Evaluation of Resources for Physical Activity in the Classroom: A Mixed Methods Pilot Study

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Abstract

In 2007 the Oregon Legislature passed a policy requiring students receive a minimum weekly amount of physical activity in school: 150 minutes for elementary and 225 minutes for middle school students. However, no implementation guidance for teachers or school districts were included in the policy. This pilot study examines the differences between teachers using a single paid curriculum versus various free or readily available resources to implement physical activity.

Fifteen elementary-level classroom teachers (8 intervention, 7 control) engaged in the study. Intervention teachers received access to Focused Fitness Curriculum; control teachers used already available resources, representing treatment as usual. Researchers administered teacher surveys, classroom activity logs, classroom observations, and teacher interviews to look at activities conducted, time in physical activity, and teacher perceptions.

The average duration of physical activity was almost double in the control group compared to the intervention group. Additionally, the control group maintained small increases in activity level throughout the semester, while activity levels of the intervention group fell. However, the treatment group had higher average activity levels and student participation.

The treatment group, using the paid curriculum, was not better than the control group. Both groups saw positive outcomes of students engaging in physical activity. Rather than one set curriculum, the more important factors are providing support and flexibility for implementation.

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Introduction

Childhood obesity is a complex problem that requires a comprehensive solution. One emerging strategy is to incorporate physical activity in the classroom (Benden, Zhao, Jeffrey, Wendel, & Blake, 2014). Youth spend significant time in school, so by emphasizing physical activity throughout all aspects of their day, including in the classroom, they can live a healthy, active lifestyle (Kaphingst & French,

2006). Creating healthy habits early is important as health status during childhood and adolescence is linked to health across the lifespan. Poor health during childhood can have long-term impacts through adulthood (Forrest & Riley, 2004).

While physical education (PE) is typically thought of as the primary source of physical activity during the school day, implementing classroom-based physical activity is another successful strategy to increase energy expenditure among students (Stewart, Dennison, Kohl & Doyle, 2004). To date, a variety of physical activity interventions have been implemented in classrooms. The goals of these interventions are two-fold: 1) improve child health through increased energy expenditure and 2) improve student attention and other academic outcomes (Sallis et al, 1999). Some require specialized equipment such as standing desks or exercise balls, while others focus on integrating movement into academic lessons, or conducting activity breaks throughout the day between lessons (Benden et al., 2014; Stewart, Dennison, Kohl, & Doyle, 2004; Mahar et al., 2006; Scruggs, Beveridge, & Watson, 2003).

Despite the growing support for implementing physical activity in classroom settings, many barriers prohibit school uptake, such as lack of infrastructure, low priority for physical activity in the classroom, and insufficient direction regarding implementation expectations (Dwyer et al, 2003). One method of addressing these barriers is through policies that build a foundation for active learning environments (Centers for Disease Control and Prevention, 2017). Frequently, the locus of control for policy development and implementation is at the school district level, which means the policy only affects schools within that district (Story, Nanney, & Schwartz, 2009). In addition, those policies vary in effectiveness because they do not always meet recommended guidelines. State-level policies are another strategy to implement changes; however, these policies are difficult to adopt and even harder to enforce (Slater, Nicholson, Chiriqui, Turner, & Chaloupka, 2012; Belansky et al., 2009).

Oregon House Bill 3141

In 2007, Oregon enacted one of the premier policies related to school-based physical activity, House Bill (HB) 3141 (Oregon State Legislature, 2007). This Bill requires that elementary students participate in 150 minutes and middle school students participate in 225 minutes of physical activity each week (Oregon State Legislature, 2007). While PE classes make up a significant portion of this time requirement, time spent in PE is not enough to meet this standard. Therefore, classroom teachers must also set aside time for physical activity.

While the policy provided standard metrics for all schools to meet, it did not specify guidelines for policy implementation. Each district determined how to fulfill the policy. This lack of guidance is a common problem with legislation in schools (Belansky et al., 2009). A policy analysis conducted in 2013 looked at all state legislation governing physical activity in schools across the United States; none include implementation guidelines (Carlson et al., 2013). The absence of guidance results in schools not having an effective strategy for implementation, or understanding best practices that could apply to their settings. This lack of understanding can lead to implementation of ineffective programs.

The Intervention: Oregon Kids Move with Heart

To aid in the execution of HB 3141, the American Heart Association (AHA) created the Oregon Kids Move with Heart program, which focused on adopting best practices to meet the physical activity standards. The program was implemented with a large school district in northwest Oregon from February 2016 to August 2017. Through the program, AHA provided professional development workshops and technical assistance for teachers regarding implementation of the physical activity guidelines. The first Oregon Kids Move with Heart teacher workshop, held in August 2016, was facilitated by a physical activity curriculum trainer. In initial training satisfaction surveys, teachers gave

positive feedback and stated that they intended to use the information. However, because the training used a specific curriculum, schools had to commit monetary resources to continue its use. As a result, the AHA and district leaders desired more information regarding the effectiveness of this type of paid resource in classrooms.

Through this pilot, researchers sought to answer the question: *Was providing teachers access to a licensed physical activity curriculum (Focused Fitness Brain & Body Boosts) more effective than teachers accessing free or readily available resources to implement classroom activity breaks?*

Methods

To conduct the pilot, AHA worked with researchers at Texas A&M University to evaluate the implementation and outcomes of the program from January-June 2017. Participating teachers were randomly assigned to an intervention or control group, then asked to implement physical activity in their classrooms using Focused Fitness Brain & Body Boosts (intervention group) or resources of their choice that were already available (control group). Evaluators aimed to assess whether the free, readily available resources or licensed physical activity curricula were more useful for implementing physical activity in the classroom. This study was approved by the Texas A&M University Institutional Review Board.

Participants

Due to the short timeline and exploratory nature of the study, a convenience sample of elementary-level (kindergarten-5th grade) classroom teachers (n=15) was recruited from the school district. Teachers were assigned to intervention (n=8) and control (n=7) groups. Four teachers (3 intervention, 1 control) dropped, resulting in 11 teachers (5 intervention, 6 control) completing the pilot.

To assess the similarity of intervention and control groups, teachers answered a survey including demographic information. Groups were similar regarding demographic factors including age, sex, race, education, and teaching experience. Table 1 details comparisons of intervention and control groups.

Table 1. Demographics of Classroom Teachers in the Oregon Kids Move with Heart Pilot Study

Demographics	Control (n = 7)	Intervention (n = 8)
Age (years)		
Minimum	25	23
Maximum	46	50
Mean (SD)	34 (6.5)	33.5 (9.5)
Sex		
Male	0%	0%
Female	100%	100%
Race		
White	100%	87.5%
Other	0%	12.5%
Education		
Bachelor's Degree	14.3%	37.5%
Master's Degree	85.7%	62.5%
Time at Current School (years)		
Mean (SD)	4.4 (3.3)	7.1 (9.6)
Median	3	2.5
Time in Education (years)		
Mean (SD)	11 (5.7)	9.9 (8.1)
Median	9	6.5

Data Collection Procedure

Intervention teachers were provided access to the Focused Fitness Brain & Body Boosts curriculum to use during physical activity breaks in their classrooms (Focused Fitness, 2017). Resources were available through an online system and consisted of ready-to-use videos. The curriculum included lessons on a variety of topics encompassing both physical activity and nutrition. Activity cards and visuals were available to aid in implementation. Teachers had the ability to mix and match a playlist of various activities, depending on their needs. The program

was intentionally flexible to allow each teacher to choose the exercises that worked best in their classroom. In addition to the online resources and the initial workshop available to all teachers prior to the pilot study, intervention teachers were trained on Focused Fitness resources at the beginning of the pilot, January 2017. The AHA paid for the licensing of the curriculum for the duration of the pilot.

Control teachers implemented physical activity in their classrooms using lessons from a variety of free or previously used resources, which they selected at their own discretion. The control group was meant to act as "treatment as usual," in which teachers were free to find and implement whatever resources they wanted. This illustrates what would happen state-wide, since Oregon HB 3141 includes no guidance on evidence-based resources (Oregon State Legislature, 2007).

Instrumentation and Analysis

This study utilized three data collection tools including: 1) classroom activity logs, 2) classroom observations, and 3) teacher interviews. Multiple data sources (both qualitative and quantitative) allowed evaluators to triangulate information and develop a comprehensive understanding of intervention implementation and short-term outcomes.

Classroom activity logs. Teachers completed self-reported classroom activity logs to document their classroom physical activity breaks. Logs were collected during three one-week time periods in January, March, and June 2017 and entered online using a Qualtrics© survey link provided by the evaluators (Qualtrics, 2017).

During the selected weeks, teachers recorded the following for each day: number of physical activity breaks, length of each break, a description of each break, and the perception of activity level (i.e., light, moderate, or vigorous). Researchers coded entries to reflect all activities for each day; therefore, some days were coded as more than one category if teachers reported multiple activities.

During analysis, activity duration was transferred from ratio to interval data to better organize the findings. Reported time for 5 or fewer minutes was coded as 5 minutes, more than 5 but less than 10 minutes was listed as 10 minutes, and more than 10 minutes was changed to 15 minutes. This was done because the original survey was in interval notation in which the teachers could select durations based on <5 minutes, 5-10 minutes, 10-15 minutes 15-20 minutes, and >20 minutes.

Classroom observations. Researchers developed an observation tool using the Systems for Observing Fitness Instruction Time (SOFIT) tool as the basis to develop a tool specific to this intervention and setting (McKenzie, Sallis, & Nader, 1992). Time and staffing limitations prevented evaluators from using the tool in its entirety. While the domains and concepts assessed in SOFIT were used, researchers made modifications for the observer to note the overall classroom environment and student engagement with an estimation of the percentage of students taking part in activities rather than observing a few students individually. For each activity, the observer recorded the duration of the activity, the percentage of students taking part at one time, activity goal, description of activity, and activity level. Duration was reported as minutes of physical activity. Options for the activity goals were fitness, skills, knowledge, and social/emotional development. Activity levels were light, moderate, or vigorous based on the classification of more than half of class time (McKenzie et al., 1992). Open-response questions were included to collect data about the teacher's interaction and involvement with the students. A guide including key terms and definitions was provided with the observation form.

Observations were conducted in March 2017 by an AHA staff member, trained by the evaluators prior to data collection. The AHA staff member scheduled the observations based on each teacher's schedule. The observer was in the class 5 minutes before and stayed 5 minutes after the activity break. This was done to understand

the transition in and out of the break along with observing students' attitudes and behaviors. Observation data was recorded using a data collection template.

The observer calculated the duration of each activity break and estimated the percent of student participation for each activity. Researchers thematically analyzed open-ended questions where the observer described factors such as teacher participation, transitions between activities, and the transition back to academic lessons at the end of the physical activity break.

Interviews. Lastly, qualitative interviews were conducted with both intervention and control teachers. Interview guides were developed using the Consolidated Framework for Implementation Research (CFIR), which comprises 5 domains: intervention characteristics, outer setting, inner setting, characteristics of individuals, and process (Damschroder et al., 2009). Questions were developed to assess the domains and sub-constructs of the framework to ensure a comprehensive assessment of the implementation process. The question set included 13 questions. Slight adaptations were made to wording for the intervention and control groups. Interview questions are listed in Table 2.

Three trained evaluators conducted the interviews in-person at each teacher's school, over a three-day period in May 2017. Interviews lasted between 10 and 30 minutes. During each interview, one teacher and one to three evaluators were present. Participants signed a consent form, and all agreed to be audio recorded. An outside

Table 2. Teacher Interview Questions for Oregon Kids Move with Heart Pilot Study.

	Interview Questions	
1.	Are you a classroom teacher or a physical education teacher?	
2.	Why did you decide to participate in the Oregon Kids Move with Heart project?	
3.	What outcomes did you expect when you decided to participate in the project? What outcomes did you see?	**Intervention Characteristics**
4.	Did you have to tailor the activity breaks or Focused Fitness programs to your classes?	
5.	While implementing the intervention, did you make any changes after you started to see some of the results?	
6.	Have any parts of your intervention been difficult to implement? If so, what parts?	
7.	What are your thoughts on the activity break or Focused Fitness Materials?	
8.	Do you need any other resources or training to implement physical activity in your class more effectively?	
9.	Were you able to get all of the support/buy-in from the students? School Administration?	**Process**
10.	Did things go as you planned when you implemented the activity breaks or Focused Fitness intervention?	
11.	Did you have any unexpected outcomes and if so, what were they?	
12.	Have the results of the Oregon Kids Move with Heart project been shared with any other teachers or staff?	
13.	Is there anything else that you would like to tell us about this program and your experience?	

transcription firm transcribed recordings with a signed confidentiality agreement.

To analyze the interviews, two members of the evaluation team, each with graduate-level training in research methods, conducted a thematic analysis using an open coding scheme to identify emergent codes. This method of data analysis is ideal for identifying themes that emerge from the data that help to describe and explain the phenomena being researched (Fereday & Muir-Cochrane, 2006). During the thematic analysis, members of the research team independently identified common themes throughout the interviews, and then converged findings with other coder to find common themes that emerged across interviews.

Results

For clarity, the results are presented according to each of the three evaluation tools.

Classroom Activity Logs

Evaluators analyzed the Classroom Activity Logs to assess the teacher reported number, duration, activity type, and activity level of activity breaks. See Table 3 for the full results including breaks per day, duration, activity curriculum source, and activity level. When looking at the number of activity breaks, the intervention group decreased from January to March but then increased to the beginning average in June. The control group had an opposite fluctuation. Both groups had similar averages hovering around two breaks per day.

Activity break duration decreased in both groups from January to March. From March to June, the intervention group plateaued in activity break duration whereas the control group increased and exceeded the beginning average duration. The control group activity breaks were 2-3 minutes longer, on average, compared to the intervention group.

Most intervention classrooms' activities came from Focused Fitness Brain & Body Boosts while control teachers mainly used GoNoodle as it was a familiar program already used in many classrooms. Activity levels (low, medium, and high) for the intervention group spiked from January to March and then tapered off. The control group stayed consistent with a small increase throughout the semester. Because the average activity level is less than 2 (1=low, 2=medium, 3=high) in both groups, the average class did not move from low activity level to moderate activity level, though there was a trend

Table 3. Activity Break Characteristics Based on Classroom Activity Logs for the Oregon Kids Move with Heart Pilot Study.

		Intervention			Control		
		January (n = 5)	**March (n = 3)**	**June (n = 3)**	**January (n = 3)**	**March (n = 4)**	**June (n = 2)**
Breaks per Day		2.045	1.53	2.07	1.93	2	1.8
Duration (minutes)		5.23	5	5	7.67	7.31	7.78
Activity Curriculum Source	(BB)	44	24	29	0	0	0
	(GN)	0	0	0	14	23	16
	(Own)	1	5	0	15	1	2
Activity Level		1.5	1.79	1.72	1.6	1.62	1.67

Key:
Activity Curriculum Source: BB=Brain & Body Boosts, GN=GoNoodle, and OWN=teacher created
Activity Level: 1 = Low, 2 = Moderate, and 3 = High

to more moderately intense breaks as the semester progressed. The intervention group had a higher average activity level overall.

Classroom Observations

Based on classroom observations, the average duration of physical activity was almost double in the control group (7.9 minutes, sd=3.04), as compared to the intervention group (4.7 minutes, sd=2.22). However, student participation was higher in the intervention group (98.9%, sd=1.64) compared to the control group (93.4%, sd=13.09). The observer reported that many of the teachers in the control group demonstrated the activities for the class, and only a few seconds were used to transition from one activity to another. All intervention teachers were reported as participating in the activities with the students. While intervention classroom students were engaged in activities, a few expressed discontent in doing "the video" exercises again. Students reengaged in academic lessons quickly after the activities in both intervention and control groups.

Interviews

Seven of the 15 originally engaged classroom teachers (three intervention, four control) agreed to participate in interviews. The main emergent themes revealed through qualitative analysis included: 1) teacher expectations, 2) outcomes, 3) curriculum perceptions, 4) challenges, and 5) support from administration.

Teacher expectations. Teachers had several main expectations in implementing classroom activity breaks; responses were similar among intervention and control groups. Two teachers (one intervention, one control) expected students to move more. Three teachers (one intervention, two control) expected academic outcomes like increased focus and the readiness to learn. One teacher said:

> I want them to have their brains ready to learn, brains ready to be engaged. So, we talk about how sometimes if we're focusing too long on one thing, we lose interest, or we lose stamina… so my goal for my students, all the time, with brain breaks is to be able to give them the break that they need to be able to refocus on what the next academic task is.

Outcomes. As a result of activity breaks, five teachers (one intervention, four control) observed increased student focus. Teachers also reported unexpected outcomes ranging from behavior changes (two intervention, two control), students enjoying the activities (one intervention, two control) and building student confidence (two intervention, one control). Regarding increasing student confidence, one teacher appreciated seeing students differently, stating, "Maybe they weren't great at the subject that you're teaching… but then they had something else they were good at."

The teachers (two intervention, two control) who found that breaks throughout the day influenced students' behavior in class observed that when students expended energy through activity breaks, they were calmer with less anxiety and fidgeting. It also surprised teachers that students liked the activities. Ultimately, the students came to expect the activities with one teacher stating, "and then the students got used to it and that was their routine. In fact, when we didn't have it, 'Aren't we going to take a break?' Kept me on my toes…" Two intervention teachers found that if they modeled the behaviors, and encouraged and guided the students through the activities, they were more willing to participate and were more excited about breaks.

Curriculum perceptions. Both intervention and control teachers expressed positive and negative thoughts on their respective curricula/ resources. Two teachers in the intervention group liked the Focused Fitness Brain & Body Boosts specifically because of the ease of creating playlists of various lengths and activity levels. One teacher said:

> …I found that making my playlist was a little bit less distracting than some of the premade ones that they had. Some of the premade ones were just a little more of that cheesy factor that made the kids distracted by the

movements rather than actually getting to the exercise.

However, two teachers that were in the intervention group said that Brain & Body Boosts needed better music to accompany the videos.

On the other hand, four control teachers enjoyed the ease of having access to a variety of exercises though GoNoodle that broke up the monotony of conducting the same activities every day. Two teachers expressed that the school district should buy the license for GoNoodle to have access beyond the free resources. They said they liked the free activities but desired the variety and customization that is offered with a paid subscription.

Challenges. Teachers experienced challenges based on a variety of factors including space and classroom structure and transitioning back to regular class lessons. Three teachers (two intervention, one control) expressed that the main difficulties they encountered regarded classroom size, time, technology, and demonstrating the moves; essentially classroom structure. One teacher stated:

> Just sometimes remembering to, even though it's in the schedule, sometimes we get busy doing things and I forget that, oh yeah, we've got to take our break… I'm just like, I got to get this stuff done, or we got to learn this. Nope, we got to take a brain break.

Four teachers (two intervention, two control) echoed the sentiment that transitioning to breaks and then back to normal class made implementation difficult in the beginning, but this improved over time. One teacher shared that:

> In the beginning, it was really hard to get the kids up and in spots and then to get them to calm down and go back to work. And now that it's kind of part of their routine, they know what to do, they know the exercises.

Support from school administration. Teachers from both groups (two intervention, two control) voiced that administrators from the schools need to not only support the consistent use of breaks in the classroom but also communicate this support.

> Our administrator is very supportive of it. She's really happy to see the kids doing it, but maybe if I think all staff knew that they had that approval, because I can imagine being in a previous school, if my administrator had walked in and seen us, he'd be like, 'Ah, what are you doing?'

Discussion

The intent of this pilot study was to determine whether providing access to a licensed physical activity curriculum (Focused Fitness Brain & Body Boosts) was more effective than teachers accessing free or readily available resources to implement classroom activity breaks for successful fulfillment of Oregon's HB 3141 (Oregon State Legislature, 2007).

The quantitative findings help to build the case for what interventions are helpful and how they are implemented, but the qualitative findings speak to the bigger picture of the benefits of physical activity in schools, and barriers to implementation. While the study had positive outcomes related to the intervention group, the control group was found to be equally beneficial. It is possible that an increased focus on physical activity through contact with the AHA and evaluators was enough to give the perception of increased support for physical activity in the classroom.

Many studies have found that classroom activity breaks are beneficial for students to not only increase physical activity but also improve focus and classroom behavior (Stewart, Dennison, Kohl & Doyle, 2004; Mahar et al, 2006; McNaughten & Gabbard, 1993). However, fewer studies have looked at intervention sources. This study shows that teacher's using a variety of readily available resources to implement classroom physical activity can be as effective as using a licensed curriculum in increasing student physical activity through activity breaks.

In this case, although a specific intervention was not prescribed to the control group, most

control teachers turned to the same free resource, GoNoodle, which was already familiar to teachers in the school district. This resulted in what could retrospectively be considered two separate intervention groups, as opposed to one intervention and one control group. Ultimately, both groups were effective in maintaining activity breaks throughout the semester. In fact, the control group experienced fewer teachers dropping out of the pilot and longer activity breaks, on average.

Overall, there was a large difference in the number of total minutes of physical activity in intervention versus control classrooms (number of breaks X number of average minutes/break). The intervention group completed an average of 7.65-10.7 minutes while the control group completed an average of 14.0-14.8 minutes of activity/day depending on the time of the semester. Activity levels of low-to-moderate activity remained similar throughout the semester for both the control and intervention groups. Based on the data, the licensed curriculum was not significantly better than the alternative. Instead, teachers who used other resources implemented breaks and for a longer duration. However, if these rates (regardless of the types of resources) were to stay constant over the entire week, students would accomplish approximately 38-74 minutes of physical activity during classroom time alone. This would contribute considerably to fulfilling the requirements of HB 3141.

Conclusion

The data indicates that the more important factor may not be providing one set curriculum, but providing a variety of options so that teachers feel they have enough variety to keep students engaged, but it is also important to have enough structure that implementing activity breaks does not become a burden. Further investigation with a variety of tools and resources will be necessary to fully understand this relationship.

Limitations

The results presented in this paper represent a small-scale pilot test performed in one school district in Oregon. As a result, the findings may not be generalizable to other locations or other states. More research must be conducted in various settings, with a variety of curricula to fully understand the best methods and required resources for implementation of effective classroom activity breaks. In addition, evaluators were limited to a convenience sample of teachers, who volunteered to participate in the study. This could introduce selection bias, as the teachers who volunteer could be more likely to implement physical activity in their classrooms compared to teachers who did not volunteer for the study. Last, a few teachers dropped out of the study. While the evaluators requested information as to why teachers dropped out, which usually centered on a lack of time and too much burden, this poses a potential issue with wide-scale implementation. If pilot teachers did not want to implement the activity breaks, then other teachers across the state may feel similarly, which would make wide-scale implementation difficult.

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