity before and after school, staff involvement, and family and community engagement. Resources include a Physical Education Toolkit developed by the Alliance for a Healthier Generation, a checklist to evaluate your PE program provided by the National Association for Sport and Physical Education, and school Activation Grants to establish and improve school physical activity programs. The CDC's Division of Adolescent School Health has developed a PE Curriculum Analysis Tool [www.cdc.gov/healthyyouth/pecat/] to help school districts and schools evaluate their PE curricula and assess how closely they align with national standards.

Evidence Gaps

There is a need for additional studies that examine the effectiveness of enhanced PE among various subpopulations including by sex, race and ethnicity, SES, and weight status. More research is also needed on the effects of physical education programs, including programs that use written standards-based curricula; have adequate time, equipment, and facilities; and are led by highly qualified, certified, or licensed teachers. Further research is needed on the effectiveness of enhanced PE from well-designed studies that reflect real world practices and account for potential confounding or mediating variables.

The data presented here are preliminary and are subject to change as the systematic review goes through the scientific peer review process.

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Document last updated January 27, 2014