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Examining Classroom Physical Activity Integration: A Mixed Methods Analysis

The 2008 *Physical Activity Guidelines for Americans* suggest that children receive at least 60 minutes of daily physical activity (PA) (U.S. Department of Health & Human Services, 2008). Contrary to these guidelines, current research indicates an upward trend in children's sedentary behaviors. Approximately one-fourth of children in the United States do not meet the recommended daily guidelines for PA (Hellmich, 2018). It is estimated that children spend up to seven hours a day in sedentary activities in and out of school (Rideout, Foehr, & Roberts, 2010). These sedentary behaviors are associated with negative outcomes for children in the school setting, inclusive of poor behavior and academic achievement. Conversely, studies indicate a positive correlation between behavior, academic performance and increased PA levels throughout the school day (Donnelly, Hillman, & Castelli, 2016).

The Changing Role of Schools

For over a century, schools in the United States have been at the forefront of providing PA for children through physical education (Wuest & Bucher, 1999). However, alarming health trends have changed the way that schools are viewed in promoting PA. An increased awareness of childhood obesity has shifted the discussion to when and where children should receive the majority of their PA. Even though schools should not be the only place children receive PA, Sidentop (2009) noted that without schools' support, the trajectory of childhood obesity will not change.

Classroom Physical Activity Integration

Several studies have emerged that provide insight into the benefits of classroom physical activity integration. Two of the most

comprehensive programs are Child and Adolescent Trial for Cardiovascular Health (CATCH) and Take 10! CATCH was developed during the 1980's to improve both PA and diet in children. As a longitudinal school-based intervention, CATCH took place in California, Louisiana, Minnesota, and Texas. The effects of health behavior interventions in the cafeteria, physical education class, and classroom on 3,714 elementary school children were examined. Over a three-year period, positive changes in dietary behaviors for the experimental group were identified and moderate-to-vigorous physical activity (MVPA) levels significantly increased (Nader *et al.*, 1999).

Take 10! is another PA integration program that began in 1999. The concept of Take 10! is to provide physically active lessons for teachers that facilitate 10 minutes of MVPA for children. One Take 10! study examined third-grade students and revealed that students who participated had 13% higher PA levels compared to a control group (Kibbe *at al.*, 2009). While these programs offer viable options for PA integration, they lack sustainability to create systemic change in children's PA at school.

Comprehensive School Physical Activity Programs

Even though PA intervention studies have been conducted at the school level, the need for comprehensive school PA programs has become a recurring theme when addressing childhood obesity. Thus, the Centers for Disease Control and Prevention (CDC) and SHAPE America collaborated to develop a step-by-step guide to implementing comprehensive school PA programs (CSPAP) (CDC, 2013). The underlying goal of CSPAP is to provide children with a variety of PA at school to meet the recommended

60 minutes of daily PA. Additionally, CSPAP aims to promote collaboration amongst its components to build and enhance skills that children learn during physical education. While the message that CSPAP embodies is one that encourages collaboration, most CSPAP plans have not been successful. This has been attributed to factors such as lack of knowledge, and skill set among classroom teachers (McKenzie & Lounsbery, 2013).

The Role of Teacher Preparation: A Wellness and Physical Activity Endorsement

While SHAPE America and the CDC provide professional development on CSPAP, the academic mandates placed on teachers leave them with an extremely heavy workload. Therefore, it is imperative for teacher preparation programs to rethink their role in developing classroom teachers who are prepared to teach academic content while effectively promoting the development of children's health through increased PA integration.

To address the above concern, a teaching endorsement for elementary education majors in wellness and PA was developed, approved by the State's Department of Education and implemented in 2015. It is currently offered at a University in the Southeastern United States to elementary education majors. The endorsement was designed to train future educators who will effectively create and implement curricula, integrating academic content and PA into the whole school environment.

To evaluate this endorsement program, the current study examined the PA levels of third-grade students (experimental group) whose teacher graduated from the endorsement program in 2017. Physical activity levels of the experimental group were then compared to a control class who did not receive daily PA integration. This study also investigated the teacher's experiences with PA integration. The following research questions guided this study:

1. Does PA integration increase the daily PA levels of third grade students compared to students who do not participate in PA integration?
2. What are the experiences and perspectives of a teacher who integrates daily PA?

Methods

This study utilized a mixed methods embedded experimental design wherein one data set played a supplemental role in the study based primarily on other data (Caracelli & Greene, 1997; Creswell, Plano Clark, Gutmann, & Hanson, 2003). Data were collected via pedometers to obtain students' step counts for six weeks (October 2017-November 2017).

Qualitative data were collected after implementation of the pedometers from a semi-structured teacher interview to help better explain the quantitative findings.

Participants

The present study consisted of an experimental group that included a third-grade class (aged 8-9 years) in Northwest Mississippi. Participants received daily PA integration for five hours each day over a period of six weeks. The control group was a third-grade class in Northwest Mississippi that did not receive PA integration for six weeks. Ten females and 11 males made up the experimental class. Ethnicities included 24% White, 38% Black, and 38% Hispanic. There were 9 females and 7 males in the control group. Ethnicities were 75% White, 13% Black, and 11% Hispanic. Both teachers had a state teaching license and while the experimental teacher had a teaching endorsement in wellness and PA the control teacher did not.

Measures

The credibility of output from pedometers utilized during research and practice has recently increased as a way to approximate daily ambulatory PA (Tudor-Locke, Hatano, Pangrazi, & Kang, 2008). The pedometer used during this study was a Pocket 3D Pedometer with Tri-Axis Technology. Its 3D digital accelerometer sensor provides superior accuracy by filtering out vibrations and only counting after it detects a sequence of continuous steps. These details were imperative to obtaining accurate and valid step count data.

Each parent, in both the experimental and control group, consented to their child wearing a pedometer for six weeks. Step counts were tracked daily on a "Counting My Steps" worksheet by each student who participated in the study (see Appendix A). The five hours students

wore pedometers represented approximately 21% of each student's 24-hour day. Tudor-Locke, Hatano, Pangrazi, & Kang (2008) note that a level of >17,500 steps for male children or >14,500 for female children is considered highly active. Thus, to be considered highly active during the five hours students wore pedometers, males had to obtain 3,500 steps and females had to obtain 2,900 steps.

An interview with the experimental teacher was conducted after pedometer data were collected to further explain the quantitative findings. A semi-structured approach was employed and an 'interview guide' was developed that included both open-ended and theoretically driven questions (Galleta, 2013). A schematic delivery of questions was presented to the participant during the interview wherein an ethnographic questioning cycle was utilized to develop questions that capitalized on the teacher's cultural and personal vocabulary (Spradley, 1979).

Data Analysis

Means and standard deviations for each class' weekly step counts were determined first followed by the daily average step count. SPSS statistical software was utilized to analyze the data. An independent *t*-test was conducted to determine if the difference between the average daily step count of the experimental and control group were significant. The effect size (Cohen's *d*) was also calculated to determine if the results were meaningful as indicated by significance.

The teacher interview was audiotaped with verbal and written consent. Photographs were also taken during the teacher's lessons as artifacts to supplement the interview data. After audiotaping occurred, the interview was transcribed. Analysis of the transcript included several steps. The first step was to read through the transcript in its entirety. Next, the interview was coded starting with broad themes and concepts and then narrowed down into smaller units. This method of unitization was defined by Lincoln and Guba (1985) as the breaking down of parts into smaller meaningful pieces. After unitization occurred, the pieces were then developed into thematic categories to represent the emerging themes that helped explain the study's quantitative data. When no new themes emerged, it was assumed that the data had met

the saturation point and final themes were identified (Glasser & Strauss, 1967).

Results

Step Counts

Data from the experimental group revealed that students averaged 3,252 steps per day. Highly active is considered 2,900 steps for females and 3,500 steps for males (Tudor-Locke, Hatano, Pangrazi, & Kang, 2008). Thus, the experimental groups' step count data were *highly active*. Students in the control group averaged 2,626 steps per day, which indicated a *moderately active* range. Results of the independent unpaired *t*-test indicated that the daily average step counts differed between the experimental class ($M = 3252.29$, $SD = 716.46$, $n = 21$) and the control class ($M = 2626.31$, $SD = 883.52$, $n = 16$) at the .05 level of significance ($t = 2.38$, $df = 35$, $p < .05$, 95% CI for mean difference 92.17 to 1159.78) (see Appendix B; Table 1). To measure effect size, Cohen's *d* was also calculated. Data revealed that $d = .78$, indicating a large effect size.

Teacher Interview

An interview was also conducted to help explain the quantitative findings by analyzing the experimental teacher's perceptions and experiences with PA integration. Three themes emerged during data analysis and were identified as most prominent to the discussion of PA integration: (1) students' positive affect, (2) varying physical activity, and (3) lack of planning time.

Positive affect

What is known from research is that positive affect can have a substantial impact on behavioral and academic motivation. To foster discussion about students' feelings regarding pedometers and PA integration in the classroom, the teacher was asked about students' reactions to wearing pedometers and PA integration. The teacher responded as follows:

I had a couple that it was a really good tool for their academic behavior because they liked wearing them. I couldn't forget them because they would remind me and I had a student that was her job every morning. At 7:35 a.m. she would pass them out and at 7:45 a.m. I would make the announcement "Okay it's time to press and hold the reset button, put them on, if you need help let me know, and that was it."

In addition to positive affect, the teacher also noted that some students showed an interest in PA integration and pedometer outcomes. Below is one story shared by the teacher:

One of my little girls...it's been very challenging getting her motivated...but something clicked between the two of us...all of a sudden there was this motivation from somewhere that was great! And she eventually saw the physical activity and pedometers as you know, "I wish I had brought my form back to do that." Like I see that it's important to you and it's cool to do physical activity. So, I did end up letting her wear the pedometer -- after speaking with her mom -- for a few days, but we didn't track anything. You could tell she really enjoyed doing the physical activity and getting to see the results on the pedometer.

The teacher noted that most students were intrinsically motivated by PA. However, some of the interview data revealed that students enjoyed the instant extrinsic gratification the pedometers provided. While evidence suggests that pedometers are a motivational tool for increasing PA in children, the teacher stated that students were only intrigued by looking at their pedometers for about a week. Thereafter, the teacher noted that PA "seemed to just become part of what we did each day."

Varying physical activity

The experimental teacher planned a variety of PA integration for students to participate in throughout the study. The teacher noted "I wanted to create a motivational setting for my students to participate in" by changing the types of PA used during the day. Below, the teacher described some of the different types of PA that were incorporated during the study:

Interviewer: What are some ways you incorporated physical activity?

Teacher: So, we started with an additional recess period. We were doing a brain break between writing and math, but now we have recess, so that is our brain break. Typically after morning meeting, we do a get up and get moving to wake up, because a lot of them come in and they're just so tired! I am slowly working to integrate within the lessons. Whether it be something as simple as one center they're moving around the room or we are utilizing classroom objects to determine area and perimeter.

Interviewer: Yeah, I noticed they enjoyed moving around during math centers.

Teacher: I am looking at trying to do some integration during recess with health and physical activity. They are calling it a health and wellness break and if they are going to call it a health and wellness break it needs to have some focus.

Interviewer: Yes! That's a prime opportunity for health and physical activity integration.

Lack of time

Even though this study elicited many positive outcomes, one of the themes that emerged during the interview was a lack of planning time. Despite prior pre-service coursework on wellness and PA integration, the teacher found it challenging to "keep up with the integration" due to daily academic mandates. Therefore, the teacher chose to primarily focus on integrating PA during mathematics as noted below:

I feel like I'm trying to get everything lined up and there are so many different things in the short amount of instruction and center time that is provided. So, I am trying to get that nailed down and it's like I get something figured out for physical activity integration and then we move on to the next area in math. For me, reading is a struggle to integrate, mainly because there are so many things mandated that there isn't much wiggle room. So, that is why I have focused on math and my administration supports my integration. Getting the movement integrated within the centers in addition to the daily breaks and morning wake up is totally worth it! I know the kids love it and succeed when I integrate physical activity. I whole-heartedly believe in it and I am making it work!

As noted in the interview, utilizing PA during academic time is essential to student success. However, the pressure of academic mandates compounded by a lack of planning time presents an issue that has to be addressed when integrating PA. While the teacher did perceive integration as feasible during mathematics, step counts may have been higher if more time for planning was allocated or integrated into other academic areas.

Discussion

A natural interpretation of the pedometry is that a change in approach at school can produce important differences in children's activity levels. This result demonstrates the unrivalled potential of schools to increase children's PA levels and slow or reverse the impending childhood obesity

epidemic. However, a systemic shift to comprehensive school PA programs across the United States has not yet occurred. One reason, as indicated by this study's findings is increased academic mandates and paucity of planning time. Moreover, teachers are under a substantial amount of pressure to increase academic achievement and without PA integration training, they may lack the efficacy to connect PA to the curriculum effectively. Therefore, classroom interventions to improve children's health are left unattended, as the focus remains steadfast on academic content. Despite a lack of focus on children's health by schools, this study revealed that a teacher with an endorsement in wellness and physical activity felt much more prepared to integrate PA and knew the benefits for her students. Support of administration and pre-service coursework were critical to both the teacher's success and thus students' increased PA. Subsequently, this study adds to the scope of literature revealing the positive benefits of training pre-service teachers on PA integration and the positive effect it can have on the health of our future generation.

While findings of the present study were significant, it is not without limitations, which included a small sample size of participants. Although it can be asserted that there was a correlation between PA integration and children's PA levels in this study, the researcher acknowledges that utilizing a larger sample size within different geographical regions and with varying demographics would enable further generalizations. Data were also collected during a five-hour time period of instruction while students were in school. Future research may examine either a longer time frame during the school day or collect pedometer data 24 hours a day to address the notion that students who receive more PA opportunities in school may exercise less outside of school (Metcalf *et al.*, 2004).

While there are barriers to obtaining data for a longer duration, it may provide additional insight into the impact of PA integration during the school day.

Conclusion

Developing pre-service teachers who can effectively integrate PA into the school day, provides a platform for creating sustainable

physical activity for children. Outcomes of this study provide evidence to suggest that both PA integration and a teacher with pre-service training in wellness and PA may be able to foster higher levels of PA in his/her students during the school day compared to a teacher who is not trained in PA integration. Therefore, it is essential for teacher preparation programs to incorporate coursework that can develop the knowledge and skills for effective PA integration. By accomplishing this, it is the hope that a systemic change will transpire within education, leading to an improvement in the overall health of children across the United States.

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Appendix A

Counting My Steps

Name _____

Date _____

	Monday	Tuesday	Wednesday	Thursday	Friday	Weekly Totals
Week 1 Oct 2- 6						
Week 2 Oct 9-13						
Week 3 Oct 16-20						
Week 4 Oct 23-27						
Week 5 Oct 30-Nov 3						
Week 6 Nov 6-10						
Total Step Count- 6 weeks						

Figure 1. Graphic organizer utilized by students to self-report daily step counts.

Appendix B

Table 1

Results of Independent Unpaired t-test for Daily Average Pedometer Step Count.

	PA Integration			No PA Integration			95% CI for Mean Difference		
	M	SD	n	M	SD	n	t	df	
Step Count	3252.29	716.46	21	2626.31	883.52	16	92.17, 1159.78	2.38*	35

* $p < .05$, PA = Physical Activity