Journal of Education and Practice
ISSN 2222-1735 (Paper) ISSN 2222-288X (Online)
Vol.6, No.15, 2015

Promoting Physical Activity in Elementary Schools: Needs Assessment and a Pilot Study of Brain Breaks

Thushanthi Perera
Linus Pauling Institute, Oregon State University
307 Linus Pauling Science Center, Corvallis, Oregon, 97331, USA
E-mail: pererah@onid.oregonstate.edu

Simone Frei
Linus Pauling Institute, Oregon State University
307 Linus Pauling Science Center, Corvallis, Oregon, 97331, USA
E-mail: simone.frei@oregonstate.edu

Balz Frei
Distinguished Professor
Linus Pauling Institute, Oregon State University
307 Linus Pauling Science Center, Corvallis, Oregon, 97331, USA
E-mail: balz.frei@oregonstate.edu

Gerd Bobe*
Linus Pauling Institute, Oregon State University
307 Linus Pauling Science Center, Corvallis, Oregon, 97331, USA
E-mail: gerd.bobe@oregonstate.edu

Abstract
A sedentary life style contributes to many chronic diseases and poor educational performance. Since elementary school-aged children spend most wakeful hours in school, classroom teachers are essential for providing physical activity (PA) breaks during school. As first objective, we assessed current PA levels for Oregon public elementary schools (379 schools responded) and learned that 92% of schools did not meet the physical education recommendation of the U.S. Centers of Disease Control and Prevention (CDC). As second objective, we evaluated teacher's preferences for increasing students' PA levels with a cross-sectional anonymous mail survey (116 teachers responded) and learned that teachers were concerned about students' PA levels (84%) and interested in incorporating short PA breaks into their classroom curriculum (88%). As third objective, a follow-up survey was mailed to teachers along with the exercise DVD "Brain Breaks: Classroom Fitness for Children" that provides 5-7 minute PA segments (43 teachers responded). Teachers perceived that Brain Breaks provided students a beneficial amount of PA (86%) and improved their concentration (91%); teachers intended to continue using Brain Breaks (91%). In conclusion, short PA breaks during the school day is a promising method for promoting increased levels of PA in elementary schools.
Keywords: Elementary school teachers, Physical activity, Preferences, Current status

1. Introduction

Physical inactivity is one of the leading causes of the childhood obesity epidemic in the U.S. (Ogden et al., 2012; Fakhouri et al., 2013) and can negatively impact academic achievement and cardiovascular disease risk factors in elementary school-aged children (Juonola et al., 2013; Haapala et al., 2014; Väistö et al., 2014). Children spend most wakeful hours in school and many children have only limited opportunities for being physically active outside of school. A recent study linked childhood obesity to length of structured and unstructured physical activity (PA) in U.S. schools (Cawley et al., 2013). Providing structured and unstructured PA during the school day can improve academic achievement and prevent chronic diseases (CDC, 2011; Juonola et al., 2013). Most U.S. states, including Oregon, do not mandate a minimum length of physical education (PE) for elementary school children or a daily minimum of other PA breaks such as recess (National Association for Sport and Physical Education [NASPE] & American Heart Association, 2012). Since No Child Left Behind (NCLB) was enacted in 2001, the length of PE in elementary schools decreased from 145 to 105 minutes per week in 2007 (McMurrer, 2007). Furthermore, the length of recess decreased from 183 to 133 minutes per week (McMurrer, 2007). To promote PE at school, Oregon has passed legislation that requires at least 30 minutes per day of PE for elementary school children to be implemented by 2017-2018 (Oregon House Bill 3141, 2007); currently only 3 states have such legislation (NASPE & American Heart Association, 2012).

Given this context, the three objectives of this study are to 1) assess PA in Oregon elementary schools (Physical activity survey), 2) to identify classroom teachers' preferences on how to increase PA levels for their

students (Classroom teacher survey), and 3) to provide and evaluate an exercise DVD that accommodates their preferences (Brain Breaks survey). To our knowledge, no quantitative assessment and teacher survey about PA in elementary schools has been done in any U.S. state.

2. Materials and Methods

2.1. Physical activity survey

We phoned between April and May 2012 all 432 elementary schools listed in the 2010-2011 Oregon public school directory. Each public elementary school was phoned at least three times and 379 schools responded (88% response rate). We asked 5 questions: How often per week is PE taught? How many minutes is a PE class? Who teaches PE (classroom teacher, PE teacher, both, teaching assistant)? How many minutes is recess per day? Do you have any additional comments?

2.2. *Classroom teacher survey*

The study was reviewed and approved by the Oregon State University Institutional Review Board (IRB protocol number 4953 "Childhood Nutrition and Exercise in Elementary Schools"). After receiving written approval from school district (we had mailed all Oregon school districts the study information) and school principals, packages that contained anonymous teacher mail surveys in English and paper format, alternative consent forms, and stamped return envelopes were mailed in November 2011 to 16 elementary schools in 13 school districts across Oregon. Of 210 contacted teachers, 127 teachers returned until December 2011 the survey (60% response rate; 11 PE teacher responses were excluded from the analysis).

To identify classroom teachers' preferences on how to increase their students' PA levels, we developed a one-page questionnaire. The questions were formulated to assess the following constructs: perceptions, attitudes and beliefs, and preferences. The questionnaire was not pretested for its' validity. The primary theoretical framework for the survey was the health belief model, as classroom teachers are mostly guided by rational decision making (Glanz et al., 2002). To account for environmental and social factors and the complexity of the task of promoting PA among elementary school students, we included constructs from the social-ecological model and the social cognitive theory (Glanz et al., 2002).

2.3. Brain Breaks survey

The study was reviewed and approved by the Oregon State University Institutional Review Board (IRB protocol number: 5446: "Elementary Exercise DVD Study"). To increase students' PA level during the school day, the Healthy Youth Program of Oregon State University developed an exercise DVD named "Brain Breaks: Classroom Fitness for Children". Brain Breaks leads children in 5-7 minute segments of PA. Activities are demonstrated in English by Oregon State University undergraduate students majoring in Exercise and Sports Sciences, Oregon State University athletes, and local elementary school children. Brain Breaks offers a variety of segments that emphasize different types of PA and address different physical and sensory needs of students. The goals of the stretching and relaxation segments are to improve students' range of motion, increase sensory body awareness, and calm students. The goals of the aerobic activity segments are to improve circulation and oxygen level of the students' body and brain. The goals of the strength training segment are to improve core strength, calm students, and support extended sitting. Teachers have the flexibility and opportunity to let their students' interests and needs guide the PA segment selected. Some segments target younger children with imaginary concepts, whereas other segments target older children with sports-themed exercises. Each segment has three components: 1) a warm-up that includes stretching and light aerobic activities; 2) a core that includes stretching and relaxation, aerobic activities, or strength activities (e.g., arm circles, jumping jacks, and walking/running in place); and 3) a cooling down similar to warm-up activities. All activities can be done in a classroom setting and performed while standing in place. No equipment is needed except a chair for the strength segment. Participating in the activities presents no greater risk than participating in a PE class. A video trailer of Brain Breaks can be found at http://bit.ly/1o6rcHk.

After receiving written approval from the school district and the school principals, packages that contained anonymous teacher mail surveys in English and paper format, alternative consent forms, stamped return envelopes, and copies of Brain Breaks were mailed in October 2012 to 17 elementary schools in 14 school districts across Oregon. Of the 274 contacted teachers, 49 teachers returned between November 2012 and February 2013 the completed surveys (20% response rate; we excluded responses of 6 teachers from the analysis because respondents were not classroom teachers, or teachers stated that they had just started using the DVD).

To evaluate the efficacy of Brain Breaks, teachers were asked to show segments of Brain Breaks at least once per week during classroom time. Teachers could choose how often, how many and which segments they showed to their students. After showing the DVD for at least 4 weeks, teachers were asked to fill out a two-page questionnaire which we had developed. The questions were formulated to assess the following constructs: perceived barriers (3 questions), perceived benefits (3 questions), perceived students' responses (4 questions),

multisensory engagement (5 questions), preferences (2 questions), action (1 question), and maintenance (1 question). The questionnaire was not pretested for its' validity. The primary theoretical frameworks for the Brain Breaks survey were the health belief model and the trans-theoretical model (Glanz et al., 2002).

2.4. Statistical analysis

Statistical analyses were performed using SAS version 9.2 software (SAS Institute, 2009). To maintain the anonymity of the respondents, the mail surveys did not contain any demographic information and, thus, only descriptive statistics were calculated.

3. Results

3.1. Physical activity survey

As shown in Table 1, 92% of Oregon elementary schools did not meet the recommended time of PE (30 min/day or 150 min/week). On average, students had twice weekly PE for 30 minutes each (60 minutes per week). PE was taught by PE teachers in 70% of schools (n = 229), classroom teachers in 27% of schools (n = 88), PE and classroom teachers together in 3% of schools (n = 9), and teaching assistants in 1% of schools (n = 3). On average, students had recess twice a day for 15 minutes; 11% of schools were below the recommended frequency and number of minutes of recess of at least one period of at least 20 minutes.

Table 1. Environmental Assessment: Physical Activity in Oregon Public Elementary Schools

	Physical Education[a]			Recess
	Frequency (days/week)	Length (min/session)	Length (min/week)	Length (min/day)
Schools	N=378	N=373	N=372	N=360
Median	2	30	60	30
Minimum	1	15	25	12
25% Percentile	2	30	60	23
75% Percentile	3	35	90	40
Maximum	5	60	300	90
Recommendations[b]	5	≥30	≥150	≥20
Schools not meeting Recommendations[c]	92% (348)	6% (24)	92% (342)	11% (39)

[a]Physical education (PE) was taught by PE teachers in 70% of schools (n = 229), classroom teachers in 27% of schools (n = 88), by PE and classroom teachers in 3% of schools (n = 9), and by teaching assistants in 1% of schools (n = 3).

[b]Recommendation for PE and recess in schools (NASPE, 2006; CDC, 2011).

[c]Values are percentages followed by number of schools in parenthesis. Percentage of schools was calculated by comparing the reported with the recommended PE and recess.

3.2. Classroom teacher survey

Most teachers (84%) were "concerned" or "very concerned" about the students' PA levels (Table 2). Nearly all teachers perceived that regular PA breaks during the school day is "important" or "very important" (97%) and that regular PA breaks during the school day benefits students (98%), as it improves students' concentration (90%), energy level (58%), and peer interaction (47%). Classroom teachers perceived themselves together with parents and PE teacher responsible to provide PA breaks (72%).

Table 2. Elementary School Teachers' Perceptions about Physical Activity in School
(Values are percentages followed by number of responses in parenthesis; total n =116)

Constructs	Responses[a]						
Concern (Are you concerned about childrens' physical activity?)							
	Very	Yes	Somewhat	Little	Not	Not sure	No answer
	51 (59)	34 (39)	14 (16)	2 (2)	0 (0)	0 (0)	0 (0)
Importance (How important is physical activity in elementary schools?)							
	Very	Yes	Somewhat	Little	Not	Not sure	No answer
	71 (82)	25 (29)	3 (4)	1 (1)	0 (0)	0 (0)	0 (0)
Impact (Do you think that regular physical activity in schools could positively impact students' health behavior?)							
	Improved concentration	More energy	Improved peer interaction	Yes, others[a]	No or no impact	Not sure	No answer
Teacher	90 (104)	58 (67)	47 (55)	4 (5)	0 (0)	2 (2)	0 (0)
Responsibility (Who is responsible to provide children with opportunities for physical activity?)							
	Parents and all teacher	Parents and PE teacher	Any classroom teacher	PE teacher only	Government	Parents only	No answer
	72 (84)	16 (18)	7 (8)	4 (5)	3 (4)	1 (1)	1 (1)

[a]Others include elevates emotions (n = 1), better overall attitude and time managers (n = 1), releases energy (n = 1), decreases behavioral issues (n = 1), and keeps them out of trouble and improves work ethic (n = 1).

The biggest perceived barriers of incorporating PA breaks into their classroom curriculum were competing academic expectations (72%) and lack of available time (47%; Table 3); the latter was also perceived as the leading personal barrier (41%). The major perceived barriers for increasing PA outside of school were "television/computers/X-Box" (89%) followed by physically inactive parents (56%) and too busy parents (52%).

Table 3. Barriers for Increasing Students' Physical Activity (PA) as Perceived by Elementary School Classroom Teachers (Values are percentages followed by number of responses in parenthesis; total n =116; Responses are presented in descending order.)

Barriers at School	Responses[a]	Personal Barriers	Responses[a]	Barriers at Home	Responses[a]
Competing academic expectations	72 (83)	I can't fit it into my already busy schedule	41 (47)	Television/computers /X-Box	89 (103)
No time available during school day	47 (55)	No barriers	24 (28)	Parents are not physically active	56 (65)
Lack of suitable curriculum	17 (20)	I don't know enough about teaching PA	16 (19)	Parents are too busy	52 (60)
Lack of support from principal	6 (7)	Not sure	12 (14)	No playground in neighborhood	7 (8)
		I don't have a curriculum	10 (12)	Children are too busy	8 (9)
		It's not my responsibility	5 (6)	Exercise classes are too expensive	8 (9)
		I'm not the right person to teach PA	1 (1)		
Others[a]	16 (18)	Others[b]	3 (3)	Others[c]	9 (11)
Did not answer	0 (0)	Did not answer	2 (2)	Did not answer	0 (0)

[a]Others include lack of money (n = 8), lack of space (n = 6), no barriers (n = 1), no PE teachers (n = 1), reform Elementary and Secondary Education Act (n = 1), and district took away all but 30 min recess after lunch (n = 1).
[b]Others include lack of space (n = 1), we have already PE (n = 1), we already do it at our school (n = 1).
[c]Others include unsafe area to be active (n = 3), parents' lack of knowledge (n = 2), bad weather (n = 2), apathy (n = 1), unhealthy diet makes kids lazy (n = 1), parents are afraid to let kids play without supervision (n = 1), few activities available (n = 1), and no motivation or parents are unhealthy (n = 1).

Most teachers preferred to have PA included in classroom activities, recess, and PE (82%; Table 4). Although nearly all teachers (91%) rated their knowledge on how to incorporate PA breaks during regular classroom time as average or better, with 12% rating themselves as proficient, nearly all teachers were at least "somewhat interested" in learning more about how to incorporate PA breaks during classroom activities (91%) and most were interested in PA training (84%). However, most interested teachers (81 of 98 teachers; 83%) perceived barriers for participating in PA training, the training costs being the greatest barrier (68 of 81 teachers; 84%).

Table 4. Elementary School Teachers' Preferences about Incorporating Physical Activity into the School Day (Values are percentages followed by number of responses in parenthesis; total n =116)

Constructs	Responses[a]						
Preference (How should physical activity be incorporated into the regular school day?)							
	Classroom, Recess	PE,Recess	Classroom	Only PE classes	Not	Others[a]	No answer
	82 (95)	85 (99)	72 (83)	5 (6)	0 (0)	3 (4)	0 (0)
Interest in Information (Would you be interested in learning more about incorporating physical activity into your regular classroom activities?)							
	Very	Yes	Somewhat	Little	No	Not sure	No answer
	32 (37)	41 (47)	16 (19)	8 (9)	0 (0)	1 (1)	0 (0)
Interest in Training (Would you be interested in physical activity training that can be incorporated into your normal classroom activities and recess?)							
	Yes	Yes, if free	Yes, if paid by district	Yes, for continuing credit	No	Not sure	No answer
	84 (98)	50 (49)	46 (45)	8 (9)	0 (0)	1 (1)	2 (2)
Self-rated Knowledge (How would you rate your knowledge on incorporating physical activity into your regular classroom activities?)							
	Proficient	High	Average	Little	No	Not sure	No answer
	12 (14)	22 (25)	58 (67)	8 (9)	0 (0)	1 (1)	2 (2)

[a]Others include should be free time (n = 1), whatever works without taking away from academics (n = 1), stretching and yoga should be included as part of classroom routine (n = 1), and not sure (n = 1). Five teachers commented that they preferred the combination classroom and PE.

3.3. Brain Breaks survey

To accommodate teachers' preferences, we developed "Brain Breaks: Classroom Fitness for Children," an exercise DVD that demonstrates 5-7 minute segments of PA. Most teachers (51%) played Brain Breaks 2 to 3 times per week and 26% once per week; 23% played Brain Breaks every day, often at the request of the students. Several teachers commented that they use it when students' focus wanes and students get restless. The relaxation and stretching segments were played most often (59% of teachers), followed by endurance (13%), and strength (5%); the remaining 32% of teachers had no preference.

Almost all teachers perceived that the segments were age-appropriate for their students (98%), had the right length to fit into their classroom schedule (91%), and that teachers were able to adapt the exercises to the available space (95%). Almost all teachers responded with "appropriate," and/or "fun," when asked about the exercises (95%), themes (98%), music (98%), backgrounds (100%), and acting (91%; Table 5).

All teachers except for one perceived that their students understood and responded to the instructions extremely well (65%) or adequately (33%). Students were excited and engaged; the relaxation and stretching segments had the highest approval rating (95%; Table 5). Several teachers commented that students asked regularly, a few of them daily, for showings of Brain Breaks. Teachers perceived that Brain Breaks segments improved students' focus and concentration (91%) and provided students with a beneficial amount of PA (86%; Table 5). Nearly all teachers (91%) intended to continue using Brain Breaks. Several teachers asked to obtain another edition of Brain Breaks.

Table 5. Elementary School Teachers' Perceptions about the Exercise DVD Brain Breaks (Values are percentages followed by number of responses in parenthesis; total n =116)

Constructs	Responses[a]						
Sensory Aspects of DVD (Mark the boxes that characterize the … of the DVD)							
	Appropriate	Fun	Inappropriate	Boring	Other: long	Other specified[a]	No answer
Exercise	93 (40)	16 (7)	5 (2)	0 (0)	2 (1)	0 (0)	0 (0)
Themes	74 (32)	56 (24)	0 (0)	0 (0)	0 (0)	12 (5)	0 (0)
Music	63 (27)	63 (27)	0 (0)	Not asked	0 (0)	2 (1)	0 (0)
Background	60 (26)	60 (26)	0 (0)	0 (0)	0 (0)	5 (2)	0 (0)
Acting	70 (30)	40 (17)	0 (0)	7 (3)	0 (0)	7 (3)	0 (0)
Students' Response to PA Type (The class's overall reaction to the following activities was…?)							
	Excited/ engaged	Unexcited	Embarrassed	Confused	Other: Not used	Other[b]	No answer
Relaxation	95 (41)	2 (1)	5 (2)	0 (0)	0 (0)	0 (0)	2 (1)
Endurance	86 (37)	2 (1)	5 (2)	0 (0)	9 (4)	0 (0)	5 (2)
Strength	81 (35)	5 (2)	7 (3)	2 (1)	5 (2)	5 (2)	2 (1)
Students' PA Level (Do you feel Brain Breaks provides a beneficial amount of PA to students?)							
	Definitely	Somewhat	No change	Not at all	Other: Not sure		No answer
	56 (24)	30 (13)	9 (4)	2 (1)	2 (1)		0 (0)
Students' Academic Behavior(Do you feel students are more focused to learn after doing Brain Breaks?)							
	Definitely	Somewhat	Just a little	Not at all	Other: Not sure		No answer
	23 (10)	67 (29)	5 (2)	2 (1)	2 (1)		0 (0)

[a]Others specified was 'too hard' for exercise, 'silly' for themes, 'too loud' for music, 'distracting' for background, and 'not believable' for acting.
[b]Others was 'not appropriate for age/space' and 'some could not keep up, most did fine'.

4. Discussion

Based on PRECEDE/PROCEDE, we developed an exercise DVD to promote increased levels of PA in elementary schools. As part of the needs assessment, we collected information about the length and type of curricular and non-curricular PA (i.e. environmental assessment). 92% of Oregon elementary schools did not meet the recommended time of PE (30 min/day or 150 min/week). The median amount of PE was twice a week for 30 minutes. Consistent with our results, surveys of Oregon school districts between 2008 and 2012 reported that the average length of PE in elementary schools was 70 to 75 minutes per week (Oregon Department of Education, 2013). Oregon is not unique in its challenges. The most recent nation-wide surveys (2006-2007) reported that 96% of the elementary schools did not meet the recommended amount of PE; the average length of physical education (PE) in elementary schools decreased from 145 to 105 minutes per week in 2007 (Lee et al., 2007; McMurrer, 2007).

Aside from simply meeting the recommended length of PE classes, the quality of PE has decreased, meaning providing beneficial PA amounts and teaching PA skills. Similar to other U.S. states (McMurrer, 2007), an increasing number of classroom teachers have been required to teach PE in Oregon without any professional training or equipment (Oregon Department of Education, 2013). According to our survey, PE was exclusively taught by certified PE teachers in only 70% of schools. A 2007 nation-wide survey of schools reported that PE was taught by a PE teacher or specialist in 88.7% of elementary schools (Lee et al., 2007). Lack of PA training is a long standing concern of teachers (Woodward-Lopez et al., 2010). Compared to other U.S. states, Oregon is close to the bottom for providing professional development on PA and fitness (Brener et al., 2014). Classroom teachers in our survey perceived themselves competent teaching PE; however, PE taught by classroom teachers instead of PE teachers is generally linked to lower levels of PA among students (Gomes et al., 2014). Our exercise DVD Brain Breaks does not require teacher training or preparation time, but rather leads students and their teachers through 5-7 minute segments of PA.

Besides PE, recess is a critical component of PA. The National Association for Sport and Physical Education (NASPE, 2006) recommends at least one daily period of at least 20 minutes of recess. Country-wide surveys reported that 26% of elementary schools did not offer recess (Lee et al., 2007). The schools that offer recess had a wide variation in length, from 20 to 60 minutes (Lee et al., 2007; Council on School Health, 2013). In our study, all schools offered recess and the length ranged between 12 and 90 minutes per day; 11% of schools were below the recommended length of recess. The 2007 country-wide survey reported the average time of recess to be 133 minutes per week, down from 183 minutes in 2001, when NCLB were implemented

(McMurrer, 2007). A recent survey noted that the length of PA breaks also decreased in U.S. secondary schools (Hood et al., 2014). There is a country-wide trend to convert recess into PE to meet policy requirements (Slater et al., 2012). Aside from providing PA, recess provides opportunities for unstructured play and social interaction and negotiation with peers; e.g., recess as supervised social learning ground, that otherwise would be lost (NASPE, 2006; Council on School Health, 2013). Therefore, we strongly discourage such policies.

Few studies have quantitatively evaluated teachers' perception about PA in elementary schools (Woodward-Lopez et al., 2010; Hammerschmidt et al., 2011). PE professionals and other teachers often feel excluded from the development of new policies and program changes. Their lack of inclusion may adversely affect implementation and quality of changes as well as teachers' job satisfaction (Franks et al., 2007; Woodward-Lopez et al., 2010; Howe & Stevick, 2014). We asked classroom teachers how they would like to promote their students' PA level. In accordance with their responses, we then provided an exercise DVD "Brain Breaks". Similar to previous studies (Woodward-Lopez et al., 2010; Hammerschmidt et al., 2011), most teachers were concerned about students' PA level and perceived regular PA during the school day as important (high health motivation). Although students' PA level is a concern, many stakeholders do not perceive it as a priority like English and math proficiency, which results in frustration of teachers (Woodward-Lopez et al., 2010).

Teachers noted several motivating factors for promoting students' PA level. In our study, teachers responded that PA improved students' concentration, students' energy level, and their peer interactions. Teachers felt shared responsibility to provide PA for elementary school children. They, however, also emphasized the importance of other stakeholders, especially parents, for providing PA opportunities outside of school. The current peer-reviewed literature reports similar perceptions but is limited to qualitative data (Woodward-Lopez et al., 2010). Being cognizant of teachers' perceived benefits is essential in promoting PA in schools. According to the health belief model, successful health promotion depends on perceived benefits outweighing perceived barriers (Glanz et al., 2002).

Current literature emphasizes multiple barriers to improving students' PA (Neumark-Sztainer et al., 2999; Bauer et al., 2006; Hammerschmidt et al., 2011; Kinnunen & Lewis, 2013). To address potential barriers for PA programs, an ecological barrier analysis was included in our survey. At all levels, teachers perceived that barriers centered on resource limitations (i.e., time, competing priorities, money, and, to a smaller extent, knowledge). It is important to be cognizant of the complexity of barriers for students' PA level; however, resource limitations and activities at home are outside of the control of teachers (i.e. external barriers). Focusing on barriers that are outside of one's control can lead to a defeatist attitude concerning students' PA. Focusing on teachers' strengths and being attentive to their constraints will help revitalize their efforts to promote students' PA (Franks et al., 2007).

Children's brains require PA breaks to process information after intense instruction (Council on School Health, 2013). Other countries that score higher in scholastic tests have 10 to 20 minute breaks between each 40 to 50-minute block of instruction (Council on School Health, 2013). In the U.S., it is common that blocks of instruction are taught consecutively without breaks (Woodward-Lopez et al., 2010), which is challenging for classroom teachers and students alike and may contribute to 'burn out'. Almost all teachers were interested in incorporating short PA breaks during classroom activities. Classroom-based PA breaks during classroom time was the top choice to promote students' PA level in a Michigan study (Hammerschmidt et al., 2011). A 2007 country-wide survey of elementary schools reported that 43.6% of schools had PA breaks outside PE classes and recess; however, the report did not specify the length and type of PA break (Lee et al., 2007).

There are many well-designed programs promoting PA within existing PE classes, recess, and for active travel to and from school (CDC, 2010; Chin & Ludwig, 2013; Dobbins et al., 2013; Parrish et al., 2013; Huberty et al., 2014; Ramanathan et al., 2014). Classroom-based PA breaks less than 20 minutes in length provide a relatively novel and innovative method for increasing student's PA level as well as academic achievement (CDC, 2010; Barr-Anderson et al., 2011; Rasberry et al., 2011). Several previously evaluated PA break programs are available for teachers to use, and showed improvements in student's PA level (Pangrazi et al., 2003; Donnelly et al., 2009; Martin et al., 2010; Bartholomew & Jowers, 2011; Kibbe et al., 2011: Whitt-Glover et al., 2011) and academic performance and/or behavior (Norlander et al., 2005; Maher et al., 2006; Uhrich & Swalm, 2007; Donnelly et al., 2009; Bartholomew & Jowers, 2011; Kibbe et al., 2011: Whitt-Glover et al., 2011). Furthermore, some of these programs reported improvements in some health measures, e.g., a decline in school nurse visits or excess weight gain or a decrease in ADHD and asthma medication use (Connelly et al., 2009; Katz et al., 2010; Kibbe et al., 2011).

Limitations of these programs included insufficient indoor space, competing academics, inadequate training, preparation time, and student safety (Naylor et al., 2006; Martin et al., 2010). Brain Breaks does not require teacher training or preparation time. Furthermore, Brain Breaks requires no additional equipment and can be performed in the classroom or other existing facilities. The most important criterion is that the PA has to be engaging and fun for students, while being easy to understand and follow along. Brain Breaks uses simple, safe movements, storylines, music and creative backgrounds to engage the students on multiple sensory levels. This

approach was well received by teachers and students alike and according to teachers improved students' concentration while providing beneficial amounts of PA.

5. Conclusion and Implications

Our study focused on the current status of PA in Oregon public elementary schools and preferences of classroom teachers. Our findings are regional; however, our developed exercise DVD can be used globally, as the barriers for PA in schools are similar in other U.S. states and other countries. Similar to other U.S. states (Lee et al., 2007; McMurrer, 2007), 92% of Oregon elementary schools did not meet the CDC's PE recommendation and will require large shifts in curriculum time to achieve compliance with statewide PE legislation for 2017-2018. Consistent with previous studies in other U.S. states (Woodward-Lopez et al., 2010; Hammerschmidt et al., 2011), most teachers were concerned about students' PA levels (84%) and interested to incorporate short PA breaks into their classroom curriculum (88%). Classroom teachers identified multiple barriers for PA inside and outside of school, including lack of time, funding, space, and teacher training. To address these barriers for PA, we developed a self-guided, exercise DVD, Brain Breaks, which provides 5-7 minute, multi-sensory PA segments for students and teachers to follow along. Brain Breaks was well received by teachers and students alike and according to teachers improved concentration while providing beneficial amounts of PA. The study focused on teachers' perception of Brain Breaks; currently, we evaluate in addition students' perception of Brain Breaks. Future studies are warranted to examine the effectiveness of Brain Breaks on PA, physical health measures, cognitive function, and academic behavior and achievement in a randomized controlled trial.

References

Bauer, K.W., Patel, A., Prokop, L.A., & Austin, S. B. (2006). Swimming upstream: faculty and staff members from urban middle schools in low-income communities describe their experience implementing nutrition and physical activity initiatives. *Preventing Chronic Disease.* 3, A37.

Barr-Anderson, D. J., AuYoung, M., Whitt-Glover, M. C., Glen, B. A., & Yancey, A. K. Integration of short bouts of physical activity into organizational routine. A systematic review of literature. *American Journal of Preventive Medicine.* 40, 76-93.

Bartholomew, H. B., & Jowers, E. M. (2011). Physically active academic lessons in elementary children. *Preventive Medicine.* 52(Suppl 1), S51-54.

Brener, N. D., McManus, T., Wechsler, H., & Kann, L. (2014). Trends in professional development for and collaboration by health education teachers - 41 states, 2000-2010. *Journal of School Health.* 83, 734-742.

Cawley, J., Frisvold, D., & Meyerhoefer, C. (2013). The impact of physical education on obesity among elementary school children. *Journal of Health Economics.* 32, 743-755.

Centers for Disease Control and Prevention (CDC). (2010). The association between school based physical activity, including physical education, and academic performance. Atlanta, GA: U.S. Department of Health and Human Services. Available at: http://www.cdc.gov/healthyyouth/health_and_academics/pdf/pa-pe_paper.pdf.

Chin, J. J., & Ludwig, D. L. (2013). Increasing children's physical activity during school recess periods. *American Journal of Public Health.* 103, 1229-1234.

Council on School Health. (2013). The crucial role of recess in school. *Pediatrics.* 131, 183-188.

Dobbins, M., Husson, H., DeCorby, K., & LaRocca, R. L. (2013). School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6 to 18. *Cochrane Database of Systematic Reviews.* Issue 2. Art. No.:CD007651. DOI:10.1002/14651858.pub.2.

Donnelly, J. E., Greene, J. L., Gibson, C. A., Smith, B. K., Washburn, R. A, Sullivan, D. K.. DuBose, K., Mayo, M. S., Schmelzle, K. H., Ryan, J. J., Joacobsen, D. J., & Williams, S. L. (2009). Physical Activity Across the Curriculum (PAAC): a randomized controlled trial to promote physical activity and diminish overweight and obesity in elementary school children. *Preventive Medicine.* 49, 336-341.

Fakhouri, T.H.I., Hughes, J.P., Brody, D.J., Kit, B.K., & Ogden, C. L. (2013). Physical activity and screen-time viewing among elementary school-aged children in the United States from 2009 to 2010. *Journal of the American Medical Association Pediatrics.* 167, 223-229.

Franks, A. L., Kelder, S. H., Dino, G. A., Horn, K. A., Gortmaker, S. L., Wiecha, J. L., & Simoes, E. J. (2007). School-based programs: lessons learned from CATCH, Planet Health, and Not-On-Tobacco. *Preventing Chronic Disease.* 4, A33. Available at: http://www.cic.gov/pcd/issues/20070apr/06_0105.htm.

Glanz, K., Rimer, B. K., & Lewis, F. M., eds. (2002). Health behavior and health education: theory, research, and practice. 3rd edition. San Francisco, CA. Jossey Bass.

Gomes, T. N., Dos Santos, F. K., Zhu, W., Eisenmann, J., & Mair, J. A. R. (2014). Multilevel analyses of school and children's characteristics associated with physical activity. *Journal of School Health.* 84, 668-676.

Hammerschmidt, P., Tackett, W., Golzynski, M., & Golzynski, D. (2011). Barriers to and facilitators of healthful eating and physical activity in low-income schools. *Journal of Nutrition Education and Behavior.* 43, 63-68.

Haapala, E. A., Poikkeus, A. M., Kukkonen-Harjula, K., Tompuri, T., Lintu, N., Väistõ, J., Leppänen, P. H. T., Laaksone, D. E., Lindi, V., & Lakka, T. A. (2014). Associations of physical activity and sedentary behavior with academic skills – a follow-up study among primary school children. *PLoS ONE*. 9, e107031

Hood, N. E., Golabianchi, N., Terry-McElrath, Y. M., O'Malley, P. M., & Johnston, L. D. (2014). Physical activity breaks and facilities in US secondary schools. *Journal of School Health.* 84, 697-705.

Howe E. K., & Stevick, E. D. (2014). The "ins" and "out" of physical activity policy implementation: inadequate capacity, inappropriate outcome measures, and insufficient funds. *Journal of School Health.* 84, 581-585

Huberty, J. L., Beets, M. W., Beighle, A., Saint-Maurice, P. F., & Welk, G. (2014). Effects of Ready for Recess, an environmental intervention, on physical activity in third- through sixth-grade children. *Journal of Physical Activity and Health.* 11, 384-395.

Juonala, M., Viikari, J. S. A., & Raitakari, O. T. (2013). Main findings from the prospective Cardiovascular Risk in Young Finns Study. *Current Opinion in Lipidology*. 24, 57-64.

Katz, D. K., Cushman, D., Reynolds, J., Njike, V., Treu, J. A., Walker J., Smith, E., & Katz, C. (2010). Putting physical activity where it fits in the school day: preliminary results of the ABC (Activity Bursts in the Classroom) for fitness program. *Preventing Chronic Disease.* 7, A82.

Kibbe, D. L., Hackett, J., Hurley, M., McFarland, A., Godburn Schubert, K., Schultz, A., & Harris S. (2011). Ten years of Take 10!®: integrating physical activity with academic concepts in elementary classroom. *Preventive Medicine.* 52(Suppl. 1):S43-S50.

Kinnunen, D.A., & Lewis, D.K. (2013). A case study of preservice physical education teachers' attitudes toward and perceived barriers to quality physical education. *Journal of Education and Practice.* 4, 123-133.

Lee, S. M., Burgeson, C.R., Fulton, J.E., & Spain, C.G.. (2007). Physical education and physical activity: results from the School Health Policies and Programs Study 2006. *Journal of School Health.* 77, 435-463.

Maher, M. T., Murphy, S. K., Rowe, D. A., Golden, J., Tamlyn Shields, A., & Raedeke, T. D. (2006). Effects of a classroom-based program on physical activity and on-task behavior. *Medicine & Science in Sports & Exercise.* 38, 2086-2094.

Martin, M.W., Martin, S., & Rosengard, P. (2010). PE2GO: program evaluation of a physical activity program in elementary school. *Journal of Physical Activity and Health.* 7, 677-684.

McMurrer, J. (2007). NCLB5: choices, changes, and challenges: curriculum and instruction in the NCLB era. Available at: http://www.cepd-dc.org/displayDocument.cfm?DocumentID=312.

National Association for Sport and Physical Education (NASPE). (2006). Position statement: recess for elementary school students. Available at: http://www.shapeamerica.org/advocacy/positionstatements/pa/loader.cfm?csModule=security/getfile&pageid=4630.

National Association for Sport and Physical Education & American Heart Association (2012). Shape of the Nation Report: status of physical education in the USA. Reston, VA: American Alliance for Health, Physical Education, Recreation and Dance. Available at: http://www.cep-dc.org/displayDocument.cfm?DocumentID=312.

Naylor, P. J., Macdonald, H. M., Zebedee, J. A., Reed, K. E., & McKay, H. A. (2006). Lessons learned from Action Schools! BC – an 'active school' model to promote physical activity in elementary schools. *Journal of Scientific Medicine in Sport.* 9, 413-423.

Neumark-Sztainer, D., Story, M., & Coller, T. (1999). Perception of secondary school staff toward the implementation of school-based activities to prevent weight-related disorders: a needs assessment. *American Journal of Health Promotion.* 13, 153-156.

Norlander, T., Moås, L., & Archer T. (2005). Noise and stress in primary and secondary school children: noise reduction and increased concentration ability through a short but regular exercise and relaxation program. *School Effectiveness and School Improvement.* 16, 91-99.

Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal K. M. (2012). Prevalence of obesity and trends in body mass index among US children and adolescents, 1999-2010. *Journal of the American Medical Association.* 307, 483-490.

Oregon Legislative Assembly (2007). Enrolled House Bill 3141. Available at: http://www.ode.state.or.us/teachlearn/subjects/pe/hb3141.en.pdf.

Oregon Department of Education (2013). Report on 2007 House Bill 3141, February 27, 2013. Available at: http://www.ode.state.or.us/teachlearn/subjects/pe/2010-12-pe-legislative-report.pdf..

Pangrazi, R. P., Beighle, A., Vehige, T., & Vack, C. (2003). Impact of promoting Lifestyle Activity for Youth

(PLAY) on children's physical activity. *Journal of School Health.* 73, 317-321.

Parrish, A. M., Okely, A. D., Stanley, R. M., & Ridgers, N. D. (2013). The effect of school recess interventions on physical activity: a systematic review. *Sports Medicine.* 43, 287-299.

Ramanathan, S., O'Brien, C., Faulkner, G., & Stone, M. (2014). Happiness in motion: emotions, well-being, and active school travel. *Journal of School Health.* 84, 516-523.

Rasberry, C. N., Lee, S. M., Robin, L., Laris, B. A., Russell, L. A., Coyle, K. K., & Nihiser, A. J. (2011). The association between school-based physical activity, including physical education and academic performance: a systematic review of the literature. *Preventive Medicine.* 52(Suppl 1), S10-S20.

SAS Institute Inc. (2009). SAS/STAT® 9.2 User's Guide. Cary, NC: SAS Institute Inc.

Slater, S. J., Nicholson, L., Chriqui, J., Turner, L., & Chaloupka, F. (2012). The impact of state laws and district policies on physical education and recess practices in a nationally-representative sample of U.S. public elementary schools. *Archive of Pediatric and Adolescent Medine.* 166, 311-316.

Uhrich, T. A., & Swalm, L. (2007). A pilot study of a possible effect from a motor task on reading performance. *Perception and Motor Skills*. 104, 1035-1041.

Väistö, J., Eloranta, A. M., Vilitasallo, A., Tompuri, T. , Lintu, N., Karjalainen, P., Lampinen, E. K., Ågren, J., Laaksonen, D. E., Lakka, H. M., & Lindi V. (2014). *International Journal of Behavioral Nutrition and Physical Activity*. 11: 55.

Whitt-Glover, M. C., Ham, S. A., & Yancey, A. K. (2011). Instant Recess®: a practical tool for increasing physical activity during the school day. *Progress in Community Health Partnerships.* 41, 1921-1926.

Woodward-Lopez, G., Diaz, H., & Cox, L. (2010). Physical Education for Kids (PERK). A study for the California Task Force on youth and workplace wellness. Available at: http://www.childrennow.org/uploads/documents/bwlw2011_resource1.pdf.

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

Academic conference: http://www.iiste.org/conference/upcoming-conferences-call-for-paper/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar