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REVIEW

USING PEDOMETERS IN ELEMENTARY PHYSICAL EDUCATION

Abstract

Identifying children's physical activity level can provide valuable information to change their lifestyles positively. Such inquiry may encourage people to be more physically active although physical activity is not only one factor to deal with health-related problems such as obesity. Such inquiry may also provide important implications for teachers who want to design physical activity programs where students' physical activity maximized. The purposes of this article are (1) to give a very brief information about physical activity/inactivity and pedometers, (2) to explain the importance of using pedometers in physical education classes, and, (3) to indicate important contributions of pedometer-based physical education.

Key Words: *Pedometer, physical education, physical activity, elementary school*

Introduction

Knowing that physical activity is a key factor in solving obesity problem, the purposes of this article are (1) to give a very brief information about physical activity/inactivity and pedometers, (2) to explain the importance of using pedometers in physical education classes, and, (3) to indicate important contributions of pedometer-based physical education.

Statistics show that physical inactivity itself has contributed to a 100% increase in the prevalence of childhood obesity in the U.S. since 1980 (CDC, 2006). Inactivity rates are especially higher among at-risk children, persons of low socio-economic levels, and persons with less education.

School physical education programs have been recognized as the most logical and practical environments to promote physical activity (Morgan, Pangrazi & Beighle, 2003). Time allocated for physical education at schools, however, fails to meet the recommendation that children and adolescents participate daily, in at least 60 minutes of moderately intense physical activity (Corbin & Pangrazi, 1998). Also, physical activity levels of children during physical education classes have declined significantly since 1991 (CDC, 2004). It is reported that 24.7% of children who participated in physical activity classes that did not make them sweat or breathe hard for at least 30 minutes on five or more of the past seven days in 2003 (CDC, 2004).

Identifying children's physical activity level can provide valuable information to change their lifestyles positively. Such inquiry may encourage people to be more physically active although physical activity is not only one factor to deal with health-related problems such as obesity. Such inquiry may also provide important implications for teachers who want to design physical activity programs where students' physical activity maximized.

Physical activity is one of the most important factors to reduce body fat percentage not only increase consumption of calorie intake but also increase basal metabolic rate. Therefore, focusing on an increase in physical activity level should be the main goal to reduce body fat percentage and to get optimal health benefits.

Since physical education classes are important factors related to the occurrence of obesity-related diseases, including type 2 diabetes and cardiovascular problems, to monitor the amount of activities can provide new arrangements for physical educators' lesson plans. Various techniques have been used to measure physical activity. The greater part of physical activity data have been collected using indirect methods including questionnaires or direct methods including accelerometers, heart rate monitors and pedometers. Among these methods, pedometers are relatively inexpensive and have reasonable reliability. Furthermore, pedometers provide immediate feedback to the user on the number of steps taken indicating how much they are active. Since pedometers have been found to be a valid and reliable way of measuring total daily activity (Tudor-Locke, Williams, Reis & Pluto, 2002), they were used to measure children's physical activity level in their school physical education classes.

How pedometers work?

A pedometer is a simple device used to measure the number of steps you take. In recent years, a wide variety of new electronic pedometers have been introduced to assess physical activity. Some pedometer models have a horizontal level arm that moves up and down in response to vertical displacement of the waist of the wearer. The lever arm opens and closes an electrical circuit with each step taken, and the number of steps is counted. Some pedometer models have a glass-enclosed magnetic reed proximity switch. The important thing to know is that there is a weighted pendulum (about 5 or 10 mm long) inside the pedometer which has to move. This indicates the pedometer works best when it is fitted the correct way up.



Figure 1. Children with pedometers

Pedometers, however, have design limits: (1) Pedometers measure the up-and-down motion of the hip in a vertical plane and would not distinguish frequency and velocity of movement. Therefore, some activities would be missed or underestimated (e.g., swimming, bicycling, or weight training), and (2) participants could also fool some pedometers into recording steps by shaking them.



Figure 2. Pedometers

Contributions of Pedometers in Physical Education Classes

One of the important contributions of pedometer-based physical education is that teachers can use pedometers to assess, promote, and teach physical activity in physical education, throughout school, and in before and after school time (Morgan, Pangrazi & Beighle, 2003). How can teachers use pedometers as an assessment tool? The great answer was given by Morgan, Pangrazi & Beighle (2003). According to these researchers, teachers should establish a baseline activity level for their students by averaging their step counts in three different categories: daily step counts, school step counts, and physical education step counts. For this purpose a four-day monitoring period will be enough. At the end of fourth day, teachers will find the average of the total step counts. Then, teachers can set a realistic goal physical activity level for their students, monitor their activity levels or encourage them to be more active.

Another important contribution of pedometer-based physical education is that children can monitor their own physical activity level by seeing the number of their steps. These taken steps can motivate children to increase their ambulatory physical activities. As a result, they can try to get best scores by doing more exercises.

The last important contribution of pedometer-based physical education is that it makes physical education fun. Enjoyable physical education classes are believed to be essential in promoting physical activity among children because these types of classes actively involve students in learning may help foster positive attitudes toward and encourage participation in physical education and physical activity (Ferguson et al., 1989).

How and what to teach?

First of all, as a teacher, you need to know how many pedometers are needed? What type of pedometer is suitable? Here is the answer: There should be one pedometer for each student in the class and the Yamax pedometer, manufactured in Japan, has been used mostly in both research studies and physical education settings because of their reliability and accuracy.

Then you need to decide what type of activities should be included in your physical education pedometer activities. Because pedometer measures the amount of step counts, the activities should include ambulatory activities (e.g., walking, running, basketball, football, and different types of aerobic games).

I generally prefer teaching physical education and sport concepts by using aerobic activities and dividing the class into three different stations. These provide children opportunities to engage in maximum amounts of enjoyable moderate-to-vigorous physical activity (MVPA), to form positive attitudes toward physical activity, and to learn how to live physically active and healthy lifestyles. To this end, I use adopted Coordinated Approach to Child Health (CATCH; Luepker et al., 1996) lessons. Originally titled The Child and Adolescent Trial for Cardiovascular Health, the CATCH is a program based on a school-based research study funded by the National Heart, Lung, and Blood Institute (NHLBI). A basic CATCH physical activity lesson is as follows: (1) warm-up: activity games such as count down or fast walk, (2) go fitness: it emphasizes fitness components associate with a health lifestyle such as cardiovascular efficiency, muscular strength, flexibility, wellness and nutrition. Frequent flier, steel abs challenges, bear tag are several examples, (3) go activity: it embraces the notion that children need to be exposed to a variety of movement possibilities. The goals are to create interest, improve skills, foster fair play, have fun, and encourage participation in physical activities. Volleyball, basketball, and soccer skills are several examples of go activity, (4) cool-down: it helps children's bodies return to a normal level. Examples include stretching and walking.

In this writing, my purpose is not give details about physical activities and games. My purpose is to indicate how physical education pedometer lesson plans can be in order to provide more benefits from pedometers' usage. You can see both example sport-focused and fitness-focused physical education pedometer lesson plans in the tables.

Table 1. Example of sport-focused physical education pedometer lesson plans for grades 3-6

Lessons	Station 1	Station 2	Station 3	Cool Down	Notes
1 st Lesson	Copy Cat (with Basketball) #19	Hoop it Up-Ball Handling Skills #371	Basketball Game	Stretching and walking	You can use soccer balls if there is not enough basketballs
2 nd Lesson	High 5 in the Middle with Basketball #9	I got Game-Dribbling Skills	Basketball Game	Stretching and walking	
3 rd Lesson	Georgia Brown Passing Challenges (Individual Passing) #375	Georgia Brown Passing Challenges (Shuttle Passing) #375	Basketball Game	Stretching and walking	
4 th Lesson	Freeze and Pivot #377	Random Grid Passing #380	Basketball Game	Stretching and walking	
5 th Lesson	Hoop Ball #382	Georgia Brown Passing Challenges (Shuttle Passing) #375	Basketball Game	Stretching and walking	
6 th Lesson	Four-Corner Drill #384	Count Down (with basketball) #12	Basketball Game	Stretching and walking	
7 th Lesson	Hoop Stations (use hoop task cards) #471	Pass Back Flying Disk #424	Basketball Game	Stretching and walking	
8 th Lesson	Hoop Stations (use hoop task cards) #471	Bull's eye Flying Disk #428	Basketball Game	Stretching and walking	
9 th Lesson	Pass and Follow Flying Disk #426	Shark Soccer #516	Mini Soccer Game	Stretching and walking	
10 th Lesson	Repair the Ozone Flying Disk #429	One-on-One Soccer #521	Mini Soccer Game	Stretching and walking	
11 th Lesson	High 5 in the middle with Soccer Ball #9	People Dodge With Soccer ball #276	Mini Soccer Game	Stretching and walking	
12 th Lesson	Stretch Routine #273	Hot Soccer Tamale #523	Mini Soccer Game	Stretching and walking	

Table 2. Example of fitness-focused physical education pedometer lesson plans for grades 3-6

Lessons	Station 1	Station 2	Station 3	Cool Down	Notes
1 st Lesson	Count Down Card #12 (Flexibility)	Steel Abs Card #235(Strength)	Whistle Fitness #17 (Cardio)	Stretching and walking	
2 nd Lesson	High Five in the Middle Card #9 (aerobic)	Pirate's Treasure #62 (Cardio)	Bear Tag / Crab Tag #237 (strength)	Stretching and walking	Tell students to bring empty cereal boxes for next class
3 rd Lesson	CATCH Cardio Course #44-55	Stretch-er-cise #281 (Flexibility)	Go-Slow-Whoa (Describe labels on products and talk about Food Pyramid)	Stretching and walking	Talk about Go-Slow and Whoa foods
4 th Lesson	Food Fat Tag #315 (Cardio)	Quick Draw Card #8 (Flexibility)	Dice-er-cise #242-243	Stretching and walking	5 dices are needed
5 th Lesson	Bears to the Honey Pot #239 (strength)	Flexibility Switcharoo #280 (Write a diagram)	Blob Tag #32 (Cardio)	Stretching and walking	
6 th Lesson	Copy Cat #19 (Cardio)	Stop & Drop #238 (Strength)	Glue & Stretch #277	Stretching and walking	
7 th Lesson	Count Down Card #12 (Flexibility)	Food Fat Tag #315 (Cardio)	Dice-er-cise #242-243	Stretching and walking	
8 th Lesson	CATCH Cardio Course #44-55	Bear Tag / Crab Tag #237 (strength)	Stretch-er-cise #281 (Flexibility)	Stretching and walking	

Note: “#” indicates card numbers in the CATCH activity box.

Conclusion

In conclusion, a pedometer is an excellent motivational tool for your students to measure objectively what is being done and what needs to be done to deal with health-related problems

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