Preventive Medicine 81 (2015) 67–72

Contents lists available at ScienceDirect

Preventive Medicine

journal homepage: www.elsevier.com/locate/ypmed

Implementing classroom physical activity breaks: Associations with student physical activity and classroom behavior

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ARTICLE INFO

Available online 19 August 2015

Keywords:
Children
Exercise
Low-income
School health

ABSTRACT

Objective. To investigate the relation of classroom physical activity breaks to students' physical activity and classroom behavior.

Methods. Six elementary-school districts in California implemented classroom physical activity interventions in 2013–2014. Students' ($N = 1322$) accelerometer-measured moderate-to-vigorous physical activity (MVPA) during school and teachers' ($N = 397$) reports of implementation and classroom behavior were assessed in 24 schools at two time points (both post-intervention). Mixed-effects models accounted for nested data.

Results. Minutes/day of activity breaks was positively associated with students' MVPA ($\beta s = .07–.14$; $ps = .012–.016$). Students in classrooms with activity breaks were more likely to obtain 30 min/day of MVPA during school (OR = 1.75; $p = .002$). Implementation was negatively associated with students having a lack of effort in class ($\beta = -.17$; $p = .042$), and student MVPA was negatively associated with students being off task or inattentive in the classroom ($\beta = -.17$; $p = .042$). Students provided with 3–4 physical activity opportunities (classroom breaks, recess, PE, dedicated PE teacher) had ≈5 more min/day of school MVPA than students with no opportunities ($B = 1.53$ min/opportunity; $p = .002$).

Conclusions. Implementing classroom physical activity breaks can improve student physical activity during school and behavior in the classroom. Comprehensive school physical activity programs that include classroom-based activity are likely needed to meet the 30 min/day school physical activity guideline.

Introduction

Public health authorities recommend that schools provide physical activity opportunities to help children meet the 60 min/day physical activity guideline (CDC, 2011; Koplan et al., 2005; Pate et al., 2006; PAG Midcourse Report, 2012; USDHHS, 2008). Elementary schools are recommended to provide children with ≥30 min/day of moderate-to-vigorous physical activity (MVPA) through a comprehensive approach that includes physical education (PE), recess, and physical activity opportunities in the classroom and before-and-after school (AAHPERD, 2013; CDC, 2011, 2013; Erwin et al., 2013; Koplan et al., 2005; Kriemler et al., 2011; Pate et al., 2006). Many schools provide insufficient physical activity opportunities, with students in some elementary schools receiving as little as 15–20 min of MVPA during school (Carlson et al., 2013; Turner et al., 2010).

Short classroom physical activity breaks are an increasingly common school intervention. Programs with evidence of efficacy for increasing student physical activity include CATCH (CATCH, 2015; Kelder et al., 2005), Instant Recess (Instant Recess, 2015; Whitt-Glover et al., 2011), TAKE 10! (Stewart et al., 2004; TAKE 10!, 2015), and classroom energizers (Mahar et al., 2006). However, more research is needed to understand the effectiveness of classroom physical activity breaks in real-world contexts where researchers are not involved in the intervention. Because some evidence suggests an association between classroom physical activity and on-task behavior (Mahar et al., 2006), it is also important to investigate the feasibility and impact of using classroom physical activity breaks as a behavioral management tool.

The primary aims of the present study were to investigate the relation of implementation of classroom physical activity breaks in six California school districts to (1) students' objectively assessed MVPA in school and (2) teacher-reported student behavior.

Methods

Intervention description

In 2013, The California Endowment issued a request for proposals to school districts across California. The objective was to fund districts to implement interventions to incorporate daily 10-minute physical activity breaks in the classroom,

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http://dx.doi.org/10.1016/j.ypmed.2015.08.006
0091-7435/

using their choice of an evidence-based program. Seven districts serving economically disadvantaged students across California were awarded $80,000–100,000 each during the 2013–2014 school year. Six of the seven funded districts participated in the evaluation.

Each district developed a plan unique to their district to support all classroom teachers from grades 1–6 in a minimum of two schools to implement at least one 10-minute physical activity break daily. Interventions began in early Fall 2013 and lasted the duration of the school year. Implementation strategies varied across districts, with primary components in all districts including appointing a district-level coordinator to provide teacher trainings, technical assistance, support groups, and materials specific to classroom physical activity breaks (e.g., handouts, instruction books, videos, websites). All but one district used an evidence-based program such as Instant Recess (2 districts) (Instant Recess, 2015; Whitt-Glover et al., 2011), TAKE 10! (1 district) (Stewart et al., 2004; TAKE 10!, 2015), and CATCH (2 districts) (CATCH, 2015; Kelder et al., 2005). The remaining district used an evidence-informed program they had previously developed and pilot tested.

Participants

Time 1 data collection occurred in the Fall of 2013, after the interventions began due to the timing of the district implementation plans and stipulations of the grant funding. Time 2 data collection occurred in Spring 2014. Time 2 assessments were conducted to assess intervention maintenance and improve measurement precision by having multiple assessments per classroom. Twenty-four elementary schools from the six participating districts were recruited into the study. Each district selected 4–5 schools for evaluation where implementation was most extensive, with the exception of two districts that had only 2 or 3 elementary schools. At least one liaison was appointed in each district to assist with student recruitment and physical activity assessments. For the physical activity assessments, up to 5 classrooms per school (approximately 1 per grade from grades 1–6) were selected by school liaisons to be fairly representative of the school population.

Students who provided assent and parental consent were eligible to participate. Each classroom had a goal of recruiting 15 students. A total of 1322 students from 97 classrooms were enrolled at Time 1 (Mean = 13, SD = 4.7, students per classroom). All classroom teachers of grades 1–6 were asked to participate in the teacher survey, and a total of 397 teachers provided informed consent and were enrolled at Time 1 (this sample included the 97 classroom teachers involved in the physical activity assessments). Retention rates for Time 2 were 90.2% (student physical activity assessments) and 92.9% (teacher surveys). This study was approved by the sponsoring university's human subjects protection committee. The authors have no conflicts of interest.

Measures

Student physical activity at school

Waist-worn Actigraph GT3X+ accelerometers were used to assess children's physical activity during school (Welk et al., 2007). School liaisons received online training from research staff and were mailed standardized protocol materials and accelerometers to fit on approximately 15 students/class from 5 classes/school. Each class was selected by the liaison and assessed during what liaisons reported as a typical school week. The same students wore the device on the same day of the week at each time point. Fall 2013 assessments occurred between mid-October and early-December, and Spring 2014 assessments occurred between mid-March and early-May, with two schools completing assessments each week and school order matched between time points. Liaisons completed logs to record the device number and on/off time for each device, and this information was used to eliminate nonwear time from the data. Accelerometer counts were recorded at 5-second epochs with the low frequency extension applied. Minutes of MVPA during school were calculated using the Evenson cut points scaled to the 5-second epoch (Evenson et al., 2008; McClain et al., 2008). At least 240 min of valid wearing time, with nonwear time defined as ≥60 min of consecutive 0 counts, was required for a student's data to be included in the analysis.

Teacher survey

The week following accelerometer data collection (at both time points), teachers were sent a brief survey. A majority of teachers completed the survey within one week, and responses were not analyzed if received after 4 weeks. The survey assessed basic characteristics (gender, age, years teaching, class size), information on implementation of classroom physical activity breaks, other physical activity opportunities, benefits of physical activity breaks, and students' classroom behavior. The survey questions were the same across time points except for the "benefits of classroom breaks" items, which were only asked at Time 2.

Classroom physical activity breaks. Physical activity breaks were defined as 10-minute blocks of structured physical activity that were incorporated into instructional time by classroom teachers. Questions were all specific to the current (2013–2014) school year, and asked: Have you been encouraged to hold classroom physical activity breaks? Have you been trained to hold classroom physical activity breaks? Have you ever held classroom physical activity breaks? Have you held classroom physical activity breaks in the most recent school week? How many breaks/week and minutes/break did you provide in the most recent school week? The last question was used to calculate physical activity break minutes/day (number of breaks/week × average minutes/break ÷ 5). All other questions had yes/no response options.

Other physical activity opportunities. Three questions were asked: During a typical week, how many minutes of (1) PE do you provide for your students, (2) PE does a PE teacher provide for your students, and (3) recess do your students receive? Response options were: None, 1–29, 30–59, 60–89, and 91+. For some analyses, responses were dichotomized.

Students' classroom behavior. Ten questions were adopted from the 60-item Classroom Behavior and Assets Scale to assess teacher-reported classroom-level student behavior (Lee et al., 2009). Questions included four asset items reflecting positive behaviors (items 1–4), and six problem behavior items (items 5–10) covering attention problems, social withdrawal, antisocial behavior, and low motivation (see Table 3 for items). The ten items were chosen because of their hypothesized association with physical activity, based on findings from previous studies (Mahar et al., 2006; Barros et al., 2009). Response options were 0 (0 students), 1 (1–2 students), 2 (a few students), 3 (about ¼ of the class), 4 (about ½ of the class), 5 (about ¾ of the class), 6 (most of the class), and 7 (all of the class). Item scores were averaged to create an Asset Scale (alpha = .85) and Problem Behavior Scale (alpha = .87).

Benefits of classroom physical activity breaks. At Time 2, eight questions were developed for this study to assess the teachers' perceptions of the impact of physical activity breaks on student enjoyment, classroom behavior and performance, and health. Response options ranged between 1 (strongly disagree) and 5 (strongly agree) and were dichotomized as agree/strongly agree vs. neutral or disagree/strongly disagree. An 8-item (overall) and a 4-item classroom (behavior/performance) index were computed by summing the number of benefits rated as agree/strongly agree.

Free and reduced price lunch eligibility

School names were matched with the state's Department of Education data to identify the percent of students eligible for free or reduced-price lunch, which was used as a proxy-measure for school socioeconomic status (SES) (CA Department of Education, 2013).

Statistics

Descriptive statistics were calculated at the student, teacher, and school levels. All models employed random intercepts mixed-effects regression to account for the nesting of students within classrooms and/or teachers within schools and were adjusted for district as a fixed effect. Time point (Fall and Spring) was entered as a repeated effect, with the exception of the benefits analyses because benefits were only asked at Time 2. The relation of teacher-reported implementation factors to student MVPA was assessed by regressing student MVPA on six implementation variables. Because of collinearity among the implementation variables, separate models were used. The relation of physical activity to classroom behavior was assessed by regressing the classroom behavior items and scales on teacher-reported implementation in the past week (y/n), as well as on student MVPA, which was averaged at the classroom level. Teacher-reported benefits of physical activity breaks were compared between implementers and non-implementers by regressing the benefits items and scales on teacher-reported implementation in the past week (y/n). To assess the impact of multiple physical activity opportunities on student MVPA, dichotomous variables were created at the teacher level for time in PE, recess, and physical activity breaks, as well as whether there was a dedicated PE teacher. Cut points to create the dichotomous "physical activity opportunities" variables