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# Examining the Knowledge and Capacity of Elementary Teachers to Implement Classroom Physical Activity Breaks

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**Abstract**

This study examined teachers' zone of proximal development for classroom physical activity breaks by assessing teachers' knowledge and capacity for implementing classroom physical activity breaks. Five school districts of various sizes (n=346 teachers) took part in a short online survey. Descriptive statistics were calculated and chi-square analyses were used to identify differences between districts. Almost all teachers utilized classroom physical activity to some extent. A third of teachers who stated they implemented classroom physical activity, experienced barriers to implementation. A majority of teachers were interested in learning more about classroom physical activity. There were significant differences between districts on the number of days per week classroom physical activity was integrated, the frequency of collaboration that occurred between teachers, the percentage of teachers who experienced barriers, and preferred delivery method of professional development. These findings support the importance of identifying teachers' zone of proximal development to increase the use of classroom physical activity breaks. Understanding teachers' knowledge and capacity for implementing classroom physical activity breaks can allow educational professionals to shift the implementation of classroom physical activity beyond sporadic use by isolated teachers and schools to a more systematic and consistent delivery across classrooms and throughout districts.

**Keywords:** Physical activity, elementary, classroom, professional development

## Introduction

Physical activity (PA) offers numerous physical and psychological benefits to children (Biddle & Asare, 2011; Center for Disease Control and Prevention [CDC], 2011; U.S. Department of Health and Human Services [DHHS], 2008). Despite these benefits, a majority of children are not meeting PA recommendations (60 minutes of moderate-to-vigorous PA every day) (USDHHS, 2008; Troiano et al., 2008). For example, only 42% of U.S. six to eleven-year-old children achieve the PA recommendations (Troiano et al., 2008). Greater efforts are needed to ensure more children are attaining PA recommendations. Children can be

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engaged in PA in varied settings including school, home, childcare, and the community (Institute of Medicine, 2005). Among these, a variety of research results has suggested schools are an ideal environment in which to implement interventions, because a majority of children attend schools and schools provide a safe environment for children to improve their knowledge, practice, and receive support for healthy behaviors (CDC, 2011; Peterson & Fox, 2007).

Typically within schools, physical education (PE) and recess periods have been the primary avenues for children to obtain some portion of PA recommendations during the school day (Webster, Russ, Vazou, Goh, & Erwin, 2015). However, decreases in school budgets and increases in academic pressure are leading to diminishing PE classes and recess periods. In the United States only 13.7% of elementary schools, 15.2% of middle schools, and 3% of high schools provide PE three days per week (CDC, 2006). In addition, only 20% of school districts (several schools located within a geographical area or which operate under a collective administration) require daily recess (Chriqui, Schneider, & Chaloupka, 2010; Elliot, Erwin, Hall, & Heidorn, 2013). Additional PA opportunities are needed to maximize the time spent at school to improve the overall health and well-being of children.

Classroom PA breaks are one viable solution for providing additional PA opportunities during the school day. Not only can classroom PA breaks contribute to daily PA accumulation (up to 19 minutes per day), but specific classroom PA break programs have been found to increase children's time on-task, as well as improve reading, math, and spelling scores (Bartholomew & Jowers, 2011; Bassett et al., 2013; Carlson et al., 2015; Dunn, Venturanza, Walsh, & Nonas, 2012; Erwin, Fedewa, & Ahn, 2013; Kibbe et al., 2010; Mahar, 2011;). Notably, several of these studies found improvements with minimal staff training (Donnelly et al., 2009; Dunn et al., 2012). Thus, classroom PA breaks could be a feasible approach for helping schools increase PA as well as an effective instructional method to improve academic achievement.

In order to understand how to best promote the use of classroom PA breaks, it is important to understand teachers' existing classroom PA knowledge and practices related to classroom PA breaks. Assessing teachers' current capabilities and implementation identifies the classroom PA strategies teachers (a) can implement unassisted, (b) may implement with support, and (c) are not yet prepared to implement. The strategies teachers may use if provided support, represents their zone of proximal development and a key area for strategic efforts (Vygotsky, 1978).

Vygotsky's Zone of Proximal Development theory posits interventions targeting this zone are most likely to help a learner (e.g., teacher) advance their skills (e.g., classroom PA breaks). Within the zone of proximal development, learners should work "in collaboration with more capable peers" (Vygotsky, 1978, p., 86) as they attempt a new task. The new task should build on learners' current knowledge yet challenge them to advance their skills. The support of someone with expertise related to the task mitigates the difficulty of learning something new. While this theory has typically been applied with children, a similar view can be utilized when schools/districts are examining how to scaffold the support teachers need to increase classroom PA breaks.

The type of support provided by a school district though may differ by school district size. Several studies have found small districts can support close interpersonal relationships and these relationships can be a factor in effective professional development (Gilford, 1996; Gruber, Wiley, Broughman, Strizek, & Burian-Fitzgerald, 2002; Mohr, 2000). Small districts may also have increased collegiality and often use peer-coaching models (Ancess, 1997; Meier, 2002; Vander Ark, 2002). Conversely, when district size increases research suggests that academic standards and school improvement initiatives are more important to

principals to guide professional development than the preferences of the teachers themselves (Gilford, 1996).

In order to understand how to assist various school districts implement classroom PA breaks, one must first understand teachers' knowledge and capacity for implementing classroom PA breaks and if there is variation across different school districts. To date, no studies have explored current teachers' knowledge and capacity to use classroom PA breaks as well as opportunities to improve future capacity and support of teachers to increase the use of classroom PA breaks. Therefore, the primary purpose of this study was to determine teachers' zone of proximal development by assessing teachers' knowledge and capacity for implementing classroom PA breaks across multiple school districts. A secondary purpose was to examine if teachers' knowledge and capacity for implementing classroom PA breaks differed by size of school district.

## Methods

*Study Design and Sample*

This descriptive exploratory study used a convenient non-probabilistic sample. Participants ($n$=346) included elementary school teachers from five metropolitan-area school districts in a Midwestern city in the United States. School districts were classified into one Small (<6,000 students), three Medium (6,001-12,000 students), and one Large (>12,001 students) district. For the purposes of this study, the Medium districts were designated as Medium A, Medium B, and Medium C. Teachers were eligible to participate if they were currently employed by the school district and agreed to take part in the study. To recruit participants, researchers first worked with Kindergarten-12 school district research boards to gain approval. Depending on the preferred process by the school district, either the school superintendent forwarded a recruitment e-mail from the researchers or the researchers contacted principals who forwarded the e-mail to teachers. The recruitment e-mail from the researchers included a short description of the survey and the online link to access the survey. Teachers received a $5 gift card for participating. The study was approved by an Institutional Review Board in the Midwest United States. A brief consent form was included on the first page of the survey and beginning the survey served as providing consent.

*Procedures and Survey*

School districts were recruited in the spring and fall of 2014. The online survey was developed based on a previously established survey measuring the willingness of teachers to implement PA and the socio-ecological model (Parks et al., 2007). Survey questions were piloted with teachers, academic experts (PA and Teacher Education), and community health experts. Based on feedback from the pilot, additional questions were added to best understand the use of and barriers to classroom PA breaks. The survey consisted of 23 questions for those who implemented classroom PA and 8 questions for those who did not. An additional 15 questions were used to collect the demographic information of the participants. The survey was administered via SurveyMonkey (SurveyMonkey, Palo Alto, CA) and took approximately 5-10 minutes to complete.

*Data Analysis*

Descriptive statistics for participants were calculated and categorical data were expressed as percentages. Chi-square analyses with 95% confidence levels were used to identify the significant difference on each primary question by the districts. All analyses were conducted in SPSS version 22 (Statistical Package for the Social Sciences, Chicago, IL). The level of statistical significance was set at $p$< .05.

## Results

Seven school districts were contacted and five took part in the survey (*n*=346 teachers). The school district's enrolment ranged in size from 3,688 to 51,069. Additional details on districts are available in Table 1. Teacher response rate varied from 17.4%-46.5% in each district. General demographics for teachers who completed the online survey are provided in Table 2. The majority of teachers were female (92.2%), White (96%), and not physically active for 30 minutes/day ≥ 5 days/week (68.9%).

**Table 1.** *District Demographics*

| District | Large | Medium A | Medium B | Medium C | Small |
|---|---|---|---|---|---|
| Public or Private | Public | Public | Public | Private | Public |
| NCES Classification* | City: Large | Suburb: Large | City: Small | City: Large | Suburb: Large |
| Student enrollment | 51,069 | 11,137 | 9,117 | 13,942 | 3,688 |
| % of Students free/reduced lunch | 73.4 | 22.1 | 50.2 | 12.2 | 10.2 |
| % of Students identifying as White | 31.4 | 81.8 | 77.8 | 87.1 | 94.7 |

*NCES=National Center for Educational Statistics

**Table 2.** *Teacher Demographics*

| | *n* | % |
|---|---|---|
| Gender | 321 | |
| Male | | 7.8 |
| Female | | 92.2 |
| Race/Ethnicity | 327 | |
| White | | 96.0 |
| Other | | 4.0 |
| Age | 322 | |
| 20-30 | | 33.9 |
| 31-40 | | 32.6 |
| 41-50 | | 17.1 |
| 51+ | | 16.4 |
| Education Level | 321 | |
| Bachelors | | 39.9 |
| Masters | | 60.1 |
| Years of Teaching | 322 | |
| 0-5 | | 30.8 |
| 6-11 | | 28.9 |
| 12-19 | | 21.7 |
| 20+ | | 18.6 |
| Physically active 30 min/day | 322 | |
| 0-2 days/week | | 27.9 |
| 3-4 days/week | | 41.0 |
| 5-7 days/week | | 31.1 |

Overall, all teachers thought it was important for children to receive opportunities for PA and almost all of the teachers thought it was important for children to receive classroom PA breaks (99.1%). Key findings of all districts are described and any differences between districts are noted.

*Knowledge and Current Capacity of Classroom PA*

Almost all teachers were aware of and utilized classroom PA (90.8%) (Table 3). A majority of teachers implemented classroom PA because their students' behavior improved when they did so (74.7%). Over half of teachers (62.2%) who integrated PA into their classrooms implemented them five days per week and one to two times per day (58.3%). There was a significant difference between districts in the number of days per week classroom PA was integrated ($p$=.028) (Table 4). Medium B district had the highest percentage of teachers who implemented five days per week at 66.7% compared to other districts where less than half (49.3%) of teachers in Medium A implemented five days per week.

**Table 3.** *Classroom PA Utilization Amount and Type*

| Questions | *n* | % |
|---|---|---|
| Do you incorporate classroom PA breaks throughout your school day? | 346 | |
| Yes | | 90.8 |
| No | | 9.2 |
| What is the main reason you implement classroom PA breaks? (Check all that apply) | 304 | |
| I think it is important for children to get more physical activity | | 63.5 |
| My student's behavior improves when I incorporate them | | 74.7 |
| My student's test scores improve when I incorporate them | | 15.5 |
| My students are in a better mood when I incorporate them | | 61.8 |
| Other | | 4.3 |
| How many days a week do you integrate PA into your classroom? | 304 | |
| 1 day/week | | 2.6 |
| 2 times/day | | 7.9 |
| 3 days/week | | 14.8 |
| 4 days/week | | 12.5 |
| 5 days/week | | 62.2 |
| How many times a day do you integrate PA into your classroom? | 304 | |
| 1 time/day | | 22.4 |
| 2 times/day | | 35.9 |
| 3 times/day | | 22.4 |
| 4 times/day | | 6.6 |
| 5 or more times/day | | 12.8 |
| What types of classroom PA breaks do you use? (Check all that apply) | 304 | |
| PA only (e.g., 5 minutes of exercises such as jumping jacks, jog in place) | | 79.9 |
| Academic ideas combined with PA *(e.g., jumping for answer to 2+2)* | | 73.7 |
| School-wide PA breaks *(e.g., all classes take a PA break at 10:00 am)* | | 11.2 |
| Which subject(s) are you comfortable including PA breaks in? (Check all that apply) | 304 | |
| Mathematics | | 72.7 |
| Science | | 44.7 |
| Reading | | 55.9 |
| Language Arts | | 59.5 |
| Other | | 29.6 |
| Do you use a specific classroom PA program (e.g., GoNoodle, Jammin' Minute)? | 304 | |
| Yes | | 66.5 |
| No | | 33.5 |
| Which program(s) do you use? | 202 | |
| GoNoodle | | 97.5 |
| Fuel Up to Play 60 | | 9.9 |
| Jammin' Minute | | 4.5 |
| Other | | 6.5 |
| When you implement classroom PA breaks do you participate with your students? | 298 | |
| Yes | | 88.3 |
| No | | 11.7 |

| Question | Probability | Large | Medium A | Medium B | Medium C | Small |
|---|---|---|---|---|---|---|
| How many days a week do you integrate PA into your classroom? | *p*=.028 | | | | | |
| 1-2 days | | 12.5% | 9.8% | 6.4% | 13.8% | 6.1% |
| 3-4 days | | 23.6% | 22.6% | 20.5% | 27.5% | 30.6% |
| 5 days | | 56.9% | 49.3% | 66.7% | 56.9% | 57.1% |
| Which subject(s) are you comfortable including PA breaks in? (Check all that apply) | | | | | | |
| Reading | *p*=.003 | 63.9% | 40.8% | 44.9% | 41.2% | 67.3% |
| Mathematics | *p*=.146 | 73.6% | 59.2% | 69.2% | 56.9% | 73.5% |
| Science | *p*=.098 | 43.1% | 26.8% | 47.4% | 45.1% | 42.9% |
| Language Arts | *p*=.454 | 59.7% | 46.5% | 57.7% | 56.9% | 49.0% |
| Other | *p*=.123 | 25.0% | 22.5% | 23.1% | 41.2% | 32.7% |
| How often do you collaborate with other teachers to discuss physical activities that could be integrated into your classroom? | *p*<.001 | | | | | |
| Once a month | | 22.2% | 18.3% | 39.7% | 19.6% | 24.5% |
| Once a quarter | | 15.3% | 9.9% | 16.7% | 15.7% | 26.5% |
| Once a semester | | 20.8% | 7.0% | 17.9% | 15.7% | 2.0% |
| Once a year | | 6.9% | 8.5% | 9.0% | 15.7% | 18.4% |
| Once every two years | | 1.4% | 1.4% | N/A | N/A | 2.0% |
| Never | | 26.4% | 36.6% | 10.3% | 31.4% | 20.4% |
| Where did you learn how to incorporate PA breaks or about the program you use? (Check all that apply) | | | | | | |
| During schooling for bachelors | *p*=.064 | 20.8% | 23.9% | 39.7% | 37.3% | 30.6% |
| During schooling for masters | *p*=.072 | 20.8% | 21.1% | 24.4% | 15.7% | 38.8% |
| Continuing education credits | *p*=.920 | 11.1% | 11.3% | 12.8% | 15.7% | 10.2% |
| Classes/seminars offered through my school district | *p*=.110 | 38.9% | 25.4% | 46.2% | 37.3% | 42.9% |
| Peer teacher | *p*=.019 | 41.7% | 33.8% | 57.7% | 39.2% | 32.7% |
| Administration | *p*=.072 | 23.6% | 8.5% | 24.4% | 21.6% | 14.3% |
| Researched ideas on my own | *p*=.168 | 30.6% | 39.4% | 29.5% | 47.1% | 28.6% |
| Do you experience any barriers to offering classroom PA breaks? | *p*=.016 | | | | | |
| Yes | | 36.1% | 31.0% | 32.1% | 27.5% | 18.4% |

**Table 4.** *Differences Between School Districts*

The majority of teachers included classroom PA that consisted of PA only (79.9%, e.g., marching in place) and PA incorporated into academic concepts (73.7%). Of all the academic subjects, teachers felt most comfortable incorporating PA into mathematics (72.7%). There was a significant difference between districts for teachers who were comfortable including PA breaks into the academic subject of reading ($p$=.003). In the Small school district (67.3%) and the Large district (63.9%) teachers were more comfortable than teachers in Medium A (40.8%) or Medium C (41.2%). Of the 66.5% of teachers who reported using a specific program, almost all of them used GoNoodle (97.5%), a website with a variety of classroom PA videos. Finally, 88.3% of teachers stated they participated in classroom PA with their students.

When participants were asked how often they collaborated with other teachers to discuss classroom PA, a little over a quarter of respondents (27.6%) reported they collaborated with their colleagues regarding classroom PA once a month (Table 5). Approximately a quarter of teachers (27%) reported they never collaborated with their colleagues about classroom PA. There was a significant difference between school districts on the number of times teachers collaborated with their colleagues ($p$<.005) (Table 4). Medium B had the highest percentage of teachers who collaborated once a month (39.7%) while Medium A had the lowest percentage (18.3%). Relatedly, Medium A had a higher percentage of teachers who reported they never discussed classroom PA with other teachers (36.6%) compared to Medium B (10.3%).

Teachers also answered questions related to where they learned about classroom PA. The top responses included from a peer teacher (44.7%), in classes or seminars offered through their school district (40.5%), and through independently researched ideas (36.8%). When examining differences between districts for each reason, the only reason that was significantly different was by learning from a peer teacher ($p$=.019). Medium B district had the highest percentage of teachers (57.7%) in this category.

A third of teachers who stated they implemented classroom PA, experienced barriers to implementation (32.9%) (Table 5). There was a significant difference between districts in the percentage of teachers who reported barriers ($p$=.016). The Large district had the highest percentage of teachers who reported barriers (36.1%) and the Small school district had the lowest percentage of teachers who reported barriers (18.4%). The largest barrier for both teachers who did and did not implement classroom PA was a lack of time (70.2%). The other top barriers were issues with behavior management (26.0%) and miscellaneous barriers such as lack of training or administrative support (45%). Almost all teachers (97.6%) indicated they would integrate more PA if they could overcome these barriers.

**Table 5.** *Knowledge and Capacity of Classroom PA*

| Questions | *n* | % |
|---|---|---|
| How often do you collaborate with other teachers to discuss physical activities that could be integrated into your classroom? | 304 | |
| Once a month | | 27.6 |
| Once a quarter | | 17.4 |
| Once a semester | | 14.5 |
| ≥ Once a year | | 13.4 |
| Never | | 27.0 |
| Where did you learn how to incorporate PA breaks or about the program you use? (Check all that apply) | 304 | |
| During your schooling for your bachelors | | 32.2 |
| During your schooling for your masters | | 25.0 |

| | | |
|---|---|---|
| Continuing education credits | | 12.8 |
| Classes/Seminars offered through my school district | | 40.5 |
| Peer teacher | | 44.7 |
| Administration | | 19.7 |
| Researched ideas on my own | | 36.8 |
| Other | | 8.8 |
| Do you experience any barriers to offering classroom PA breaks? | 301 | |
| Yes | | 32.9 |
| No | | 67.1 |

**Table 5 (Cont.).** *Knowledge and Capacity of Classroom PA*

| Questions | *n* | % |
|---|---|---|
| What barriers prevent you from offering PA breaks in your classroom? (Check all that apply) | 131 | |
| There is not enough class time (or time in the day) | | 70.2 |
| I have not had enough training OR I am not trained to integrate PA with other subjects | | 11.5 |
| My students would not be interested | | 4.6 |
| I do not have enough resources | | 5.3 |
| I think I will OR have had issues with behavior management | | 26.0 |
| My administration does not support me | | 6.1 |
| Other | | 17.5 |
| Would you be willing to integrate more PA breaks if you did not have or could overcome these barriers? | 125 | |
| Yes | | 97.6 |
| No | | 2.4 |

*Future Capacity for Classroom PA*

A majority of teachers were interested in learning more about classroom PA (75%) (Table 7). Teachers were interested in learning about classroom PA from a physical educator within their school (36.6%), a teacher within their school (35.7%), a national expert (32.9%), and/or a PA expert (32.3%). There was one significant difference between districts regarding who would prefer to learn from a PE teacher within their school. A higher percentage of teachers from Medium B (53.8%) compared to Medium C (23.5%) wanted to learn from a PE teacher within their school (Table 7). The method teachers preferred to learn about classroom PA were a training offered at their school (66.5%) or short videos e-mailed to them or available on a website (41.8%). There were significant differences between districts regarding teachers' preferred method to learn about classroom PA (Table 7). The results indicated that there was a significant difference between teachers' preferences for a training to be offered at their school, yet having a training offered within their school was still teachers' first preference for training across all districts. In Medium C though a training offered at their school and training videos offered online had similar high response rates (60.8%, 58.8% respectively).

**Table 6.** *Future Capacity for Classroom PA Breaks*

| Questions | *n* | % |
|---|---|---|
| Are you interested in learning more about classroom PA breaks? | 296 | |
| Yes | | 75.0 |
| No | | 25.0 |
| Who would you be the most interested in learning about classroom PA breaks from? | 328 | |
| Physical educator at your school | | 36.6 |
| Physical educator within your district | | 15.5 |
| Physical educator from another district | | 8.8 |
| PA expert | | 32.3 |
| Teacher within your school | | 35.7 |
| Teacher within your district | | 22.8 |

| | | |
|---|---|---|
| Teacher from another district | | 13.7 |
| National expert | | 32.9 |
| Other | | 5.8 |
| Where would be the most effective place for you to learn about classroom PA breaks? | 328 | |
| Training offered at your school | | 66.5 |
| Training offered through your district | | 33.2 |
| School website | | 12.2 |
| District website | | 12.2 |
| Community website | | 8.2 |
| Short online training videos e-mailed to you or available on a website | | 41.8 |

**Table 7.** *Future Capacity Differences between Districts*

| Question | Probability | Large | Medium A | Medium B | Medium C | Small |
|---|---|---|---|---|---|---|
| Who would you like to learn about classroom PA from? (check all that apply) | | | | | | |
| PE Teacher at your school | p=.011 | 31.9% | 41.1% | 53.8% | 23.5% | 26.5% |
| PE Teacher from your district | p=.123 | 12.5% | 19.2% | 20.5% | 9.8% | 14.3% |
| PE Teacher another district | p=.299 | 6.9% | 8.2% | 14.1% | 7.8% | 6.1% |
| PA expert | p=.003 | 22.2% | 34.2% | 41.0% | 31.4% | 34.7% |
| Teacher within your school | p=.000 | 45.8% | 31.5% | 42.3% | 21.6% | 34.7% |
| Teacher within your district | p=.011 | 23.6% | 16.4% | 33.3% | 17.6% | 22.4% |
| Teacher from another district | p=.558 | 13.9% | 9.6% | 16.7% | 11.8% | 16.3% |
| National expert | p=.003 | 37.5% | 35.6% | 23.1% | 41.2% | 32.7% |
| Where would you like to learn about classroom PA? (check all that apply) | | | | | | |
| Training offered through your district | p<.001 | 27.8% | 43.8% | 37.2% | 17.6% | 38.8% |
| Training offered at your school | p<.001 | 77.8% | 61.6% | 70.5% | 60.8% | 63.3% |
| School website | p=.006 | 18.1% | 4.1% | 9.0% | 11.8% | 22.4% |
| District website | p=.457 | 11.1% | 13.7% | 10.3% | 7.8% | 18.4% |
| Community website | p=.067 | 9.7% | 6.8% | 2.6% | 15.7% | 10.2% |
| Short online training videos e-mailed or available on a website | p<.001 | 30.6% | 39.7% | 44.9% | 58.8% | 42.9% |

## Discussion

The primary purpose of this study was to determine teachers' zone of proximal development by assessing teachers' knowledge and capacity for implementing classroom PA breaks across multiple school districts. A secondary purpose was to examine if teachers' knowledge and capacity for implementing classroom PA breaks differed by size of school district. This study found that within this sample, a majority of teachers implemented classroom PA; however, there were several key differences between districts. These results suggest that while many teachers currently implement classroom PA, the zone of proximal development for classroom PA may differ by district. These differences impact the potential implementation, barriers, and support teachers need to increase the use of classroom PA strategies.

Overall, nearly all of the teachers who participated in the study thought classroom PA was important and implemented some type of classroom PA (Kibbe et al., 2010). In this study however the number of days per week as well as times per day varied by school district. The

largest difference was found between two medium-sized school districts. Interestingly, the district with the greater percentage of teachers who implemented classroom PA five days per week (66.7%) also reported a greater percentage of teachers who collaborated to discuss classroom PA once a month (39.7%). Similarly, a study by Naylor and colleagues (2006) identified providing teachers with time to prepare to implement PA as a key factor to improving the use of PA throughout the school day.

The fact that one of the medium-sized school districts had a significantly higher amount of collaboration is important since previous research has suggested close interpersonal relationships in smaller districts can be a factor in effective professional development (Gilford, 1996; Gruber et al., 2002; Mohr, 2000). Future research studies could investigate how to encourage collaborative relationships to promote the use of classroom PA breaks regardless of district size.

Overall these findings align with Vygotsky's Zone of Proximal Development theory. This study provides preliminary evidence that simply encouraging teachers to discuss classroom PA with their "capable" peers and/or providing them with time to do so may be an important factor to increasing the number of days teachers utilize classroom PA, however more research is needed.

A majority of teachers implemented classroom PA because their students' behavior improved when they did so. This is important for researchers, educators, and practitioners to understand when promoting the use of classroom PA to other teachers. This is especially notable since other researchers have suggested teachers preferred classroom PA breaks connected to academic content which may indicate they were more interested in the improvements in academic outcomes (McMullen, Kulinna, & Cothran, 2014). Another study by Cothran and colleagues (2010) found teachers may be aware of the need for PA but were not able to articulate how PA and learning were related. In this study fewer teachers were concerned about the academic benefits. Future professional development efforts should build on teachers' current knowledge of the importance of classroom PA and ensure teachers are aware of all of the potential benefits including behavioral, physical, and cognitive improvements for students to help teachers advance their classroom PA skills.

While a majority of teachers incorporated PA into the classroom through varied options, there was a significant difference between districts in teachers' confidence for incorporating PA into the subject of reading. It is important to note that each school district adopts a reading curriculum based on the needs of their district. More research is needed to determine if specific reading curriculums are more adaptable to PA while others may be more prescriptive in nature which could make the incorporation of PA more difficult.

Consistent with other research, many teachers reported barriers to incorporating PA into the classroom including time as the most frequently reported barrier (Cothran et al., 2010; Gately et al., 2013; Webster et al., 2015). There were differences between districts, the largest being between the Large and Small districts. Although teacher autonomy is not necessarily a function of a large or small school district, additional research studies related to teacher and building level autonomy could lead to important findings about how teachers structure time in their individual classrooms. These potential findings could add to existing literature on the importance of a supportive school environment and help inform researchers, educators, and practitioners on how best to encourage teachers to implement classroom PA (McMullen et al., 2014; Naylor et al., 2006; Webster et al., 2015).

Despite how much teachers already used classroom PA and any barriers, a majority were interested in learning more about classroom PA and felt they had the capacity to integrate more PA if they could overcome their barriers. However, the preferred method of delivery for professional development varied by district. These differences may reflect the districts

approach to professional development. While some districts may rely on professional learning community models which promote collaboration between colleagues within a school, others may rely on professional development models based primarily on introducing outside resources and expertise into schools. Future research studies could examine the districts' current delivery of professional development in comparison with teachers preferred learning methods to determine the most effective delivery format.

Interestingly while most of the teachers reported implementing classroom PA and thought PA was important, a majority were not regularly physically active (30 minutes/day five days/week). This is despite a majority stating they participated in PA with the students. Other research in PE suggests that more active PE teachers utilized more physical fitness activities whereas low active PE teachers were more apt to simply promote physical fitness (McKenzie, LaMaster, Sallis, & Marshall, 1999). Potentially classroom teachers who actively participate in classroom PA may encourage more participation by their students; however more research is needed. Regardless of the impact on student PA, considering the cognitive and physical benefits of PA and the high stress levels of teachers, schools could consider promoting classroom PA as a benefit to teachers' wellness through an employee wellness program (Bogaert, De Martelaer, Deforche, Clarys, & Zinzen, 2014).

Although this study had many strengths, there were limitations to this study. First, the response rate varied greatly in each district (17.4%-46.5%). Given the title of the study and that the e-mail informing teachers about the survey contained the words "physical activity" potentially only those teachers who were interested in the subject completed the survey. Thus, this may not be an accurate representation of the number of teachers who implement classroom PA. Second, the length of the survey was short, a longer survey may have provided more in-depth information. However, based on feedback from the community and school districts this was the preferred length that would 1) ensure districts' did not feel the survey was a burden for teachers, and 2) encourage more teachers to complete the survey. A strength of this study is that it is the first study to examine differences in implementation of classroom PA breaks across five diverse school districts. Additionally, even though the response rate was low in several districts, the minimum sample size needed was reached in all districts.

## Conclusions

Importantly, Vygotsky's Zone of Proximal Development theory served to be a viable theory to view teachers' current knowledge and capacity for classroom PA breaks in order to advance their skills. There are both opportunities and challenges to increase the overall PA of children through the implementation of classroom PA breaks. In terms of the knowledge of teachers, there seems to be a tremendous opportunity to capitalize on teachers' positive perceptions of classroom PA breaks as well as their already existing knowledge and implementation of classroom PA breaks. Most teachers identified a capacity to learn more about implementing additional PA into their instruction. For those advocating to increase PA in children and promoting healthy lifestyles for children (physically, cognitively, and emotionally), these findings indicate great potential. Researchers, educators, and practitioners should seize teachers' positive perceptions and interest as an opportunity to partner with school districts to implement sound PA with effective teaching pedagogy. Further, given the number of respondents who stated they already incorporated classroom PA breaks, it is evident there are already a large number of teachers who could be deemed "experts" and could be called upon to help other teachers mitigate the difficulty of learning this "new" instructional strategy.

However barriers to classroom PA breaks will limit the use of PA and the subsequent health benefits to children unless current implementation practices are changed. The challenge for

educational professionals is to shift the implementation of classroom PA beyond sporadic use by isolated teachers and schools to a more systematic and consistent delivery across classrooms and throughout districts. To do so, PA organizations and school districts must work together to remove both the individual and organizational barriers to classroom PA breaks Additionally, those who design classroom PA resources must be sensitive to the time demands of the school day. Teachers in this study provided a strong and consistent message. Classroom PA breaks must be brief and require minimal instructional time or be able to be incorporated into academic curriculum.

Additional questions for future research studies should focus on how to build teachers' capacity in implementing classroom PA breaks. Specifically, collaboration and subject area confidence may be factors related to capacity.

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**References**

Ancess, J. (1997). Urban dreamcatchers: Launching and leading new small schools. New York: National Center for Restructuring Education, Schools, and Teaching (NCREST). Teachers College Press, Columbia University.

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

Bassett, D.R., Fitzhugh, E.C., Heath, G.W., Erwin, P.C., Frederick, G.M., Wolff, D.L., … Stout, A.B. (2013). Estimated energy expenditurs for school-based policies and active living. *American Journal of Preventative Medicine, 44*(2), 108-113.

Biddle, S.J., & Asare, M. (2011). Physical activity and mental health in children and adolescents: A review of reviews. *British Journal of Sports Medicine, 45*(11), 886-95.

Bogaert, I., De Martelaer, K., Deforche, B., Clarys, P., & Zinzen, E. (2014). Associations between different types of physical activity and teachers' perceived mental, physical, and work-related health. *BMC Public Health, 14,* 534.

Carlson, J.A., Engelberg, J.K., Cain, K.L., Conway, T.L., Mignano, A.M., Bonilla, A., … Sallis, J.F. (2015). Implementing classroom physical activity breaks: Associations with student physical activity and classroom behavior. *Preventative Medicine, 81,* 67-72.

Centers for Disease Control and Prevention. (2006). *School health policies and programs study*. Atlanta, GA: Retrieved from: http://files.eric.ed.gov/fulltext/ED498697.pdf

Center for Disease Control and Prevention. (2011). *Childhood obesity facts.* Atlanta, GA: Retrieved from: http://www.cdc.gov/healthyyouth/obesity/facts.htm

Centers for Disease Control and Prevention. (2015). *Physical education profiles, 2012: physical education and physical activity practices and policies among secondary schools at select U.S.*

*sites.* Atlanta, GA: Retrieved from: http://www.cdc.gov/healthyschools/physicalactivity/pdf/PE_Profile_Book_2014.pdf

Chriqui, J.F., Schneider, L., Chaloupka, F.J., Gourdet, C., Bruursema, A., Ide, K., & Pugach, O. (2010). *School district wellness policies: Evaluating progress and potential for improving children's health three years after the federal mandate. School years 2006-07 through 2010-2011.* Volume 3. Chicago, IL: Bridging the Gap Program, Health Policy Center, Institute for Health Research and Policy, University of Illinois at Chicage, 2013, www.bridging the gapresearch.org.

Cothran, D.J., Kulinna, P.H., & Garn, A.C. (2010). Classroom teachers and physical activity integration. *Teaching and Teacher Education, 26*(7), 1381-1388.

Donnelly, J.E., Greene, J.L., Gibson, C.A., Smith, B.K., Washburn, R.A., Sullivan, D.K., … Willaims, 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. *Preventative Medicine, 49*(4), 336-341.

Dunn, L.L., Venturanza, J.A., Walsh, R.J., & Nonas, C.A. (2010). An observational evaluation of move-to-improve, a classroom-based physical activity program, New York City Schools, 2010. *Preventing Chronic Disease, 9,* 146.

Elliot, E., Erwin, H., Hall, T., & Heidorn, B. (2013). Comprehensive school physical activity orograms: helping all students achieve 60 minutes of physical activity each day. *Journal of Physical Education, Recreation & Dance*, *84*(9), 9.

Erwin, H., Fedewa, A., & Ahn, S. (2013). Student academic performance outcomes of a classroom physical activity intervention: A pilot study. *International Electronic Journal of Elementary Education, 5(*2), 109-124.

Gately, P., Curtis C., Hardaker, R., McBride, N., McKay, M., Sumnall, H., & Evans, D. (2013). An evaluation in UK schools of a classroom-based physical activity programme - TAKE 10!: A qualitative analysis of the teachers perspective. *Education and Health*, *31*(4), 72-78.

Gilford, D. (1996). Measures of Inservice Professional Development: Suggested Items for the 1998–99 Schools and Staffing Survey (NCES 96-25). U.S. Department of Education. Washington, DC: National Center for Education Statistics Working Paper.

Gruber, K.J., Wiley, S.D., Broughman, S.P., Strizek, G.A., & Burian-Fitzgerald, M. (2002). Schools and Staff Survey, 1999–2000: Overview of the Data for Public, Private, Public References 80 Charter, and Bureau of Indian Affairs Elementary and Secondary Schools (NCES 2002-313). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office

Institute of Medicine. (2005). *Preventing childhood obesity: health in the balance.* Washington, DC: The National Academies Press.

Kibbe, D.L., Hackett, J., Hurley, M., McFarland, A., Schubert, K.G., Schultz, A., & Harris, S. (2010). Ten years of TAKE 10!: integrating physical activity with academic concepts in elementary school classrooms. *Preventative Medicine, 52*(Suppl 1), S43-50.

Mahar, M.T. (2011). Impact of short bouts of physical activity on attention-to-task in elementary school children. *Preventative Medicine, 52*(Suppl 1), S60-64.

Meier, D. (2002). Just let us be: The genesis of a small public school. *Educational Leadership*, *59*(5), 76-79.

McKenzie, T.L., LaMaster, K.J., Sallis, J.F., & Marshall, S.J. (1999). Classroom teachers' leisure physical activity and their conduct of physical education. *Journal of Teaching Physical Education, 19*(1), 126-132.

McMullen, J., Kulinna, P., & Cothran, D. (2014). Physical activity opportunities during the school day: classroom teachers' perceptions of using activity breaks in the classroom. *Journal of Teaching Physical Education, 33*(4), 511-527.

Mohr, N. (2000). Small schools are not miniature large schools. Potential pitfalls and implications for leadership. In W. Ayers, M. Klonsky, and G. Lyon (Eds.), *A simple justice: The challenge of small schools* (pp. 139-158). New York: Teachers College Press.

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 Science and Medicine in Sport, 9*(5), 413-423.

Parks, M., Solomon, M., & Lee, A. (2007). Understanding classrom teachers' perceptions of integrating physical activity: a collective efficacy perspective. *Journal of Research in Childhood Education, 21*(3), 316-328.

Peterson, K.E., & Fox, M.K. (2007). Addressing the epidemic of childhood obesity through school-based interventions: what has been done and where do we go from here? *Journal of Law, Medicine & Ethics, 35*(1), 113-30.

Troiano, R.P., Berrigan, D., Dodd, K.W., Masse, L.C., Tilert, T., & Mcdowell, M. (2008) Physical activity in the United States measured by accelerometer. *Medicine & Science in Sports & Exercise, 40*(1), 181-188.

U.S. Department of Health and Human Services. (2008). *Physical activity guidelines for Americans.* Washington, DC: Author.

Webster, C.A., Russ, L., Vazou, S., Goh, T.L., & Erwin, H. (2015). Integrating movement in academic classrooms: understanding, applying and advancing the knowledge base. *Obesity Reviews, 16*(8), 691-701.

Vander Ark, T. (2002). The case for small high schools. *Educational Leadership, 59*(5), 55-59.

Vygotsky, L.S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

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